TRAINING NOTES

Why T-P-U?
Bradley Crew Evaluation

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The goal of Bradley crew evaluation has always been to challenge crews to meet realistic threat-based standards while developing warfighting skills concurrently with gunnery. The latest Field Manual 23-1, *Bradley Gunnery*, dated 15 March 1996, reflects this goal of evaluating the ability of Bradley crews to outperform the threat and also the warfighting skills associated with these gunnery tasks.

To understand the evolution of crew gunnery evaluations, it is helpful to look at the three different types of evaluation procedures in historical sequence.

Scoring Matrices

Units have used scoring matrices since the introduction of the Bradley fighting vehicle in 1983. The developers of gunnery doctrine based the scoring matrix time standards on a determination of where a crew's proficiency should be in relation to its past performance. Doctrine has adjusted these standards through the years to match the increases in crew proficiency.

A point system reflects crew performance; each engagement has a 100-point maximum score. "Time to kill" standards determine an engagement's point value (Figure 1). As an example, if a crew hits both targets during a multiple engagement in 33 seconds, the score will be 82 points for that engagement. If the crew hits only one target during this engagement, the score is 41 points. Bradley crew evaluators (BCEs) determine the engagement's point value by consulting one of the six scoring matrices found in previous versions of FM 23-1.

The BCE subtracts failures in any crew duties from the "time to kill" points. These crew duties are assigned point-value penalties as follows:

A 5-point reduction for:

- Improper fire commands.
- Firing before receiving the command FIRE or announcing ON THE WAY.
- Using incorrect engagement techniques.
- Selection of improper ammunition or weapon for the target.
- Incorrect driving techniques.
- Failure to return to a defilade position after completion of a stationary engagement.

A 15-point reduction for:

- Not using the "Z" pattern for area engagements with coaxial machinegun or 25mm automatic gun.

A 30-point reduction for:

- Failure to raise the TOW launcher and

TIME (SECONDS)	POINTS: KILL 1 TARGET	KILL 2 TARGET	KILL 1 AUXILIARY SIGHT/NBC TARGET	KILL 2 AUXILIARY SIGHT/NBC TARGET
30	50	100		
31	47	94		
32	44	88		
33	41	82		
34	38	76		
35	35	70	50	100
36	32	64	47	94
37	29	58	44	88
38	26	52	41	82

Figure 1. A portion of Scoring Matrix 4.

conduct self-test during a defilade engagement.

• Failure to be in MOPP-4 (mission-oriented protective posture 4) with all hatches closed during an NBC (nuclear, biological, chemical) engagement.

• Bradley commander's (BC's) failure to fire a BC-specific engagement.

• Engagement of friendly targets.

• Use of integrated sight unit (ISU) during an auxiliary sight engagement.

If a crew hits both targets in 33 seconds and fails to give a proper fire command, it receives a 5-point reduction. (Time to kill score for the engagement is 82 points, minus 5, resulting in a score of 77 points.) BCEs cannot subtract more than 30 points in crew cuts from the time to kill points per engagement: If the time to kill is 100 points, and the deductions amount to 35 points, the total is 70 points instead of 65.

These scoring matrix procedures initially provided a fair picture of crew proficiency. But doctrine based this system on an estimation of where crew performance should be and did not provide the realistic standard of other evaluation procedures.

Point Calculation Worksheets

In 1991 the Armor School introduced the Point Calculation Worksheet (PCW) concept during a Bradley Master Gunner conference at Fort Benning. Members of the Bradley Proponency Office at Fort Benning and the Cavalry Weapons Division from Fort Knox jointly developed the worksheets for the Bradley. The Infantry School published these scoring procedures in Change 1 to FM 23-1, dated 24 March 1994, as an alternative to the scoring matrices. During this test period, the Bradley Proponency Office collected data from units using these procedures to determine their application as a replacement for the scoring matrices.

PCWs are part of a point-type scoring process that uses threat data from the Army Materiel System Analysis Activity as the base time standard for Bradley crew gunnery. The time required for a specified variety of threat vehicle to hit a Bradley established these time standards. The time standards reflected the time a threat vehicle crew took to give a fire command, the cyclic rate of fire of the weapon system, and the time of flight of its burst to the Bradley's position. The farther away the threat target, the longer that target took to hit a Bradley. The Bradley crew therefore had more time to hit the threat target.

BMP-2, TWO CONDITIONS

METERS	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800
TIME (SECONDS)	POINTS										
11	100	100	100	100	100	100	100	100	100	100	100
12	96	97	97	98	98	98	99	99	99	99	99
13	93	94	94	95	95	96	97	97	97	97	97
14	90	91	92	93	93	94	95	95	96	96	96
15	87	88	89	90	91	92	93	93	94	94	94
16	75	79	81	83	85	86	88	88	91	93	98
17	70	74	78	80	82	84	85	86	88	91	95
18	64	70	74	77	79	81	83	84	86	88	93
19	58	64	70	73	76	78	80	82	84	86	91
20	52	58	64	70	73	75	78	79	82	84	88
21	46	52	58	64	70	73	75	77	79	82	86
22	40	46	52	58	64	70	73	75	77	79	84
23	34	40	46	52	58	64	70	72	75	77	82
24	28	34	40	46	52	58	64	70	72	75	79
25				4		5		6		7	

Figure 2. A portion of PCW showing BMP-2, two conditions.

PCWs have three additional timing conditions: threat vehicle moving, BFV moving, and NBC conditions. Each condition adds to the time the threat vehicle needs to engage a Bradley. A moving threat target is given more time because it is more difficult for a threat vehicle on the move to engage a Bradley. A moving Bradley is given more time because it is more difficult for a threat vehicle to engage a moving target. NBC conditions are given more time, not because the Bradley crew must wear masks, but because the threat crewmen themselves must wear masks while engaging the Bradley. A Bradley crew does not receive more time if it uses the auxiliary sight or the manual hand stations or if the Bradley commander is firing the engagement, because these methods of engagement have no effect on the threat's ability to engage the Bradley.

The threat's time of hit, referred to as "threat-based time," provides a point value of 70. Past crew performances from unit score sheets determine times for the 100-point values—the time it takes a good crew to achieve 100 points using the scoring matrices. Averaging the points to seconds provides the point values, per second, between 70 and 100 points. The lethality of the given target type determines the point values from 0 to 69. For example, in a hypothetical engagement with a BMP-2, the Bradley crew loses 6 points for each second of delay, beyond the threat-based time, in engaging the target.

There are PCWs for the BMP-2, BRDM, and BTR-70 vehicles, the HIND-D helicopter, and dismounted troops—a total of 16 different worksheets that include all of the timing conditions. Figure 2 shows a portion of the BMP-2 worksheet with two conditions.

BCEs determine a crew's point score based upon the time it takes to hit a target at its range and under the given conditions. The evaluators time each target individually. The result of multiple target engagements is an average of the two individual target hit values. For example, a BFV on the offense in NBC conditions engages one stationary BMP-2 at 1,000 meters and another at 1,200 meters. The crew hits the vehicle at 1,000 meters in 10 seconds and, 11 seconds later, hits the other one.

The crew receives 100 points for the first and 100 points for the second. The BCE determines the engagement score by averaging the two individual scores—in this case 100. Crew duties are penalized the same as with the scoring

matrices. For example, a target score of 100 points minus 30 points for failing to be in MOPP-4 equals 70 points.

The highlight of the PCW is its threat-based methodology, which gives crews a standard that is based on threat capabilities. But data collected from units using PCWs has revealed several issues. One of these issues was the 100 point value assigned for each engagement. Crew qualification score sheets provided the data for these point values. This limited the data to particular range bands—1,000-1,200 or 1,200-1,400 meters—because the qualification table requirements placed most targets within these range bands. Therefore, 100 point values outside these range bands were not as easy to define. Some units felt the 100 point values were too stringent while others felt they were too lax—primarily because of differences in range facilities and target lateral dispersion.

Another concern was the complexity of the BCE duties. Because the timing procedures used with PCWs were more complex, the number of timing matrices increased from 6 to 14. A previous concern about the declining proficiency of BCEs added to this concern. Another issue was the lack of realistic timing procedures for multiple target engagements in the offense. The Bradley's exposure time to a second target did not start until the first target was hit, while in combat, both targets would be trying to hit the Bradley simultaneously, and exposure time for both targets would begin at the same time.

The problem with this timing procedure is that it establishes an unachievable standard. Although crews have time to achieve 70 points (threat-based time) for the engagement, it is humanly and mechanically impossible for them to achieve 100 points on most engagements. Using the previous example, if the crew took 10 seconds to hit the first BMP-2 and then another 11 seconds to hit the second BMP-2, the recorded time to hit the second BMP-2 is 21 seconds, not 11. The time of 21 seconds falls significantly below a possible 100 points. Adjusting the 100 point values to compensate for this (21 seconds = 100 points) does not provide enough of a point spread (70-100) to be useful in statistically reflecting crew proficiency.

T-P-U SUBTASKS

CRITICAL

Crew engages target(s) using the auxiliary sight.
Crew engages target(s) in an NBC environment.
Crew engages target(s) using manual controls.
Bradley commander engages target(s) using the commander's hand station.
Crew does not engage friendly targets.

LEADER

Bradley commander uses proper fire commands for each engagement.
Bradley commander ensures most-dangerous target is engaged before least-dangerous.
Bradley commander ensures the proper ammunition and weapon system for the target(s) are selected in accordance with target ammunition requirements and unit engagement criteria.
Bradley commander ensures the vehicle moves at least one vehicle length when moving from a turret-defilade to a hull-defilade position and when returning.
Bradley commander ensures the gunner does not fire before receiving the command FIRE.

NON-CRITICAL

Bradley commander or gunner uses proper response terms in support of leader subtask standards.
Bradley commander or gunner uses proper engagement techniques.
Driver uses proper driving techniques.
Crew uses proper defensive techniques.

ENGAGEMENT ASSESSMENTS

T = A GO on task standards, a GO on all critical and leader subtask standards, and no more than one NO-GO on a noncritical subtask standard.
P = A GO on task standards, a GO on all critical subtask standards, with a NO-GO on one or more leader subtask standards or a NO-GO on two or more noncritical subtask standards.
U = A NO-GO on the task standard or on one or more critical subtask standards.

During this period of the evolution of crew gunnery evaluation, the Bradley community had to consider several questions:

Do we retain an evaluation philosophy based on crew performance (scoring matrices)? Do we attempt to have a mixture of performance and threat-based evaluation (PCW) and accept the trade-off of realistic timing standards to retain a point system? Or do we develop a true threat-based system that achieves the goal of challenging crews to meet the realistic standard they may face in combat?

The solution was a GO/NO-GO, threat-based system referred to as T-P-U—trained, needs practice, or untrained.

T-P-U

T-P-U evaluations were first introduced by the Bradley Proponency Office in November 1994 during a master gunner work group meeting, which included a coordinating review of the FM 23-1 preliminary draft. During this meeting, the group discussed the PCW issues along with several other concerns. A prevailing issue was the inflated point systems and the feeling that they would never provide a clear picture of a crew's true proficiency. Battalion averages of 995 points were an example of this problem.

T-P-U represents a fundamental shift in gunnery philosophy toward a standard that is based on the threat's capability and includes the warfighting skills needed to perform gunnery tasks. It also allows units to design gunnery scenarios with realistic threat arrays. T-P-U evaluates each crew engagement on the basis of the GO/NO-GO criteria for the engagement task and its subtask standards.

Crew engagements have a task standard with *critical, leader,* and *noncritical* subtask standards (as shown in the accompanying box). The task standard requires the crew to hit a given target with an appropriate type of ammunition and number of rounds and without exposing the Bradley beyond any of the presented targets' threat-based time. Critical

subtasks are tasks that a crew must accomplish to meet the engagement task standard; leader and noncritical subtasks support the engagement task, but have little effect on a crew's success or failure in accomplishing the engagement task. The crew's T, P, or U is based on its performance while conducting the applicable task and its subtasks.

The Bradley's maximum times of exposure to a target are the threat-based times used with the PCWs. Using only the threat-based times, and combining vehicles into threat categories, has reduced the number of timing matrices to four. These are referred to as BFV exposure timing matrices (see sample matrix in Figure 3).

RANGE (Meters)	TARGET CONDITIONS			
	NORMAL (seconds)	1 CONDITION (Seconds)	2 CONDITIONS (Seconds)	3 CONDITIONS (Seconds)
400	11	12	16	17
500	12	13	17	18
600	13	14	18	19
700	14	15	19	20
800	14	17	20	21
900	15	18	21	22
1000	16	19	22	24
1100	17	20	23	25
1200	18	21	24	26
1300	18	22	26	28
1400	19	23	27	29
1500	20	24	28	30
00	21	25		

Figure 3. Sample of a BFV exposure timing matrix.

A crew that performs the task to standard (hits the target) within these times is a GO for the task standard; in other words, "Hit him before he hits you." If a crew meets the task standard but does not perform a *critical* subtask to standard, it receives a NO-GO for the critical subtask and therefore a "U" for the engagement.

As an example, if a crew hits two targets without being overexposed to either but fails to put on protective masks, it receives a "U" for an NBC engagement. The rationale is that if the crew conducted that engagement in combat it would not be able to hit the target due to the effects of the environment. The principle is, "Train as you would fight."

In another example, a crew detects two targets and engages the less dangerous one before the more dangerous. If the crew overexposes itself to the more dangerous target while engaging the other one, it receives a "U" for the engagement. In combat the more dangerous of the two vehicles would have time to hit the Bradley while the Bradley crew was engaging the other one.

These two examples reflect significant changes from the scoring matrix and PCW philosophies. In the first of these examples, scoring matrices and PCW evaluation procedures would penalize a crew only 30 points for failing to wear protective masks, and a crew that achieved 100 points for an engagement time would pass the task with 70 points. In the second example, scoring matrices and PCW evaluation procedures would penalize a crew only 5 points for engaging the less dangerous target first; a crew that achieved 100 points for an engagement time would pass the task with 95 points. If the crew hit only one of the targets, it could still receive up to 45 points for the engagement.

Even with these improvements, there are some concerns about T-P-U evaluations. One of these is the lack of a numerical score to motivate crews to excel. This is a valid concern that will challenge commanders and their master gunners to develop incentive programs to encourage crew performance. There are several ways to convert these evaluations to numerical scores, but doing this loses sight of the intent and focus of the evaluation philosophy.

T-P-U represents a fundamental shift in gunnery philosophy toward a standard that is based on the threat's capability and includes the warfighting skills needed to perform gunnery tasks.

It is certainly better for a crew to walk away from a gunnery after-action review thinking, "We missed one of two targets during an engagement; in combat, that threat target would have hit us!" instead of, "We missed a target and lost 50 points, but we can make it up during tonight's run." Units can use numeric conversions as a tool for statistical summaries of battalion or squadron gunnery results for AARs to higher headquarters, but points really have little value outside of battalions or squadrons. The bottom line: In unit readiness reporting, the reportable item is the percentage of crews qualified.

Another concern is the use of T-P-U to assess individual crew proficiency. T-P-U is a commander's assessment tool—his personal assessment (opinion) of a unit's level of proficiency on given tasks. The use of T-P-U as an evaluation tool with stringent GO/NO-GO criteria is a move away from the subjectivity of T-P-Us' original purpose; but this evaluation process is designed to evaluate individual crew performance, not overall unit proficiency.

Historically, the proficiency and skills of our noncommissioned officers have determined the results of individual Bradley crew performance, and commanders have used these results to determine their overall assessments of Bradley crew proficiency. Using T-P-U for crew evaluations has no effect on a commander's ability to use it as an assessment tool.

Establishing a GO/NO-GO, threat-based standard for all Bradley models is one of the most important advantages of

T-P-U evaluations. As we field the Bradley A2ODS vehicle with its laser rangefinder and automatic gun elevation correction, we will find that it outperforms its predecessors. And the Bradley A3, which will have a ballistic solution that applies automatic elevation and target lead, should outperform the A2ODS models.

Maintaining a standard based on the threat capabilities and the crew's warfighting skills provides evaluation standards that are applicable to all Bradleys. It does not matter to the threat whether a crew is in a Bradley A0 or A3; his rounds are going to hit the Bradley in the same amount of time. Just as the vehicle has evolved, so have the methods of evaluating crew gunnery. With the publication of the new FM 23-1, we have reached the gunnery goal of providing realistic threat-based training for the entire Bradley fleet.

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Direct Fire Planning

Platoon and Company Sector Sketch

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After a rotation at the National Training Center (NTC), our unit returned home with the realization that our direct fire planning procedures were disorganized, time-consuming, and ineffective. It was apparent that good direct fire planning was an art that required study, practice, and visualization.

Additionally, we were introduced to a set of planning considerations (thanks to our observer-controllers) that we had not been using effectively—time-phasing the engagement area, for example. We needed some tools to help us use this newly acquired knowledge. Clearly, the old method of designating sectors and covering deadspace with indirect fire does not make the most effective use of the company team's capability, nor does it constitute a direct fire plan (DFP). Direct fire is the biggest asset a company commander controls. Engaging a numerically superior force and winning requires higher-level work in direct fire planning.

We identified our major deficiencies as follows:

- Visualization and verification of the plan was lacking. Platoon sector sketches of varying sizes and quality prevented the commander from visualizing and finding weaknesses in the DFP.
- We lacked a standard format for translating what a rifleman or gunner can see and engage up through the chain of command.
- Because of the lack of standardization, disseminating refinements and changes was difficult.
- Although many of the tools of direct fire planning were being used, there was no plan that centralized the effort.

In preparing for our next rotation, and to capitalize on this learning experience, we set out to develop some tools to help soldiers and leaders with direct fire planning. The guidelines we used were as follows: The plan had to be simple, standardized, easy to use, and understood by all soldiers. We had to find a way to bridge the gap between the handwritten range card and an accurate, scaled DFP. Additionally, we wanted to make it easier to disseminate the plan up and down the chain of command. For this, we needed clear, scaled, accurate representations of the platoon and company fire plan. Since no plan is ever static, the plan would also have to allow for the rapid dissemination of changes.

The cornerstone of our system is DA Form 5517-R, the standard range card. We placed two forms back-to-back, with an example derived from the appropriate manual—for example, Field Manual (FM) 7-7J, *The Mechanized Infantry Platoon and Squad (Bradley),* page 6-9, for the BFV; FM 7-8, *The Infantry Rifle Platoon and Squad,* page 2-77, for dismounted positions—on one side and laminated it (Figure 1). Each BFV kept two copies in the turret, and each dismounted soldier carried a reduced version in his helmet. This ensured that each two-man fighting position had one copy and the other copy went to the appropriate leader. The range cards were added to our pre-combat inspection checklist.

The 1:50,000-scale platoon fire plan overlay (Figure 2) is the platoon leader's sector sketch. The company commander issues the upper left and lower right grids during the warning order to ensure that all platoon overlays will line up when he