



**AOE
and the
60mm
Mortar**

Captain Morton Orlov II

Our Army of Excellence (AOE) has a serious flaw at a critical point—organic fire support in its light infantry companies. The problem is two-fold—the lack of a dedicated fire direction center (FDC) and too few soldiers with which to man the mortar sections of our airborne, air assault, and light infantry divisions. The Army has gone astray in its efforts to properly organize and man these mortar sections, and it appears we have placed strategic mobility requirements and manpower constraints ahead of the combat imperatives of the modern battlefield.

The current mortar section of the units mentioned above has two M224 mortars and is organized into two three-man mortar squads. This organization, which resulted from a 1984 decision made at the highest levels, departs from our past mortar experience through the elimination of the FDC and the men necessary to run one, and the reduction of the mortar squad from five to three men. The absence of a dedicated FDC affects the tactical employment of the section, while the reduction of the mortar squad from five men to three men affects the physical ability of the section to do its job.

There are three reasons for these changes: The number of combat units in the Army has increased, while the Army's overall strength has not; light divisions have a 10,000-man ceiling to meet the strategic mobility requirement of 500 C-141 sorties; and some people believe that the M224 mortar is primarily a direct lay weapon and best used without a dedicated FDC. An in-depth discussion of the AOE force structure requirements and the strategic mobility requirement and concomitant manpower ceiling of the light division are beyond the scope of this article. Nonetheless, each in its own way has influenced the current structure of the mortar section.

The M2 60mm mortar was adopted in 1937 and served in our rifle companies throughout World War II. Historically, the 60mm mortar section was part of a weapons platoon led by a lieutenant. There were three mortar squads of five men each and a section headquarters, with a messenger and a section leader. The platoon headquarters consisted of two messengers, two drivers, a platoon sergeant, and a platoon leader. The platoon had two organic jeeps, one of which was used to transport the mortar section's equipment. Thus, the old organization had 17 men in the mortar section, three mortars, and a vehicle at platoon level to carry its equipment. The M19 mortar replaced the M2 after World War II, and was essentially an improved version of the M2.

The pentomic reorganization of the late 1950s replaced the M19 60mm mortar with the M29 81mm mortar. This change was made because it was felt the 60mm mortar did not have the range to operate on the anticipated "pentomic period" nuclear battlefield. In some units the weapons platoon was replaced by a mortar platoon, and under the ROAD (Reorganization Objective Army Division) reorganization of the early 1960s the 81mm mortar went to Vietnam with our rifle companies. The 81mm provided the needed range but weighed a great deal more than the 60mm and required vehicles to move it any distance. In fact, the Army's experience in Vietnam proved that the 81mm mortar was too heavy for most, if not all, company-level offensive operations. As a result, many line units obtained the old M19 or M2 60mm mortars and used them without an FDC. Although these 60mm mortars proved to be of great value, this was an ad hoc action that was never

officially recognized by any TOE changes.

As a result, after the Vietnam War ended, the Army began to develop the M224 60mm mortar. The idea was to replace the M29 81mm mortar with one that would weigh less than 45 pounds while retaining its range and lethality. The developers felt that a new mortar designed around these criteria would also improve the mortar platoon's mobility.

With the adoption of the AOE concept, the 81mm mortar, the mortar platoon organization, and the associated vehicles were removed from the rifle company. The 81mm mortar was replaced by the M224 60mm mortar, the platoon structure was replaced by a section structure, and the new organization called for no organic vehicles.

The critical difference between the organizations is the lack of a dedicated FDC, which drastically changes the new section's method of employment. Under the former H-edition TOE, the FDC consisted of three men: the section sergeant (chief computer), the fire direction computer, and the radio-telephone operator. Each man had a specific job related to either leading the section or controlling the mortars' fires. The mortars themselves were used mainly for indirect fire.

SMALL SECTION

Ironically, just when the Army had completed developing a new and improved 60mm mortar and its ammunition, it chose to match this improved technology with a structure that could not adequately exploit it—a small section with no dedicated FDC. In reality, the current mortar section organization in our light infantry divisions reflects the Vietnam era practice of using the M19 or M2 for direct lay or direct alignment fire.

The M224 should not be mistaken for the old M19, though, with its limited range and lethality. Because of its increased range and improved lethality, the M224 was meant to be a replacement for the M29 81mm mortar, and thus should be used with a dedicated FDC. If its new capabilities can be tied to the M23 mortar ballistic computer (MBC), there will be a tremendous improvement in the firepower effect, range, and speed of the mortar section's fire. It should be remembered that the M224 is the only weapon a rifle company commander has with which to influence a battle beyond 1,000 meters.

Unfortunately, according to FM 7-70, Light Infantry Platoon/Squad, the mortar section will "in the course of operations, (use) the direct lay and/or direct alignment methods (as) the primary methods of engagement." This change in doctrine seems to mean that the 60mm mortar section will train and fire without an FDC most of the time. Oddly, the J-edition TOE gives the mortar section two M19 plotting boards, and each section is currently receiving two MBCs, but there is no one to devote himself exclusively to the fire direction computer's duties, which are considerable.

Both the section leader and the squad leaders have crew assignments and are in effect "dual-hatted." They must help the crews, lead the section, and in their spare time train themselves to run an FDC. Anyone familiar with the perishable skills of a fire direction computer will realize the training problem presented by this lack of dedicated FDC personnel. Some may argue that the MBC will reduce the demands of the

computer, but the MBC is a fairly complicated piece of equipment that requires training and practice to master. The addition of the computer does not negate the need for a dedicated fire direction computer; it merely provides a means whereby a fire mission can be computed faster.

The only advantage the direct lay and direct alignment methods have over the FDC results from their speed of employment and limited reliance on FM communications. Direct lay involves sighting the mortar directly on a target by using either the sight and bipod or the mortar in the handheld mode without the sight and bipod. Direct lay is a good method of employing the mortars during a movement to contact, but it requires that a target be identified; and because it relies on line-of-sight, the mortar squad is exposed to the enemy's fire.

Direct alignment is similar to direct lay except that the section or squad leader acts as a forward observer. He must remain within sight of the mortar, although this method does allow the mortar to remain in defilade. It reduces the forward observer's flexibility because he is tied to the general vicinity of the gun-target line.

These methods of engagement can seldom take full advantage of the increased range of the M720 HE round (3,489 meters), because in both cases the soldier who identifies the target is either on the mortar or close to it. During periods of limited visibility, too, the mortar will not be effective, and the use of either direct lay or direct alignment will eliminate the possibility of coordinated illumination missions. These methods also forfeit preplanned fires (such as final protective fires), time on target missions, and the ability to shift and mass fires quickly to support distant units. Aside from not fully exploiting the capabilities of the system, both methods of firing are more likely to expose the mortar crews to enemy fire.

OVERLOADING

For nearly 20 years the Army manned the 60mm mortar squad with five men and usually provided them with some sort of organic transportation. Thirty years later, under AOE, the Army has decided to handle the same amount of equipment with only three men and no organic transportation. Given our current manning level, the mortar section will be unable to fully exploit the improved range, lethality, and speed that the new equipment gives it. The amount of weight each soldier will have to carry is the critical factor. In the mortar section of 30 years ago, the ratio of men to mortars was better than 5:1. Today that ratio is 3:1, yet the current mortar has no weight advantage over the mortar used in the 1950s—the old mortar weighed 46.2 pounds, while today's mortar weighs 46.5 pounds. We have ignored this historic reality and, as a result, our current mortar section is overloaded (see Table 1).

The mortarman's load must be of serious concern to a rifle company commander. According to FM 7-70, "Commanders must ensure that soldiers carry no more than 48 pounds when in contact with the enemy or when enemy contact is expected." Historically, the top weight carried by an individual soldier has been deemed to be one-third of his body weight. Today, however, even the mortarman with the lightest load exceeds this recommended weight. Our doctrine acknowledges that the

MORTAR SECTION MINIMUM LOAD CONFIGURATION¹

COMMON ITEMS	WEIGHT
Battle dress uniform, boots	8.20
LBE	1.60
Canteens (2/filled) w/cup and cover	6.60
Poncho	1.70
Gloves	0.30
Socks	0.30
Bayonet w/scabbard	1.30
MRE (1) ²	0.25
Helmet ³	3.10
ALICE pack complete ³	6.30
TOTAL	29.65

DUTY LOAD

Equipment	Item Weight	Qty	Total Weight
Baseplate M7	14.4	2	28.80
Baseplate M8	3.6	2	7.20
Cannon	14.4	2	28.80
Bipod Assembly	15.2	2	30.40
Sight Unit M64 (w/case)	3.5	2	7.00
Bore Sight	.2	1	.20
Aiming Poles	5.0	2	10.00
M19 Plotting Board	1.0	2	2.00
Circular M19 (w/case)	3.0	2	6.00
Mortar Ballistic Computer	8.0	2	16.00
M2 Compass	.5	2	1.00
PRC-77 Radio	24.0	1	24.00
Telephone Set (TA-1/PT)	3.5	2	7.00
M1911 (.45) (35 rounds)	5.5	4	22.00
M16 (180 rounds in 6 mags)	15.0	2	30.00
SUBTOTAL			220.40
Ammunition (HE M720)	3.75	6	22.50
TOTAL			242.90

¹IMLC does not include any additional environmental protection items such as wet or cold weather gear, or any survival gear like NBC equipment.

²FM 7-72, Light Infantry Battalion, states that the soldier carries a basic load of two days of meals and one gallon of water, requiring the soldier to carry an additional five MREs and a 2-quart canteen (1.25 + 4.80) adding 6.05 pounds to his Common Items weight (35.70).

³These items are not included in FM 7-70 as common items; I believe they should be, because they will be required for most combat operations.

Table 1

soldiers in our light infantry divisions will have to carry loads approaching 72 pounds but indicates that this should occur only when our forces are not engaged, or when they are not in danger of being engaged by the enemy. Simple mathematics proves that the mortar section's soldiers routinely will carry more than the recommended loads (Table 2).

This weight does not include environmental protection items or special protective equipment other than the helmet. The soldiers would have no protection from the elements other than their ponchos, and there would be no wire for the TA-1s, no extra batteries, and only one meal per day per man. There is no realistic way of meeting the field manual's recommended weight limits without reducing the capability of the section; 70.1 pounds represents about the least weight a mortarman will have to carry when fighting the enemy.

The M224 system can be tailored to reduce its mission weight, but for every item of equipment not carried there is a corresponding reduction in capability. The easiest modification is

to substitute the M8 baseplate, which weighs only 3.6 pounds, for the M7 baseplate, which weighs 14.4 pounds. But by doing so, the section loses the 360-degree capability of the mortar, and if the mortar must be fired from soft ground it will eventually bury itself. Then if a commander is willing to give up his indirect fire capability, the load can be cut by another 18 pounds if the section leaves the FDC equipment behind. With this added to the baseplate savings, the section will be 46 pounds lighter.

Another, more drastic, option is to use the two mortars in the handheld mode only; this option requires the least amount of equipment—only two cannons and their M8 baseplates. The total weight reduction would amount to 108.4 pounds. The cost of achieving this weight reduction would be considerable: a complete loss of the mortar's indirect fire capability; a limited maximum range (1,342 meters); and the use of the mortars only in the direct lay mode.

The most glaring deficiency as a result of these load limitations is the amount of ammunition that can be carried. The common response to the problem of ammunition supply and resupply is to state that the rest of the company will carry the balance of the section's mortar rounds. In the days before AOE this may have been a realistic argument, even if units in the

field seldom practiced it. In today's rifle company, with its two-man machinegun teams, SAW gunners, and nine-man squads, there are no extra backs to rely on. If all the riflemen, including team leaders, carried one 60mm round, a company would have a basic load of 42 rounds, 6 in the mortar section and 36 carried by the company, resulting in a paltry 21 rounds per gun. In comparison, the 1955 mortar section had a basic load of 72 rounds per weapon based on a three-mortar section. The company carried half the load (108 rounds), while the battalion trains carried the remaining 108 rounds. There is no easy solution to the ammunition issue, but our current section organization hurts more than it helps.

Because of undermanning, the members of the section are more likely to be physically exhausted and prone to error when entering combat. If the mortar section is not where it needs to be when there is a call for fire, it will have failed in its mission. If it arrives at its position with men or equipment missing, its capabilities will be seriously diminished. The overloading of the mortar section will not only hurt the section, but could adversely affect its company's ability to accomplish its mission.

HANDLING TASKS

The other implication of insufficient manpower in the mortar section is the squad's inability to handle all the tasks of gunnery and fire direction control. Under the mortar section's current organization, if the FDC is to be used, two soldiers will have to man each M224 mortar. During training, a good two-man crew can perform as well as a three-man crew on most, if not all, gunnery tasks. But training is not combat, and when fear, fatigue, and a real fight are added, the results could be less than adequate.

Meanwhile, the section leader and the squad leaders will have to handle the fire direction control duties. At least two men are necessary to monitor the radio, calculate and enter the firing data, and issue the fire commands. Furthermore, the section will not be able to provide itself with even rudimentary security and, during sustained operations, the crew members will quickly become ineffective, since there will be no one to relieve them so they can get adequate rest.

The section cannot afford to lose one man, because with six men and six jobs, each man is absolutely necessary. Any loss will reduce the effectiveness of its fire by increasing the amount of time needed to conduct each fire mission. The loss will also affect the section's ability to move its equipment, as well as any ammunition. This lack of manpower reduces the value of the section. In fact, if it suffered only a few losses, the section would become a liability to its company rather than an asset.

There are a number of possible solutions to the present problem. The mortar section can be removed from the company, but this would reduce the company's firepower and eliminate the longest range weapon in the unit. It would also take away the company's only organic indirect fire support. This solution could be hazardous in the artillery-poor environment of a light infantry division. Adding vehicles to the company structure would increase the unit's battlefield mobility but would also complicate its strategic mobility while running counter to our current doctrine.

SECTION LEADER	
Common Items	29.65
Duty Load	
M16 (180 rounds in 6 mags)	15.00
PRC-77 Radio	24.00
Binocular M19 (w/case)	3.00
TOTAL	71.65
SQUAD LEADER	
Common Items	29.65
Duty Load	
M16 (180 rounds in 6 mags)	15.00
M23 MBC	8.00
Binocular M19 (w/case)	3.00
Bore Sight	.20
TA-1	3.50
Cleaning Equipment	2.00
Ammunition (2 rds HE M720)	7.50
TOTAL	68.85
GUNNER ¹	
Common Items	29.65
Duty Load	
M1911 (.45) (35 rounds)	5.50
Entrenching Tool (w/carrier)	2.52
Cannon	14.40
Baseplate M8	3.60
Aiming Poles	5.00
Sight Unit M64 (w/case)	3.50
M2 Compass	0.50
Ammunition (1 rd HE M720)	3.75
TOTAL	68.42
AMMUNITION BEARER ¹	
Common Items	29.65
Duty Load	
M1911 (.45) (35 rounds)	5.50
Blipod	15.20
Baseplate M7	14.40
Ammunition (1 rd HE M720)	3.75
TOTAL	68.50

¹The remaining gunner and ammunition bearer will carry identical loads. These loads do not include the second plotting board, MBC, or TA-1.

Table 2

ACTIVE ARMY LIGHT INFANTRY BATTALIONS		
UNIT	LOCATION	NUMBER OF BATTALIONS
82d	Ft Bragg	10 ¹
101st	Ft Campbell	9
7th	Ft Ord	9
25th	Hawaii	9
10th	Ft Benning	2
10th	Ft Drum	3
6th	Alaska	3
		<u>45</u>

¹Includes Airborne battalion in Italy.

Table 3

Another option is to keep the current equipment and manning levels but change our doctrine of employment. Realizing that this doctrine has already been changed to require direct lay or direct alignment only, we could go even further along this line and drop the secondary mission of FDC-directed fires. Specifically, the M224 would remain in a company but would be used only in the handheld role. Its mission weight would then drop to 18.5 pounds per mortar. This option would reduce the weight of the system, but would also reduce its effectiveness.

A similar solution might be to change the mortar section's equipment. There are smaller, lighter mortars available that six men can easily handle. For example, the British 51mm mortar weighs only 13.6 pounds, requires only one man to fire, and has an 800-meter range. The British use this mortar primarily for illumination at the platoon level, but it is also capable of firing HE and smoke. The Israelis have the Soltam Commando, which is a 60mm mortar that weighs 13.2 pounds and has a range of 900 meters. In both cases, the whole mortar can be conveniently carried and fired by one man.

If we adopted this option, we would not have to maintain 11C infantrymen in the mortar section; we could convert those positions to 11B infantrymen. The trade-off would be in range and indirect fire capability, but the section would be more evenly matched in terms of men to mortars.

IDEAL SOLUTION

The ideal solution, however, would be to increase the strength of the mortar section and put it back in a platoon under the control of a platoon leader. There is no need to go back to the days of 17-man sections, but an increase to 11 men is justifiable and desirable. Four men on each gun would provide depth and a better ability to distribute the weight and the tasks of the mortar crew. A three-man section headquarters would add greater depth in the fire direction control process and would allow the

section leader to effectively carry out his reconnaissance and firing site selection duties without hurting the capabilities of the section if it was currently firing.

A similar structure has proven itself in the Ranger battalions, which have eight-man mortar sections and habitually have the weapons platoon leader and his RTO accompanying the mortars. This, in effect, would raise the section's strength to 10 men. Not only would this structure improve the training prospects of the section in peacetime, most important, it would provide the rifle companies with a mortar organization that could truly support them and successfully meet the heavy demands of combat.

Realizing that the Army today must prepare for war in a resource-restricted environment, the ideal solution may be too costly in terms of manpower. Nevertheless, the current mortar section requires at least a dedicated combined headquarters and FDC. This is necessary if we are to bring the load size down to a realistic level within the section, and if we are to take full advantage of the M224 mortar, which was expressly designed for use in the indirect fire mode.

The creation of a combined headquarters and FDC would require two more men in the mortar section. The two men (privates) would be assigned as assistant gunners, relieving the section leader and squad leaders of their mortar crew duties. The section leader would then be free to lead the section and carry the radio, while the squad leaders would change names and become the dedicated FDC. They would be able to focus their energies on perfecting the use of the new and untried MBC, while remaining proficient on the M19 plotting board, which is the section's backup. This restructuring would greatly increase the mortar section's capacity to meet its wartime mission and would increase the combat power of the light infantry rifle company.

There are 45 light infantry battalions (not including the Ranger battalions) in the active Army today (see Table 3). This means that we have 135 mortar sections that are overloaded, insufficiently manned, and improperly organized to handle the fire support requirements of combat. Strengthening our mortar sections with an increase of two men per mortar section would require an additional 270 men, an increase of 54 spaces in a division's size. It would yield dramatic results.

The Army of Excellence has gone to great lengths to improve the fighting ability of its light infantryman. But that infantryman needs the responsive, indirect fires of his 60mm mortar if he is going to win in a close combat situation. The current mortar section must be changed to meet his needs.

Captain Morton Orlov II recently completed the Infantry Officer Advanced Course and is assigned to the 5th Infantry Division. He previously served with the 82d Airborne Division and with the 3d Battalion, 75th Ranger Regiment.

