



# Tank Proofing Teams: Key to a Successful Gunnery

by Sergeant First Class Samuel K. Haines

The first priority in tank gunnery is mastery of individual and collective gunnery training objectives, skills, knowledge, and the demonstration of crew proficiency. Crew qualification is the standard used to measure crew proficiency. This requires well-planned training. Progress in training is based on mastery of the basic tank gunnery individual skills and knowledge. One means of ensuring a successful gunnery is to utilize tank proofing teams.

The proofing team assists the master gunner in training and supervising individual tank crews at company/troop level. The team helps tank commanders perform maintenance checks, fire control system calibration, and troubleshooting procedures. The commander and master gunner must select the most technically competent tank commanders and gunners to act as the proofing team.

At home station, the proofing team trains the tank crews, as required or directed by the commander, and is on hand to help crews prepare for and conduct the screening test. The team also assists the crew in firing the screening test, if necessary. The success of the screening test depends on the proofing team and crewmembers eliminating mechanical faults and crew errors before firing the first round of the test.

The proofing team inspects tanks that fail the screening test for mechanical or crew procedural errors that might have caused a screening test failure. When available, direct support contact teams should also participate. Throughout the remainder of the gunnery density, the proofing team provides assistance, as required. The following must be completed before the screening test:

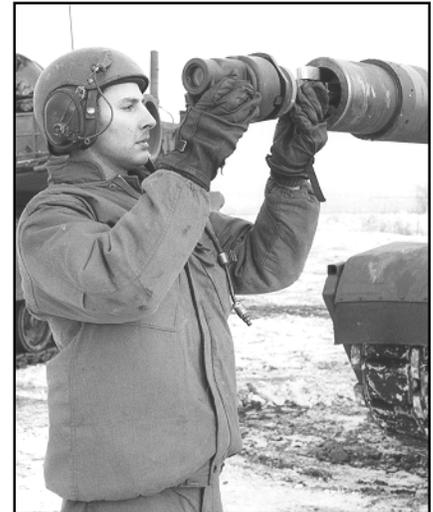
- **Collimation checks** of the Muzzle Boresight Device (MBD), (M26A1 or M27A1). An MBD may be colli-

ated to the particular tank on which it will be used. When an MBD is collimated to a particular tank, boresighting the tank is faster and more accurate and does not require a mean boresight reading. The tank crew should conduct a collimation check before main gun live fire to determine if the MBD must be collimated. The crew should also conduct collimation checks periodically during routine maintenance to ensure the MBD is correctly collimated and to determine if it needs to be turned in for repair.

- **Preventive maintenance** checks and services (PMCS) are performed to keep the tank in operating condition. The checks are to find, correct, or report problems.
- **Fire control system calibration.** Reserve component tank crews should perform armament and accuracy checks (AACs) quarterly. These checks allow units to diagnose and correct problems at home station before any scheduled live fire.

Prepare-to-fire checks and muzzle boresighting must be performed before the AACs; therefore, quarterly checks also serve as valuable training tools to help ensure crews become proficient in prepare-to-fire checks and muzzle boresight procedures. A master gunner performs special gunnery checks when a tank fails the screening test. Fire control system calibration consists of:

- **Prepare-to-fire checks.** These checks ensure the tank is ready to fire. These checks supplement, but do not replace, PMCS and should be performed in the order listed in table 2-2 of the operator's manual.
- **Muzzle boresight procedures.** Bore-sighting establishes a definite relationship between the axis of the bore



of the gun and the sights, providing a basis for all sight adjustment. When the tank is boresighted at a known range, the fire control system provides system parallax corrections to the gunner's primary sight (GPS) and the thermal imaging system (TIS). It is impossible to fire accurately without sight adjustment; therefore, boresighting is fundamental in tank gunnery. In training, boresight before every firing table. In a hostile environment, boresight whenever the tactical situation permits.

- **Armament and accuracy checks.** These checks help to ensure that the fire control system is fully operational and special inputs and the ballistic solutions are implemented properly for fire control components and all main gun ammunition. They also verify that the muzzle reference sensor (MRS) can correct an artificially induced boresight loss. These checks are also designed to be performed by the crew quarterly. Crews need to know, not only how to perform the checks, but also what they are checking.
- **Special gunnery checks.** A master gunner will perform these checks if the AACs cannot be performed or the tank cannot pass the screening test. The lead accuracy check should be done when the gunner begins to miss targets excessively in azimuth for no

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apparent reason. The superelevation check should also be done when the gunner begins to miss targets excessively in elevation for no apparent reason. Before conducting these checks, the crew must perform an end-for-end check on the M1A1 gunner's quadrant to ensure it is within tolerance.

**Live fire accuracy screening test (LEAST).** To ensure tanks can fire accurately using the fleet zero, Computer Correction Factors (CCF) method of calibration, a screening test is conducted at the start of every live-fire training cycle. Calibration of the main gun consists of boresighting and entering CCFs into the ballistic computer; the zeroing process is no longer performed when an MBD is available. In the past, many fire control mechanical errors were not detected, or were allowed to go uncorrected, because crews thought zeroing would compensate for mechanical problems. Zeroing will never make mechanical problems go away; nor will zeroing make a defective tank shoot properly under all conditions. The only effective correction is to identify the mechanical problem and fix it.

- The screening test consists of firing first sabot, then HEAT ammunition at a screening test target (ST) at 1200 meters, (the target must be within 20 meters of the required range). Two rounds of each ammunition type are allocated for this purpose once each year. To pass the screening test, one round (out of two shots) for each ammunition type must hit entirely within the octagon of the target.
- If a tank fails either the sabot or HEAT portion of the screening test, the proofing team inspects it. If a correctable mechanical problem or procedural error is found, it is corrected and the crew re-boresights the tank, with supervision from the proofing team. Then the tank crew re-fires the portion of the screening test the tank failed. If the tank passes the screening test the crew and tank proceed with training. If the tank is sent to direct support maintenance or a line replacement unit is changed, the tank crew must reboresight the tank and fire another screening test (when the faults are corrected) using the fleet CCF, or the tank-discrete CCF if one has been established, with supervision from the proofing team.
- The next step is to zero the coax and boresight the M2 caliber .50 machine

guns in accordance with the operator's manual.

**Troubleshooting.** Maintenance instructions are outlined in Chapter Three of the operator's manual. They are organized into two sections: troubleshooting and maintenance procedures. Each section has its own index to provide a quick reference for solving a problem. Troubleshooting helps the crew solve the problem through corrective action. Maintenance procedures tell the crew how to make the repairs allowed at crew level. The proofing team must have extensive knowledge of maintenance procedures and of the following tasks:

- **Boresight loss.** Boresighting is simply an alignment process by which the gun and sighting system are referred to the same point. Any movement of the gun or sights away from that alignment is a loss of boresight. While the tank has boresight retention equipment (the MRS), the most reliable method of correcting boresight loss is to reboresight the system.
- **Boresight check.** During long periods between the time the system is boresighted and the time the tank is fired, boresight loss may occur due to changes in weather conditions. Crews can check for boresight loss by conducting a boresight check.
- **MRS confirmation.** When reboresighting or a boresight check cannot be performed, an MRS update is used to correct for boresight loss. An MRS update can be accomplished only if the tank sights and MRS have been properly boresighted. During live-fire training, crews can monitor the performance of their MRS to determine if the MRS performs within tolerance.
- **Screening test failures.** *FM 17-12-1-1* chapter 5-5,6 lists some common questions the proofing team should check when a tank fails a screening test. These questions are only samples and are not all-inclusive.
- **Tank-discrete CCF.** If a tank cannot pass the screening test using the fleet CCF, a tank discrete CCF must be determined. An additional round of the ammunition type that failed must be fired. The proofing team will determine a CCF from the three-round group in accordance with procedures in *FM 17-12-1-1* chapter 5-6 through 5-8. Once the CCF is entered, fire one round for confirmation. If the round hits, screening is complete. If the

round misses, the proofing team will troubleshoot the system. If the proofing team established a new tank-discrete CCF, that CCF should be recorded on the vehicle DA Form 2408-4 and used on that vehicle in place of the published fleet CCF.

Results of all screening test failures must be compiled by the firing unit and sent to the U.S. Army Armor School (USAARMS). The data will enable the USAARMS to monitor unit experience under these calibration policies. This data will be recorded on a discrete CCF worksheet seen in *FM 17-12-1-1* chapter 5-9.

Good maintenance and training programs are paramount to successful fire control system calibration. Success of the screening test depends on the proofing team and crewmembers eliminating mechanical faults and crew errors before firing the first round of the screening test. Having a qualified proofing team at company/troop level will better enable the unit to meet requirements during tank gunnery qualification.

**References:** FM 17-12-1-1/2, TM 9-2350-255-10-1/2, and DA PAM 350-38

*Editor's Note: To implement this technique, units may wish to access a Proofing Team Certification Test and a Training Outline, which will be available on our website at: [www.knox.army.mil/armormag/ma00indx.htm](http://www.knox.army.mil/armormag/ma00indx.htm).*

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SFC Samuel K. Haines entered military service in 1983. After OSUT at Ft. Knox, he served as a loader, driver, and gunner with 3-66 Armor, Ft. Hood, Texas. Other assignments include gunner and TC with 3-32/2-67 Armor, Friedberg, Germany; gunnery instructor, Armor Officer Gunnery Branch, 6-12 Cav, Ft. Knox; recruiter/station commander, Salt Lake City Recruiting Battalion, Utah; and TC/platoon sergeant, A Trp, 4-16 Cav, Ft. Knox. He has attended PLDC, BNCOC, ANCOG, COFT SIO, AFIST SIO, and Master Gunner School. He recently served as Master Gunner Advisor, Field Training Group, 28th Infantry Division (M). Presently, he is a National Guardsman serving as a master gunner in the 28th ID (M).