

Improving Soldier Lethality: A Machine-Gun Training Outline for Small-Unit Leaders

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The M240B machine gun is one of the most important weapons assigned to platoons and companies. The large caliber 7.62 ammunition and high rate of fire make it invaluable in supporting attacks and ambushes as well as protecting defensive areas and mounted patrols.

The purpose of this article is to provide the small-unit (team, squad, and section) leader a training outline that will help improve the knowledge, performance, and more importantly, the lethality of their machine-gun crews. One of the first things the reader may notice about this article is that it does not discuss the techniques of machine-gun live-fire training. Subjects such as fire commands, marksmanship, and range operations will not be covered. This training outline focuses primarily on machine-gun theory (explanation of terms) and employment practices (crew drill).

The training program is outlined in four instructional topic areas:

- Characteristics of Fire
- Classes of Fire
- Application of Fire
- Crew Drill

The aim of these topic areas is to provide the crew members with a basic understanding of machine-gun theory and to explain how machine-gun fire relates to the ground, target, and the weapon itself. The crew will also learn about the types of machine-gun targets and the methods used for successful engagement. An overview of the crew drill will be provided to give crew members an opportunity for “hands-on” learning and practical application of emplacing the machine gun into and out of action.



Photo by SGT Kimberly Lamb

Soldiers with the 37th Infantry Brigade Combat Team qualify on the M240B machine gun at Camp Mike Spann, Afghanistan, on 7 February 2012.

Characteristics of Fire

The purpose of this topic area is to provide and explain terminology that describes machine-gun fire. These terms are important for the crew to understand what happens to the 7.62 round(s) after the trigger is pulled. As shown in Table 1, there are five terms that crew members should know. Understanding these terms will set the foundation for the following modules that further discuss machine-gun theory.

The two most important terms in this topic area are **danger space** and **beaten zone**. These terms describe to the crew members how to make machine-gun fire lethal. Understanding how range can affect danger space and the beaten zone gives crew members useful knowledge, especially when selecting firing positions in tactical scenarios.

Term	Definition
Trajectory	Path of bullet in flight
Maximum Ordinate	Highest point of trajectory between barrel and the target
Danger Space	Space between the weapon and the target where the trajectory does not rise above 1.8 meters, including the beaten zone (1.8 meters is the height of average soldier)
Cone of Fire	Pattern formed by different trajectories in each burst of fire as they travel down range
Beaten Zone (BZ)	Pattern formed by rounds striking the target or ground. Range affects the BZ. Short engagement range: BZ is narrow and long Long engagement range: BZ is shorter and wider

Table 1 — Characteristics of Fire

Classes of Machine-Gun Fire

This subject explains to crew members how machine-gun fire is directly related to the ground (terrain), the target, and the machine gun itself. After discussing the previous subject, which only concerned the effect of rounds leaving the barrel, this topic area teaches the crew how machine-gun fire is inter-related between the weapon, target, and terrain. Understanding this relationship is vital when selecting firing positions for the machine gun. This relationship is outlined in Table 2.

The most important instructional points from this topic area

are for crew members to fully understand **grazing** and **enfilade fire**. Both are related as they make the maximum use of the beaten zone. It is critical to impress upon the crew that anytime they select a firing position, it should incorporate grazing fire and enfilade fire whenever possible.

Application of Fire

Continuing to expand on theory, this subject area covers methods of emplacing the machine gun to take advantage of the weapon's inherent superiority in range and rate of fire over

Table 2 — Classes of Machine-Gun Fire

Fire in Respect to the Ground	Fire in Respect to the Gun	Fire in Respect to the Target
<p>Grazing Fire: Cone of fire which does not rise more than one meter above the ground. Maximum range of 600 meters over level terrain.</p> <p>Plunging Fire: Occurs when the danger space is confined to the beaten zone.</p>	<p>Fixed Fire: Only one aim point is required for the beaten zone to cover this target. Used against a point target.</p> <p>Traversing Fire: Fire distributed in width by successive changes in direction. Used against a linear target.</p> <p>Searching Fire: Fire distributed in depth by successive changes in direction and elevation. Used against a deep target.</p> <p>Traversing & Searching Fire: Fire distributed in width and depth by successive changes in direction and elevation. Used against a linear target with depth.</p> <p>Swinging Traverse: Fire delivered from a tripod-mounted gun against targets too wide to cover with the traverse lever on the M192 ground mount. This type of engagement requires major changes in direction.</p> <p>Free Gun: Fire delivered from a tripod-mounted gun that cannot be applied with the traversing and elevating levers on the M192 ground mount. This type of engagement requires major changes in direction and elevation.</p>	<p>Frontal Fire: When the long axis of the beaten zone is delivered at a right angle to the front of the target.</p> <p>Flanking Fire: Fire that is delivered to the side of a target.</p> <p>Oblique Fire: When the long axis of the beaten zone is delivered to an angle other than a right angle to the front of a target.</p> <p>Enfilade Fire: When the long axis of the beaten zone coincides with the long axis of the target. Can be frontal or flanking. Makes the maximum use of the beaten zone.</p>

Type of Target	Description	Example
Point Target	Beaten zone adequately covers the entire target. Gunner uses fixed fire with a single aim point.	<ul style="list-style-type: none"> - Bunkers - Vehicles - Weapons emplacements - Concentration of dismounted troops
Area Target	Has width and depth. Exact enemy location may be unclear. Requires traverse and search methods to cover the entire target area.	<ul style="list-style-type: none"> - Linear targets - Deep targets - Targets that are linear with depth

Table 3a — Type of Machine-Gun Targets

Type	Range
Maximum Range	3,725 meters
Range of Suppression Fire	1,800 meters
Range of Grazing Fires	600 meters

Position	Type Target	Range
Bipod	Point	600 meters
	Area	800 meters
Tripod	Point	800 meters
	Area	1,100 meters

Table 3b — M240B Effective Ranges

Term	Purpose
Sustained Rate of Fire	Used to conserve ammunition. Used after enemy suppression is achieved. Fewer barrel changes.
Rapid Rate of Fire	Used in initial enemy contact to gain fire superiority. Achieves high volume of fire on enemy. Used to suppress enemy quickly. Frequent barrel changes.
Cyclic Rate of Fire	Constant trigger hold to rear — continuous burst. Used for aerial targets. Highest volume of fire for the machine gun. Barrel change required every minute.

Table 3c — M240 Rates of Fire Description

Rate of Fire (RoF)	Rounds per Minute (RPM)	Rounds per Burst	Barrel Change Frequency
Sustained RoF	100 RPM	6-9 round burst every 4-5 seconds	Every 10 minutes
Rapid RoF	200 RPM	10-12 round burst every 2-3 seconds	Every 2 minutes
Cyclic RoF	650-950 RPM	Continuous burst	Every 1 minute

Table 3d — M240 Rates of Fire

lesser weapons on the battlefield such as rifles, carbines, and grenade launchers.

Application of machine-gun fire describes the type of targets a machine gunner will engage on the battlefield along with the maximum effective ranges of the weapon system. Rates of fire and the timing of barrel changes are also discussed to ensure the target area is kept engaged with the correct amount of ammunition without damaging the machine gun's barrel or causing stoppages from an overheated gun.

To the left are four tables that describe in detail the type of machine-gun targets, maximum effective ranges for the M240B machine gun, and rates-of-fire data that apply to the weapon system (Tables 3a, 3b, 3c, and 3d).

The most important instructional point in this topic area is for crew members to know and understand the M240B's rates of fire. They should know that the rapid rate of fire is used when initiating or receiving contact with the enemy. This rate of fire allows the crew to gain fire superiority over the enemy — allowing movement and maneuver of friendly forces. Once fire superiority is achieved, the crew can begin using the sustained rate of fire to conserve ammunition while still keeping the enemy's head down. Knowing the scheduled times for changing the barrel is also important for ensuring the weapon system does not become damaged or overheated during the engagement. Instruction on changing the machine-gun barrels will be covered in the next topic area concerning the crew drill.

Crew Drill

Any training outline concerning machine-gun training would not be complete without discussing the crew drill. The crew drill is the most important method of training a machine-gun crew to employ the weapon system. For new machine-gun crews, the crew drill provides basics of emplacing the machine gun into and out of action. For the advanced crew, the crew drill can perfect the weapon's employment and coordination amongst the team. When training new crew members, actions should be instructed slowly but deliberately. The ultimate training goal is for the machine-gun team to execute each move of the crew drill rapidly but never at the cost of precision.

The crew drill can be conducted with a two-Soldier or three-Soldier machine-gun crew. For this article, the three-Soldier crew will be referenced. The three-Soldier machine-gun team is made up of:

1. Gunner (G) carrying the M240B machine gun.
2. Assistant gunner (AG) carrying the spare barrel and case with heat-protective mitt (HPM).

3. Ammunition bearer (AB) carrying the M192 ground mount (tripod).

Crew members execute actions on commands (cues) provided by a leader. The following tables discuss the commands given by the leader and the actions executed by the crew members during the machine-gun crew drill.

It should be mentioned that the manner of execution as

outlined in the tables above serve only as an introduction to the crew drill. Once a foundation of knowledge is gained by the crew members, the crew drill may be modified into tactical scenarios, only limited by the imagination of the leader and crew. The crew drill is a time-tested method of training machine-gun teams in the employment of the weapon system and should be incorporated in preliminary marksmanship instruction (PMI) plans and mission rehearsals.

Table 4a — Leader Command: Form for Crew Drill

Action by Gunner	Action by AG	Action by AB
Take a prone position five steps from and facing the leader.	Take a prone position five steps behind the G.	Take a prone position five steps behind the AG.
Upon receiving the command, all crew members move simultaneously. Once in their positions and starting from the rear, announce their duties: AB, AG, gunner.		

Table 4b — Leader Command: Inspect Equipment Before Firing, Bipod/Tripod

Action by Gunner	Action by AG	Action by AB
Gunner inspects the machine gun using checklist. (See TC 3-22.240 for complete checklist.)	AG inspects the spare barrel and case using checklist. (See TC 3-22.240 for complete checklist.)	AB inspects the M192 using checklist. (See TC 3-22.240 for complete checklist.)
Announces any deficiencies to the machine gun, AB and AG equipment or if none, "all correct."	Announces any deficiencies to spare barrel or if none, "AG correct."	Announces any deficiencies to M192 or if none, "AB correct."

Table 4c — Leader Command: Gun to be Mounted Here (Bipod), Front, Action

Action by Gunner	Action by AG	Action by AB
Gunner moves (first) to identified position and assumes prone position. Clears and loads machine gun.	AG moves (second) to position, assumes the prone to the left of the gunner. Removes spare barrel and the HPM from the case. Puts on the HPM. Aids gunner in loading machine gun upon arrival.	AB moves (last). Places M192 one step to the left of machine gun. Moves 10 steps to left of the AG and assumes a prone security position.
Announces "Up."	After gunner announces "Up," AG gives ready signal to the leader.	

Table 4d — Leader Command: Out of Action (Bipod)

Action by Gunner	Action by AG	Action by AB
Gunner moves (last) after the AB and AG has departed. Unloads and clears the machine gun. Moves five steps to the rear and assumes the prone position.	AG moves (second) after removing the HPM and placing it, along with the spare barrel, back into the case. Moves 10 steps behind the machine-gun position and assumes the prone position.	AB moves (first) to machine gun and retrieves the M192. Moves 15 steps to the rear of the machine-gun position and assumes the prone position.
Checks to make sure the AG and AB are in position and announces "Up."	After gunner announces "Up," AG gives ready signal to the leader.	

Table 4e — Leader Command: Gun to be Mounted Here (Tripod), Front, Action

Action by Gunner	Action by AG	Action by AB
Gunner moves (last) to the identified position. Assumes prone position and mounts the gun on the M192. Clears and loads machine gun.	AG moves (second) to position, assumes the prone one step to the left of the M192. Removes spare barrel and the HPM from the case. Puts on the HPM. Aids gunner in mounting the machine gun onto tripod and loading the machine gun upon arrival.	AB moves (first) to the identified position. Opens the M192 and places it on the ground, stomping the rear tripod shoes. Pulls the M192 traverse and elevation mechanism out for the gunner. Moves 10 steps to the left of the M192 and assumes a prone security position.
Once gun is ready to fire, announces "Up."	After gunner announces "Up," AG gives ready signal to the leader.	

Table 4f — Leader Command: Out of Action (Tripod)

Action by Gunner	Action by AG	Action by AB
Gunner moves (second) after unloading and clearing the machine gun. Removes the machine from the M192 and moves five steps to the rear of the position and assumes the prone position.	AG moves (first) after helping the gunner remove the machine gun from the M192. AG removes the HPM and places it, along with spare barrel, back into the case. Moves 10 steps behind the machine-gun position and assumes the prone position.	AB moves (last) to the machine gun and retrieves the M192. Moves 15 steps to the rear of the former machine-gun position and assumes the prone position.
Checks to make sure the AG and AB are in position and announces "Up."	After gunner announces "Up," AG gives ready signal to the leader.	

Table 4g — Leader Command: Fall Out Gunner

Action by Gunner	Action by AG	Action by AB
Gunner moves 10 steps to the rear, assumes the prone position, and becomes the AB.	AG moves five steps forward, assumes the prone position, and becomes the gunner.	AB moves five steps forward, assumes the prone position, and becomes the AG.
Upon receiving the command, all crew members move simultaneously. Once in their positions and starting from the rear, announce their duties: AB, AG, gunner.		

Table 4h — Leader Command: Change Barrels

Action by Gunner	Action by AG	Action by AB
Ensures bolt is to the rear by pulling the cocking handle to the rear with a palm-up grip. Places the weapon on safe and returns the handle forward. Indicates to AG that gun is ready for barrel change by announcing "Go."	Upon hearing "Go," using HPM, the AG pushes the barrel release button and removes the hot barrel from the machine gun with the handle. Places new barrel on the machine gun. Ensures it is secure by listening for 2-7 clicks when emplacing the new barrel on the receiver.	Remains in prone security position.
Once the new barrel is on, announces "Up."	Announces to gunner: "Barrel on." After gunner announces "Up," AG gives ready signal to the leader.	

Conclusion

This article has outlined a training program for small-unit leaders to improve the knowledge, performance, and lethality of their assigned machine-gun crews. Though the instruction on machine-gun theory can be delivered in a classroom setting, practical exercises will give machine-gun crews hands-on training. For example, by placing available items such as assault packs or rucksacks in a line, column, or tactical wedge formation, a machine-gun crew can practice methods of engaging point and area targets by using fixed, traversing, or searching fire. These exercises can be conducted in the unit area after a morning foot march.

Crew drill can be done almost anywhere and should be

incorporated during opportunity training at marksmanship ranges and situational training exercises (STX) while in the field.

The instruction presented is not intended to replace other techniques of machine-gun training. In fact, its purpose is to enhance and supplement other subjects used in instructing machine gunnery. For more information on machine-gun theory and practice, see Training Circular (TC) 3-22.240, *Medium Machine Gun* (April 2017).

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