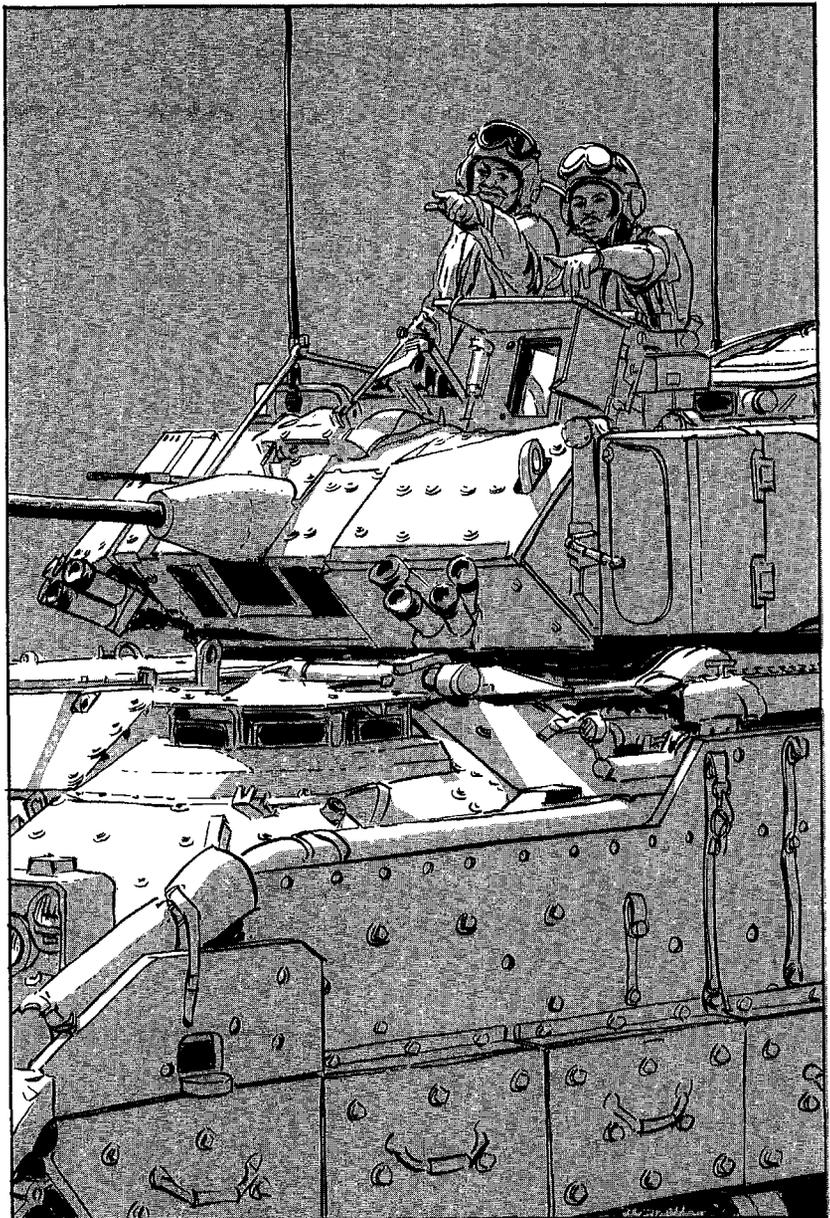


# THE NEW BRADLEY GUNNERY STANDARDS

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In January 1997, as part of the train-up for its deployment to Bosnia, our battalion—the 2d Battalion, 2d Infantry Regiment, 1st Infantry Division—became the first unit in Europe to qualify Bradley infantry fighting vehicle (BIFV) crews under the guidelines set by the new Field Manual (FM) 23-1, *Bradley Gunnery*, dated 18 March 1996. These new gunnery standards presented a number of surprising challenges, not only for the crews but for unit master gunners and leaders as well.

As a result of our collective experiences, we discovered a number of strengths and weaknesses in the new manual in the area of crew qualification gunnery. This discussion of crew gunnery focuses on technical rather than tactical proficiency, addressing lessons learned concerning the new Bradley Table (BT) VIII tasks and our observations on some of the strengths and weaknesses.

The new version of FM 23-1 establishes a crew qualification table of ten single-firing-vehicle tasks. Of those ten tasks, five are designated as day tasks and five as night tasks,

with four of the ten designated as swing tasks (those that may be fired either day or night).

The table designates the tactical scenario—offensive or defensive; firing conditions—auxiliary sight, nuclear, biological, chemical (NBC), manual engagement, commander's engagement; and the type of target—high-explosive (HE) stationary, armor-piercing (AP) moving, coaxial point—while giving unit commanders and master gunners the latitude to develop specific range scenarios.

In accordance with the commander's intent and an estimate of the situation (including the terrain or ranges available), master gunners set the actual type of targets, range to targets (and thus time allowed to kill them) and the actual sequence of firing tasks. This gives units the opportunity to tailor training to likely unit missions (in accordance with FM 25-101, *Battle Focused Training*), while maintaining a baseline throughout the Army.

The gunner's manual defensive engagement task (Task 1), undoubtedly a necessary part of crew qualification gunnery,

has proved to be one of the easier tasks for the crews to master. The transition has been made easier by the requirement to fire manual tasks in the unit conduct-of-fire trainer. However, master gunners should put the target in a range band beyond 1,000 meters, giving the crews 18 seconds of exposure time to kill the target. Since using manual controls to adjust on target obviously takes longer than using the power mode, this range provides a longer exposure time without putting the target at a range that results in a greater ammunition dispersion factor.

The gunner's defensive auxiliary sight engagement (Task 3) offers several challenges to units. In fact, poor planning on the part of unit master gunners could make it impossible for a crew to succeed on this task. The troop target must be positioned at less than the 900 meters maximum effective range allowed, because it is nearly impossible for crews to see their tracers with the auxiliary sight at 900 meters. In addition, range greater than 900 meters must be specified for the HE stationary target (a truck) to keep crews from engaging it with the coaxial machinegun.

An alternate task should be specified for use in periods when weather or other limited visibility conditions make it impractical to use the auxiliary sight. At the Grafenwoehr Training Area in Germany, units often spend hours waiting

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for fog to clear on ranges. Even when the fog clears, there are times when it is only enough for the crews to identify the range fans. Firing with the auxiliary sight in such conditions is impossible, and waiting for conditions to improve is not feasible because of the tight range schedule. An alternate task would enable commanders to continue training despite poor weather.

The commander's offensive engagement (Task 4) proved difficult for our Bradley commanders (BCs) to master. The biggest problem is verbally getting out the entire fire command and gunner's response terms before the BC must fire. Many of the crews that failed this task gave excellent fire commands but either failed to destroy the target in time or simply did not fire in time. While we have proved that it is an achievable standard for BCs to issue a complete multiple fire command in the offense, the combat effectiveness of doing so is questionable. An abbreviated fire command would probably be much more effective in both combat and qualification. (More on this subject later.)

The gunner's offensive NBC engagement (Task 7) tends to create problems for both master gunners and crews, because (using the new "determining factors" of Table 2-4) the priority of targets changes with their placement on the range. This causes significant problems for crews in terms of engaging the most dangerous target first (a leader task). Therefore, it also causes problems for unit master gunners in

terms of designing scenarios that will challenge crews without confusing them.

The commander's offensive engagement (Task 9) has proved to be a fairly simple task, although range safety certainly becomes a problem with both the BC and gunner down inside the turret and the Bradley crew evaluators unable to confirm turret orientation. Orientation between the range fans is easily lost, creating the possibility of rounds fired out of the impact area.

A quick fix that we implemented was to ensure that our crews understood their right to call "cease fire" if they became disoriented at any time while performing the tasks. Since an unsafe range condition existed, we would immediately "alibi" the crew, stopping the task and rerunning it. This has created our equivalent of the tankers "aft cap," offering crews an alibi to reduce the temptation to continue under unsafe conditions.

### **Crew Gunnery: What's Wrong**

The first shortcoming we discovered was in the area of ammunition allocation: Crews do not currently receive an adequate allocation per target. The 25mm rounds are allocated on the basis of target type (Table 1), but no rounds are allocated for the changeover from one type of ammunition to another. The cycle of function of the M242 gun continually keeps a round on the face of the bolt. When the ammunition selection is changed, this cycle causes a round of the previous ammunition selection to be the first round out of the gun. As a result, FM 23-1 (paragraph 2-8, page 2-33) dictates that the crew fire two sensing rounds when changing ammunition. The burst that follows will be three to five rounds followed by another burst of three to five rounds to kill. This results in one sensing round and two bursts on target only if the bursts are limited to one three-round burst and one four-round. The problem with this "new math" is illustrated in Table 2: Even if the crew fires in this manner for every task, its ammunition allocation will still fall six rounds short.

There are a number of possible solutions to this problem. One is to change FM 23-1 to include changeover ammunition in the allocation, giving each crew additional rounds to ensure that it has the proper allocation per target type and the rounds required for changeover. Another solution is to give local master gunners the authority to change ammunition allocations to reflect what is actually needed to complete the table in accordance with both the manual and the realities imposed by local range complexes. In this case, master gunners need to be instructed to look at the scenario they will use and change the allocation as necessary to ensure that the crews have enough ammunition to complete the table. In addition, future versions of the Bradley (in which the ballistic computer is used to put super elevation into the gun system) should be designed to ensure a first-round hit by not adjusting the gun elevation following ammunition changeover until after the first round has been fired.

An additional ammunition allocation problem that must be addressed arises from the limited guidance concerning range-to-target requirements. According to FM 23-1 (paragraph

CURRENT AMMUNITION ALLOCATIONS	
<b>25mm gun:</b>	
8 rounds TPDS-T per AP point target.	
20 rounds TPDS-T per aerial point target.	
8 rounds TP-T per HE point target.	
25 rounds TP-T per HE area target.	
<b>Coaxial machinegun:</b>	
50 rounds 7.62mm per RPG or ATGM team or unarmored target.	
100 rounds 7.62mm per area target.	
<b>Total BT VIII ammunition allocation:</b>	
TPDS-T	48 rounds
TP-T	48 rounds
7.62mm	450 rounds

Table 1

Bradley Table VIII 25mm Ammunition Comparison (Depicts day phase ammunition firing five day tasks and five night tasks.)							
	TASK 1	TASK 5	TASK 2 (Multi Task)	TASK 3	TASK 4	TOTAL	ALLOCATED
HE	8	1	8	1	8	1	27
AP	1 <sup>1</sup>	8	1	8	1	8	24

<sup>1</sup> First AP round (Task 1) is result of confirmation fire being conducted using AP (TPDS-T) ammunition.

Table 2

TARGET	KILL STANDARD
25mm Point Tgt	Hit with a minimum of 3 rounds.
25mm Area Tgt	Suppress 75% of target using a Z pattern (one round in 6 of 8 boxes).
Coax Point Tgt	(Troop) hit 1 target with 1 round; (Truck) hit with minimum of 3 rounds.
Coax Area Tgt	Hit one troop target with 1 round and suppress area with Z pattern.

Table 3

12-1a(6), page 12-2), "BT VIII...scenarios must contain a minimum of 1 day engagement and 1 night engagement at 600 meters or less and 1 day target and 1 night target at 1,400 meters or beyond." In fact, unit master gunners can place truck targets at less than 900 meters (paragraph 12-1b(6), page 12-3). Specifically, "Unarmored targets within 900 meters can be designated a coax point target. However, these targets must have a unique design easily identifiable to the crew (silhouette or thermal image). This reduces confusion as to what ammunition type is used to engage that target."

While this may reduce the ammunition selection problem for the crew, it creates additional problems for the master gunner—and, ultimately, for the crew as well. From an ammunition allocation standpoint, for targets at less than 900 meters the crew would use ammunition allocated for other coax point targets. From a scenario development standpoint, requiring one day engagement and one night engagement at 600 meters or less causes several problems. It either decreases the total kill time to 14 seconds for both targets (setting the crews up for failure), or it increases the surface area danger zone beyond the range fans (because of the length of the maneuver box and the short distance between the targets and the BIFV). The only task (among the day tasks) that does not create these problems is the day NBC task, which allows a crew 11 seconds to kill a coaxial machinegun area target and 18 seconds to kill a moving AP target.

A solution to these problems is to prescribe a realistic ammunition allocation per target (to include changeover ammunition) and range to target, and let unit master gunners determine round count based on local range scenarios. An additional advantage to this solution is that it gives master gunners the flexibility to create alternative scenarios, reducing predictability for the crews by moving even farther away from "canned" scenarios.

A second shortcoming we discovered lies in the area of kill standards, especially for the coaxial machinegun. Table 9-1 (excerpted here in Table 3) says that to achieve a kill on a coax area target, a crew must hit one troop target with one round and suppress the area with "an effective Z-pattern" in

order to "kill" the target. FM 23-1 does not say how many rounds must hit within the target area to achieve suppression.

Theoretically, a quick Z-pattern spray of the area can be accomplished using only ten rounds (including as few as two tracer rounds), but such a small number of rounds on target certainly does not achieve a standard of 75 percent of the target area, as exists for 25mm gun area targets. To effectively cover 75 percent of a typical target area—consisting of seven IRETS (infantry remoted target system, targets)—a crew would have to fire bursts (of 10 to 15 rounds) into the area of each of five targets.

From an evaluation standpoint, this cannot be effectively recorded using a thermal imagery sight, making it difficult (or impossible) to evaluate coax tasks fairly. From a threat standpoint, the time for the threat to kill the BIFV is only 13 seconds with the target at maximum range (900 meters). The BIFV, on the other hand, requires approximately one minute to fire the 100 rounds allocated for the target at a sustained rate of fire. One possible solution is to make the Z-pattern strictly a noncritical subtask (as is stated in paragraph 9-5, page 9-13) and not part of the kill standard.

The introduction of leader tasks has added emphasis to the role of the BC and has also raised some questions. A major component of the leader tasks is the appropriate fire command, and a primary part of every fire command is correct target identification.

If a BC misidentifies a truck as a personnel carrier (PC) or vice versa, the crew will not receive credit for killing the target (receiving a "U" for the task) because the ammunition type fired is not capable of killing the target (according to the kill standards in Table 9-2). However, if the BC gives no target description at all and the crew kills both targets, it will still receive a "P" rating for the task when it failed the leader task.

While the first case is certainly inexcusable, the second should not be rewarded with a passing score. Our argument for this is that, in the second case, there is no way of knowing whether the crew correctly identified the targets (and thus engaged it with the correct type of ammunition); conversely, in the first case, the only way of knowing whether

the crew self-corrected would be to hear a gunner's verbal correction over the jump net.

One solution is to make issuing any correct fire command (abbreviated, precision, or battlesight, single or multiple) a critical task, and to give credit for the task only if the command is used (with appropriate corrections by other members of the crew). In addition, crews should be required to wait until the first target "locks up" before issuing the fire command. (Given the relative predictability of the current scenario, crews are now theoretically able to issue a fire command immediately once the conditions for the task are announced, as there is no specific requirement for them to wait until targets appear.)

Requiring a fire command as a critical task while making any correct fire command allowable, along with a requirement for the crews to wait until targets are seen, will offer

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crews a more realistic, combat-oriented evaluation while teaching them better coordination (and that is the whole stated purpose of the critical and leader tasks). This will not only standardize gunnery training further, but it will train crews to kill the enemy faster.

The determining factors listed in paragraph 2-4b (page 2-24) now force crews to perform some confusing mental gymnastics at the same time they are trying to engage multiple targets. That paragraph says:

*When multiple targets of the same threat level are encountered, the targets must be prioritized according to the threat they represent. The determining factors used to prioritize these targets are:*

*(1) Engage close-range targets before engaging long range targets.*

*(2) Engage stationary targets before engaging moving targets.*

*(3) Engage frontal targets before engaging flank or rear targets.*

Under these guidelines, the "most dangerous" target changes in direct proportion to the distance at which the targets are placed on the range because of the threat target time to kill the BIFV time standard (in accordance with Table 9-4). For example, the stationary truck (in Tasks 2 and 7) is most dangerous when it is placed anywhere forward of, and up to 300 meters behind, the moving PC, because both targets have the same lethality (paragraph 2-4b). But placing an unarmored target in the same threat category as a light armored target does not make sense and should be reevaluated. Obviously, a stationary frontal truck should not represent the same threat as a stationary frontal PC at the same range band, but the current "determining factors" do not follow this logic.

An easily implemented solution, however, would be to add two clarifying criteria to the determining factors:

*(4) When confronted with both a dismounted threat and a vehicle threat, engage dismounts first.*

*(5) Engage most heavily armored vehicle targets before lightly armored or unarmored targets.*

### **Crew Gunnery: What's Right**

Despite the somewhat negative connotation of the "What's Wrong" section, there are a number of aspects of the new FM 23-1 that are definitely right.

One of the best changes to the manual is the replacement of crew cuts with critical, leader, and non-critical subtasks. This new division of subtasks places a greater emphasis on the role of the Bradley commander. He is promoted from uninvolved passenger to the individual responsible for everything the crew does or fails to do; now, his role is just as vital to crew success as the gunner's is.

Just as in older versions of FM 23-1, there are still critical tasks that would mean life or death in combat and thus will fail a crew in training. In the past, those tasks were recognized as 30-point crew cuts; now, appropriately, critical tasks will kill (fail) a crew. Accordingly, there have always been several tasks or subtasks that were not mission-essential; these tasks, formerly known as 5-point crew cuts have now been de-emphasized as "nice-to-do" non-critical subtasks.

Another much-needed change to the FM is the integration of the T-P-U (trained, needs practice, untrained) method of quantifying evaluation. This has removed the previous emphasis on point scores, in which crews were pressured to achieve scores in excess of 900 points (on a 1,000-point scale). This in turn has resulted in a better use of training resources. Crews need only to re-fire the tasks they "failed" (evaluated as "Untrained") instead of an entire day or night run, thus saving range time and ammunition. In addition, the change brings FM 23-1 in line with the Army standard for evaluation found in FM 25-101.

In general, the new FM 23-1 contains many much-needed changes compared to the older versions, while adding a much-needed challenge to Bradley gunnery. Certainly, the days of battalion averages of more than 900 points are gone forever, replaced by better ways of measuring the proficiency of a unit's crews. In addition, the flexibility to create scenarios that challenge crews to achieve the next level of proficiency will ultimately create a better-trained force, ready to meet the challenges of the future battlefield.

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