

TRAINING CIRCULAR 3-20.31-120 Gunnery: **HEAVY TANK**



Editor's Note: In keeping with the traditions of Armor and Cavalry and the Profession of Arms, the C92-series of articles contain a focus on crew gunnery, training, resources, and general information that will be useful and informative to the Mounted Maneuver Community.

C92 was selected as the name of this column as it will be written from the tower's perspective. For decades, the tower has typically been referred to as "Charlie-Niner-Two" or simply written "C92." The origins of the callsign C92 are not in official publications. The legendary use of C92 as the tower's callsign are from the 1970's where units used a Signal Operating Instructions (SOI) to determine their daily or weekly callsigns. While at gunnery, a unit identified the tower as "C92," wrote it down on the scripts for gunnery, and handed the standardized scripts off to the follow-on units. That callsign continues its long history as the authoritative voice during direct-fire gunnery operations

by Weapons and Gunnery Branch

The Evolution of Tank Gunnery

It has been ten years since the last revision of the tank gunnery manual. In the coming weeks the 2025 version of the Abrams gunnery manual will be authenticated and formally published through the Army Publishing Directorate (APD).¹ This manual has a great number of changes from its predecessor, TC 3-20.31, *Training and Qualification, Crew*.² Change is inevitable. Change can be good. According to C92, these are the key changes every leader should be aware of. As the Armor force focuses on large-scale combat operations (LSCO), the evolution of tank gunnery must refocus to more complex, longer-range engagements

and appropriate techniques.

The changes to the gunnery manual will be discussed over three articles. This initial article will discuss the most impactful changes at the unit level. It will be followed by the "nice to know" and "why did that change" topics. The last article will include an introduction and overview to Table Charlie: Complex Engagements.

The Big Changes

The largest changes in the manual are found on Tables IV, Basic, Table V, Practice, and Table VI, Qualification.

Return to Platform Gunnery Manuals

As a recommendation from leaders stemming from the III Corps Lethality

Report³, each platform type should have their own separate gunnery training publication (gunnery manual) for simplicity. TC 3-20.31, Training and Qualification, Crew, included multiple platform training and qualification standards. From that recommendation an updated gunnery manual structure was developed similarly to that used in 1957 through 2005. The basic structure is shown in Figure 1 below. Although not all the manuals in the set, those specific to gunnery on the range are shown for simplicity.

TC 3-20.31, Training: Crew Platforms

The core publication remains TC 3-20.31 with a more refined focus on unit training plans, range requirements, scenario development, and key planning considerations. That

publication will include a series of checklists for units to build their own gunnery standard operating procedures (GUNSOP) and leader certification programs based on Army policy, regulatory requirements, and best practices.

There are three primary gunnery publications for ABCT formation use:

- TC 3-20.31-120, **Gunnery: Heavy Tank**
- TC 3-20.31-25, **Gunnery: Bradley Fighting Vehicle, 25mm**
- TC 3-20.31-404, **Gunnery: Crew-Served Weapons.**

The publication number from the previous 2015 manual was used as the “root” number – with the addition of “-120” or “-25” to describe the caliber of the platform’s primary armament.

The “-120” and “-25” are awaiting authentication and official publication. TC 3-20.31-404, Gunnery: Crew-Served Machine Guns, is undergoing staffing through the remainder of FY25.

The gunnery manuals follow a common outline structure to provide a common

operating picture for the user.

Chapters 1 through 6 provide an overview of the training event, the training event definition, the purpose, method, and end state of the training, and a guide to plan, prepare, execute, and assess each event. Chapter 7 details methods to manage crews once they achieve proficiency.

Prescriptive Engagement Conditions

The “Required Performance Measures” TC 3-20.31, **Training and Qualification, Crew, 2015**⁴ from the previous gunnery manual are rescinded. This allows a far more consistent standard for all engagements in the manual. It removes the ability of a unit to create scenarios with minimal thresholds for training and qualification.

This manual removes the unit’s ability to create scenarios such as:

- One defensive engagement, day and night.
- One offensive engagement day and night.

- One short-range machine gun engagement (<400m), day or night.
- One long-range machine gun engagement (>600m), day or night.
- One short-range main gun engagement (<400m), day or night.
- One long-range main gun engagement (>1800m), day or night

Commanders may only select the sequence of engagements, the split for day / night based on their environmental conditions and select one chemical, biological, radiological, and nuclear (CBRN) engagement day and night.

This is to enable training and qualification standardization across the force, drive extended range engagements supporting large scale combat operations, and eliminate scenarios that were designed toward the minimum thresholds of proficiency.

Live Fire Accuracy Screening Test

Units must be aware of the changes with zeroing or the live fire accuracy screening test (LFAST) both Abrams and Bradley platforms. For Abrams, the procedures for conducting boresighting and LFAST have changed. First, the boresighting distance recommendation is moved from 1200-meters to 1600-meters, +/- 10-meters. This pushes the boresight panel out to a more tactically relevant distance. The LFAST panel range-to-target also is pushed out to 1600-meters (an increase of 100-meters). This allows crews to align their optics during boresighting procedures and conduct the live-fire accuracy screening checks at a tactically relevant distance in keeping with the Army Calibration Policy and recommendations from the Armor and Engineer Board.⁵ Updated standard target number 5 (ST-5) panel dimensions and construction instructions are provided as shown in figure 2.

The procedures for conducting the LFAST have also changed to require the gunner complete a “G” pattern on

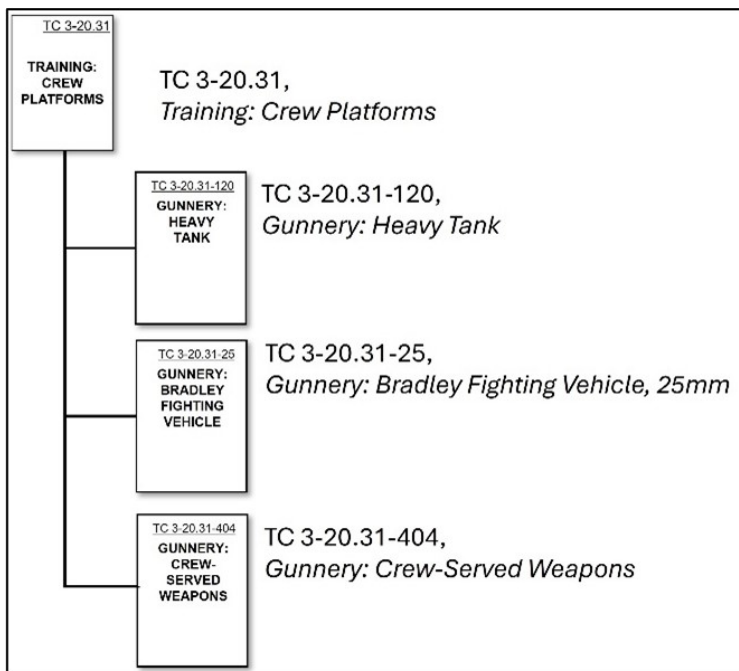


Figure 1. Gunnery Manual Structure (U.S. Army Graphic)

target using manual controls, ensure the appropriate ammunition type is indexed and loaded, lase to the target to ensure the ballistic solution is created, and release the palm switches. Once done, the gunner uses manual controls to refine the lay on target with the last movement up. When prepared-to-fire, the tank commander reports set, and the command of execution is authorized by C92. Using the manual firing mechanism (commonly referred to as the “master blaster”) to send the round to target.

Why is that such a big deal?

Our gunners today are relatively inexperienced with no live-fire engagements under their belt. For most, LFAST is the first time a new gunner has ever fired a main gun round with purpose (not including one station unit training or OSUT). Use of manual controls after the ballistic solution is established and then firing with the manual firing mechanism eliminates flinching, jerking, or anticipation movement

of the gun firing. It removes gunner lay error and focuses on the fire control system’s ability to calculate the ballistic solution, apply it to the main gun, and fire the round in as close to a static firing occasion as possible. The goal of the change is to eliminate crew error as much as possible from the accuracy screening test.

Main Gun Confirmation

Once LFAST and zeroing are complete,

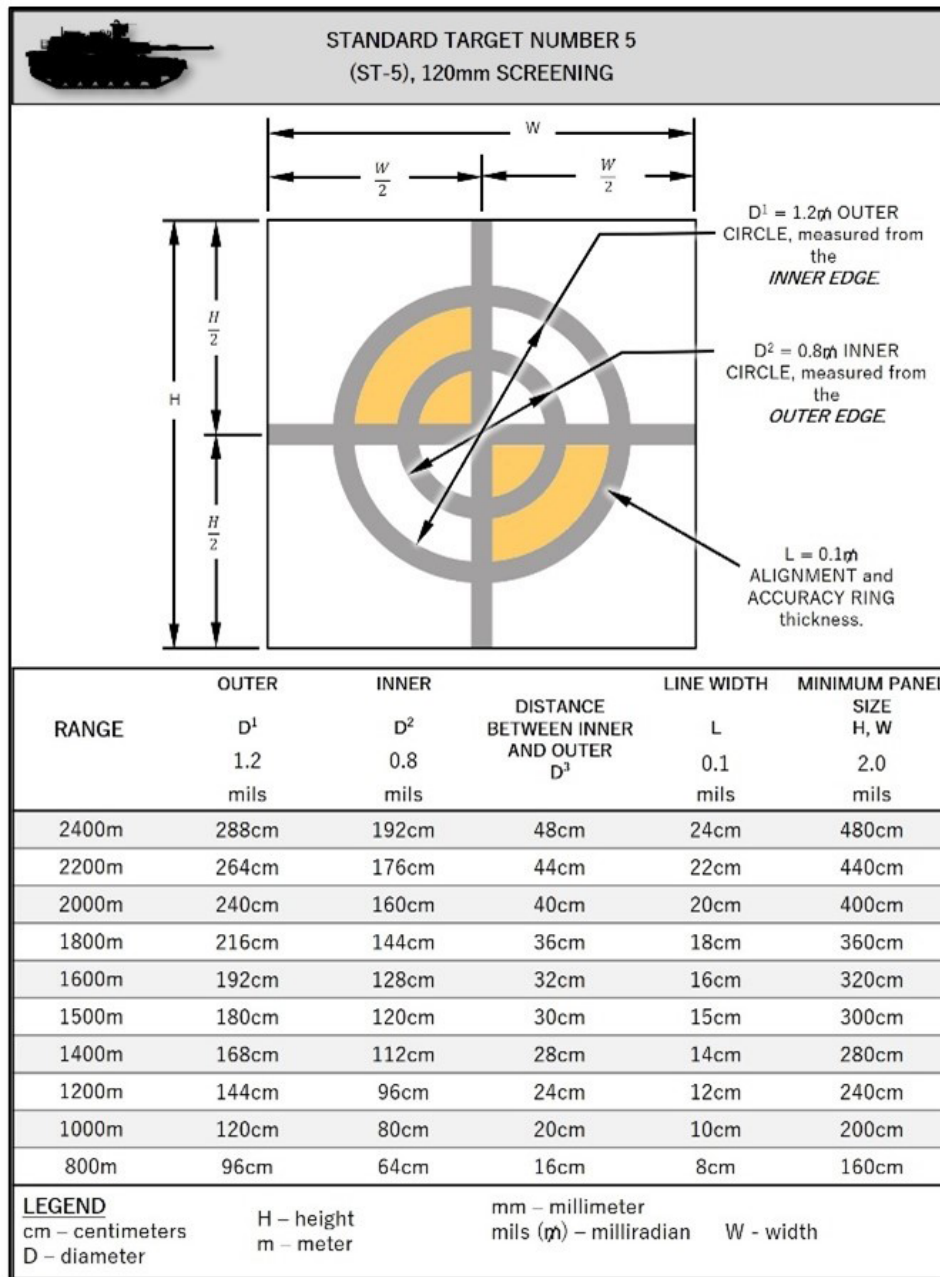


Figure 2. ST-5 Panel Updated Dimensions (U.S. Army Graphic)

the unit may conduct an enhanced fire control system check for main gun engagements. This is not resourced with Department of the Army Pamphlet (DA Pam) 350-38, *Standards in Weapons Training*. To conduct these two engagements, each crew requires an additional six (6) rounds, 3 each M865A1 training sabot and 3 each M1002 training Multi-Purpose Anti-Tank (MPAT) rounds. Reviewing the Army’s utilization reports over the past ten years show historically low utilization of main gun resources (below 65% of authorized in most units) and therefore have the ability to self-resource these engagements.

There are three primary tasks within these two engagements:

- From a defensive firing position using a fully operational fire control system, the gunner engages one stationary tank frontal with sabot training round, followed by one moving personnel carrier with an MPAT training round.
- Crew conducts a Muzzle Reference Sensor Update per their technical manual (TM).
- From a defensive firing position using a fully operational fire control system, the tank commander engages one stationary tank frontal with sabot training round, followed by one moving personnel carrier with an MPAT training round.

The LFAST coupled with these three tasks provide the crew with confidence in their fire control system, preparation-to-fire procedures, maintenance procedures and processes and conduct of fire. It verifies the lead angle sensor from a stationary platform against a moving threat, amplified by using the slowest main gun round against a moving target.

The crew gains additional confidence in the muzzle reference sensor update by continuing to engage from the tank commander’s position. Again, the slower round is used against the moving target to ensure the lead-angle




| 43  | | TABLE IV, B MAIN GUN CONFIRMATION | | | |
|--|---------------------|---|---|------------------|----------|
| TASK TYPE: | | MAIN GUN PURE | | POSTURE: DEFENSE | |
| | | DELAY: | | 25 SECONDS | |
| | | TARGET 1 | TARGET 2 | TARGET 3 | TARGET 4 |
| CONDITIONS | |  |  | | |
| FIRER | | GUNNER | GUNNER | | |
| WEAPON / AMMUNITION | | SABOT | MPAT | | |
| TARGET | | TANK | BMP | | |
| TARGET TYPE | | H1T-FRT | M2T-FLK | | |
| TARGET POSTURE | | STATIONARY | MOVING | | |
| RANGE TO TARGET | | 1,400m | 1,600m | | |
| ENGAGEMENT MODIFIER | | 7 | 8 | | |
| LEGEND | | | | | |
| COAX | COAXIAL MACHINE GUN | m | METER | | |
| FLK | FLANK | MPAT | MULTI-PURPOSE ANTITANK | | |
| FRT | FRONTAL | | | | |

Figure 3. Engagement 43, Main Gun Confirmation, gunner’s power control handles, example (U.S. Army Graphic)

sensor and ballistic computer are functioning properly, as the commander’s handle and trigger.

These engagements also facilitate the platoon sergeant’s evaluation of their crew’s conduct of fire during the engagement while serving as the loader.

Basic Machine Gun Engagements

Once complete, the crew continues with the defensive, basic machine gun engagements. These engagements are machine gun pure using both the coaxial machine gun and commander’s caliber .50 heavy machine gun. These engagements are designed to assist the crew with identifying any issues with their machine guns, commander’s independent thermal viewer (CITV or ITV), and also allow the platoon sergeant to evaluate the crew’s basic conduct of fire techniques.

Four-Target Engagements

This table introduces the crews to one offensive and one defensive four-target engagements, which have not been in the live fire training strategy since

the “BRAVO-THREE-SWING” or “B3S” from 2001.⁶

The original B3S was introduced to the Abrams fleet in 1998 where a crew fighting from a defensive position, engaged a stationary tank frontal and a moving tank, followed by a defilade tank frontal (15-second delay) and a set of troops (25-second delay). This engagement was a “swing” task, where it could be fired either during the day or night phase of the course of fire.

In general, not including any authorized defilade time, the crew must kill all 4 targets in 52 seconds to pass.

By way of comparison, placing the targetry from the B3S from 1998 in today’s threat-based scoring model under the same firing conditions, the crew must kill all 4 targets in under 55 seconds (again, not including defilade or break times.)

In the older scoring model, the crew also could pass the engagement if they defeated 3 of 4 of the targets (using all authorized defilade time) in a total of 42 seconds.⁷ Today, if a crew fails to kill any target presented within an engagement, they fail the engagement.

Although the targets within these engagements are different, without scrutinizing the type of targets within the engagement itself, to pass the crews must defeat all targets (not just 3 of 4) presented in less than:

- 59 seconds on the offense
- 57 seconds from the defense.

The scoring models differ conceptually, but they don't differ much mathematically. These numbers are based on a "slowest minimum standard" calculation.⁸ In the defense alone, the minimum standard appears 5-seconds slower. But the targetry within those engagements are not equal in nature. For example, Engagement 65 in the Gunnery: Heavy Tank book, provides the conditions for the four targets fired from the defense:

- Troops, 400m (coax) – generally the same range band from the B3S.
- Stationary PC, 1600m (MPAT) – the defilade tank is presented at 700-900 meters – 700-meters closer with a smaller target.
- Stationary tank, 2000m (sabot) – 400-meters farther than the B3S stationary tank.
- Moving tank, 2200m (sabot) – this is 400-meters farther than the B3S's moving target.

The sequencing of the targets coupled with the extended range of the targets provide 5-seconds more time to kill the threats in the current scoring model.

In context to killing, the further the target, the more time to kill it is available.

Minor Crew Penalties Don't Fail You

Lastly, in older scoring models, if the crew killed all the targets and received 70-points (passing), they could have received a penalty for an error in their conduct of fire (-5 points), causing the crew to fail the engagement. Today's

scoring model does not permit conduct of fire issues (5-point penalties) from disqualifying a crew's engagement. If the crew killed fast enough but said some things out of sequence, it will not cause the crew to fail the engagement.

Table V, Practice

The principles of the practice course of fire include use of ¾ scale targets at full-range and provide more challenging engagements to build experience for the crew prior to the qualification course of fire, Table VI. This isn't a change, actually... we are just highlighting this as a critical requirement during scenario development along with the required use of battle effect simulators (BES) as part of the Army-standard target presentations.

Train Harder than the Test

That's the most important aspect of Table V. Practice with a higher level of difficulty and the qualification course of fire will be easier.

There are other aspects of "difficulty" that are applied to Table V. The degraded engagement conditions are more complex and difficult to master. The engagement ranges are farther – which provides more time but have a lower probability of hit (Phit).⁹ Other aspects of Table V require the unit to actively evaluate conduct of fire to reduce the time it takes to announce the fire commands. The unit should practice brutality evaluating the conduct of fire for each crew during simulations including Table II, Table III, Table IV, and Table V.

Enforce Speed and Violence of Action

In killing, speed and violence of action are critical for the crew's success. For every crew that doesn't understand conduct of fire (fire commands), valuable time is lost. Units that do not adhere to training conduct of fire correctly are the ones that habitually use "fire and adjust" for most engagements

without understanding what it is actually for, or that they are adding one or two additional seconds to their kill time.

The goal is for the crews to understand conduct of fire better than proper emoticon use on their phone. Say only what is necessary.

Acquisition Reports vs. Contact Reports

Crews must understand that an accurate acquisition report takes the place of the alert and target description elements of the fire command. If done correctly, it also includes the mandatory crew response terms for the gunner. TC 3-20.31-040, *Direct Fire Kill Chain*, and TC 3-20.31-043, *Conduct of Fire*, establish a clear difference between a contact report and an acquisition report. Contact reports are fine informing leaders of observed things by military description – i.e. the loader announcing

"TANK, LEFT FRONT."

The tank commander and gunner have that contact report to react to. An acquisition report is provided by the gunner and includes a target description and range to target. This takes the place of multiple elements in the fire command AND a required crew response. For example, the gunner can provide an acquisition report of

"TANK, ONE-FOUR-HUNDRED."

This simple acquisition report provides a sufficient target description and includes the determined range to target. It is implied that the gunner identified the target description and does not need to announce "IDENTIFIED" as a crew response.

The tank commander would wait for "UP" from the loader, assess the acquisition report and target, and just announce the command of execution...

"FIRE."

And that speeds up the conduct of fire.

That makes killing faster. That makes crews better. That increases the crew's lethality. If units don't train proper conduct-of-fire or reinforce that training during simulations use and during every tank table, they're placing their qualification in jeopardy.

FIRE, FIRE SABOT

In the next article, we will discuss those slight changes and nuances and explain some of the "why" and "how" behind them. We will provide background information to build better context for each.

Notes

¹Army Publishing Directorate. (2025, April). APD - Army Publishing Directorate. Retrieved from ArmyPubs: <https://army-pubs.army.mil/>

[pubs.army.mil/](https://army-pubs.army.mil/)

²TC 3-20.31, Training and Qualification, Crew. (2015). Fort Benning: Department of the Army.

³III Armored Corps. (2019). III Armored Corps Lethality Report. Fort Hood: Department of the Army, III Armored Corps.

⁴TC 3-20.31, Training and Qualification, Crew. (2015). Fort Benning: Department of the Army.

⁵(1980). TRADOC ACN 2136, Concept Evaluation of Battlefield Boresight Techniques and Zero Retention. Fort Knox: US Army Armor and Engineer Board.

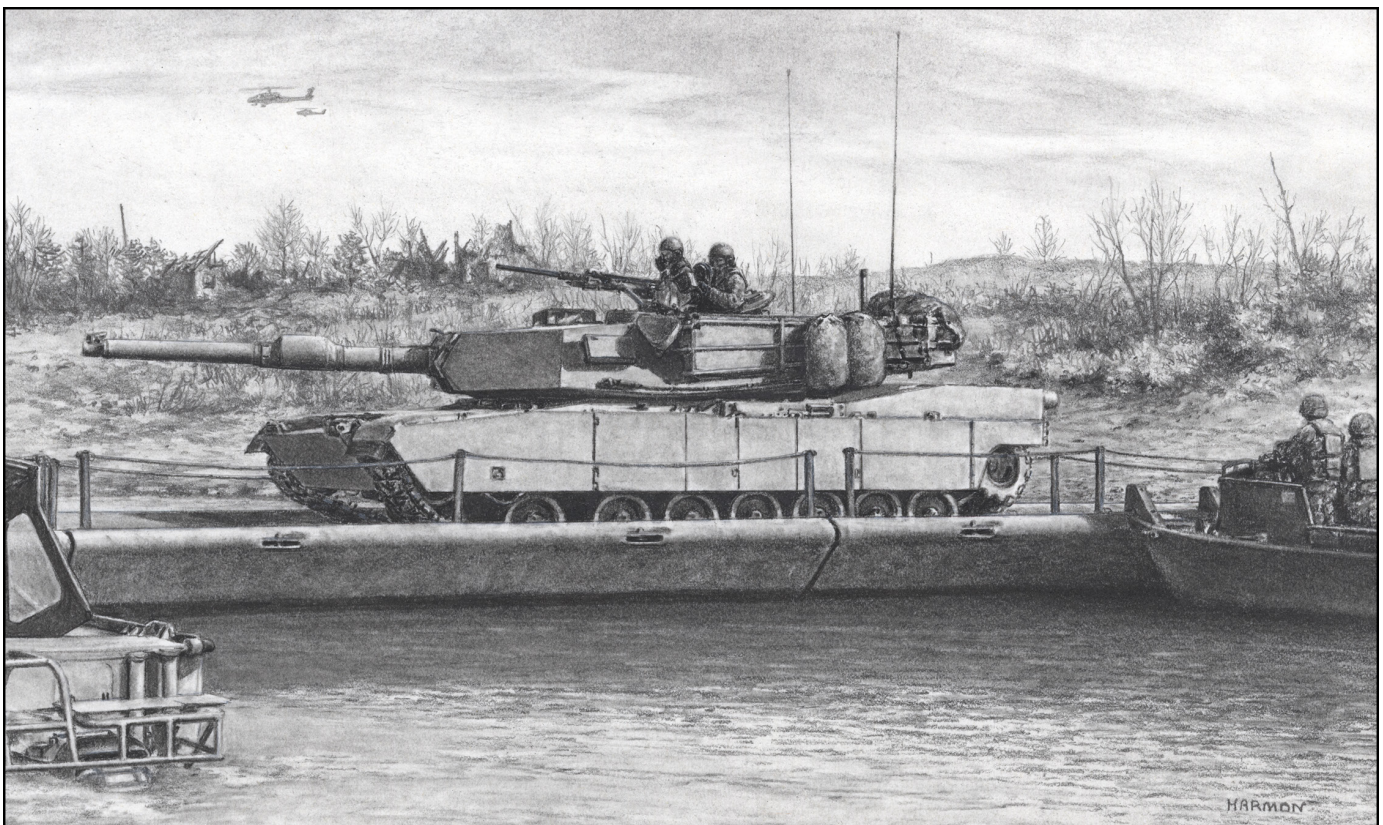
⁶FM 3-20.21, Tank Gunnery (Abrams). (2001). Fort Knox: Department of the

Army.

⁷FM 17-12-1-2, Tank Gunnery (Abrams) Trainer's Guide. (1998). Fort Knox: Department of the Army.

⁸DA Form 8265, Common Crew Score Sheet. (2015). TC 3-20.31, Training and Qualification, Crew. Fort Benning, GA: Department of the Army.

⁹Probability of hit (Phit) for gunnery training accounts for unclassified aspects of the error budget. Generally speaking, the error budget for main gun engagements includes fixed biases that are mathematically accounted for by the fire control system, variable biases that are mostly addressed by the fire control system, and random errors.



From the ARMOR Art Archives:
"River Crossings"