

NEW, IMPROVED LOMAH SHOT LOCATION SYSTEM

SFC (RETIRED) MATTHEW GOLDEN AND MAJ (RETIRED) DENNIS TERRY

Many Soldiers have never fired on a range that has a Location of Miss and Hit (LOMAH) system. The LOMAH system is an automated live-fire target system that provides immediate feedback of the location of each shot fired by each rifleman using a display screen at the firer's position and at the centralized computer system in the range tower. The LOMAH system detects hits and misses (up to two meters from the center of the target).

This is a much more efficient way of accomplishing the old "human method" of individual marking and scoring on known distance (KD) ranges. LOMAH enables the coach/trainer in recognizing and identifying shooting errors in order to assist in correcting those errors in a more defined and accurate methodology while reducing ammunition expenditure and time required for training exercises. The art of recognizing shooting errors cannot be taught by the LOMAH system, but it can enhance a knowledgeable trainer's ability to explain errors more effectively. The LOMAH system significantly reduces manpower requirements to conduct certain small arms training strategy tasks.

In the early 1980s, the U.S. Army Training and Doctrine Command (TRADOC) inquired about a system to improve the efficiency of conducting confirmation of zero at distance using an automated process versus manpower. This task was conducted on a KD range that was time and manpower intensive. A typical day consisted of conducting this task by assigning a detail platoon to raise and lower the large KD target lifter from behind a large earthen and concrete berm while shooters engaged the target from a distance of 100-300 meters. After the firing order fired their first three-round shot group, the target would be lowered and marked with pasters. The target would be raised to show the shooter and instructor the shot locations. An experienced guess (depending on the proficiency of the trainer) would be used to determine what sight corrections should be made in order to get the shooter's rounds to strike near the center in order to confirm the shooter's zero at distance. The targets were lowered and pasters were reapplied to make the target appear clean for the next shot group. Imagine a 240-Soldier Initial Entry Training (IET) company trying to complete this task from the 100-, 200-, and 300-meter firing lines with only 32 lanes. In some cases, it would take units two days to complete this very important basic rifle marksmanship (BRM) task, thus the reason for TRADOC looking for efficiencies.

This led to the LOMAH system being designed for Army IET units in the mid-to-late '90s. Between 2000-2004, LOMAH systems were installed on ranges at all IET locations such as Fort Jackson, S.C.; Fort Benning, Ga.; Fort Knox, Ky.; Fort Sill, Okla.; and Fort Leonard Wood, Mo.

The system was designed for the M16 series rifle and 5.56mm ammunition that were used at that time using a three-round shot group training strategy based off of iron-site engagements. These systems were installed on Army field fire ranges that had three rows of targets at set distances of 75 meters, 175 meters, and 300 meters. This range is also used to train other BRM tasks such as introduction

to automated targets with single exposure (untimed) to multiple exposures (timed). The idea was to slowly increase the difficulty using a gated strategy in order to ultimately meet the qualification standards on a range with target bands from 50-300 meters.

In 2009, the TRADOC commander asked the Maneuver Center of Excellence (MCoE) to re-examine current BRM training strategies for both IET Soldiers and Basic Officer Leadership Courses (BOLC) students. This led to a new strategy that was implemented the 3rd Quarter of Fiscal Year (FY) 2010. This new strategy introduced many changes in both BRM and advanced rifle marksmanship (ARM). This also led the TRADOC Sustainable Range Program (SRP), TRADOC Capability Manager (TCM)-Live Range Development Team in TCM-Live Ranges, MCoE, and Project Manager (PM) Training Devices (TRADE) toward analyzing current ranges and target systems (including LOMAH) for compatibility to meet the new requirements. This system has proprietary software which required a new contract action to modify the software each time doctrine changed. During the analysis, it was determined that updating the old LOMAH system software would be too costly and in some cases impossible to meet the new requirements.

TCM-Live and PM TRADE proposed a plan to execute a new contract for a LOMAH system in order to bring it into the 21st century from a technological perspective. The older system was outdated and did not meet new Army target and Corps of Engineers infrastructure standards. TCM-Live, TRADOC SRP, and MCoE captured all requirements from the 2010 approved strategy and worked closely with PM TRADE, who ultimately wrote the specifications document that led to industry competing for the opportunity to provide the Army with a first class LOMAH system with government-owned software.

Having government-owned software will save the Army millions of dollars over time as software will need to be updated periodically to reflect changes in training strategy, weapons, weapon sites, and ammunition. Writing the specifications to meet the current requirements and be flexible enough to make easy changes to the software in order to accommodate new equipment in the future was critical in this endeavor, and PM TRADE hit a home run with this newer generation LOMAH specification requirements document.

The old system provided iron site corrective data for one set zero distance. The newer system is using up-to-date software technology that allows the end user to make changes to scenarios on the range in just a few minutes. The newer system accommodates all M16 and M4 series weapons with every type of site configuration in the system (iron site, backup iron site [BUIS], close combat optic [CCO], and advanced combat optical gunsight [ACOG]). The newer system can easily change the number of rounds fired in a shot grouping. For example, IET Soldiers fire five-round shot groups whereas home-station Soldiers fire three-round shot groups. It provides instant feedback to the Soldier on an android-based tablet at the shooter's location to include site adjustments

based off the input data the Soldier provided initially (e.g. Soldier inputs M4 series weapon with CCO and 200-meter zero distance). The system will have the zeroing circles match the zeroing distance by off-setting the circle (the 200-meter or 300-meter zeroing circle would be in different locations on the 175-meter target) as necessary and provide site corrective data for the site and weapon entered. The shooter aims for center mass throughout the process of confirming zero at distance.

During the newer LOMAH development process, an instructor/leader station was also produced. This station is a wireless android tablet that allows instructors to see all lanes, a group of four lanes, or the ability to drill down into a single lane if necessary. The instructor/leader station also provides colored-coded backgrounds that indicate how well or how poorly a shooter is executing the tasks at hand. If the shooter is not shooting well and has little or no chance of meeting the required grouping size, the background for that lane will change to yellow or red. This shows instructors who needs immediate assistance. The newer LOMAH system has been installed on two modified record fire (MRF) ranges at Fort Benning and one automated field fire (AFF) range at Fort Leonard Wood. Fort Jackson should receive the newer LOMAH system in FY14. Fort Eustis, Va., and Fort Drum, N.Y., have recently acquired this new LOMAH capability as well.

Fort Benning's LOMAH range is unique in that it was installed over a normal qualification range known as the automated record fire (ARF) range. When ARF and AFF ranges are combined (by adding the 75 meter and 175 meter targets), they become MRF ranges. This also provides a capability where home-station units based at Fort Benning could schedule the range and conduct three tasks on one range in a third of the time it normally takes. On the MRF range with the LOMAH system, units can skip the 25-meter zero range and KD range and meet both requirements because it provides the ability to zero at distance (zeroing and confirming zero at distance becomes one task). Once all Soldiers have confirmed zero at distance, you can run the qualification scenario on the same range because it has all the qualification targets as well. During the government acceptance test (GAT) conducted at Fort Benning, the 3rd Squadron, 1st Cavalry provided a home-station organic platoon to test the new range. During the GAT, they had 22 Soldiers who did not go to a zero range prior to testing. Soldiers used M4 series weapons with different sites (BUIS, CCO, and ACOG). Twenty of the 22 firers shot sharpshooter or expert during their practice qualification. Soldier feedback on the system included that "every qualification range should have this system." Soldiers were impressed that they could come to one range and meet three different tasks, which included qualification in such an effective and efficient manner. They were also impressed with the how simple

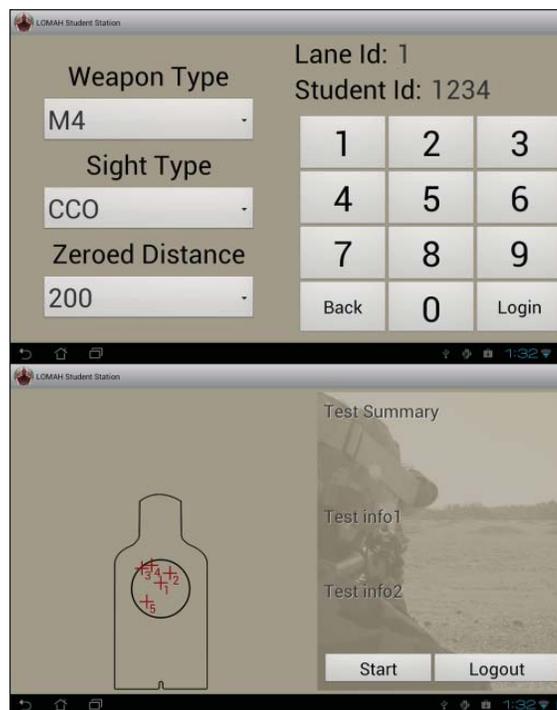


Figure 1 — Example LOMAH screenshots

the system was to operate and how each lane could be independently run during the zeroing process.

PM TRADE has ensured that the LOMAH system's operating infrastructure and software can be installed on old or new infrastructure ranges; it has also conducted research on potentially using the LOMAH bar as a standalone system that communicates directly to the student/shooter station without any range infrastructure. A range could literally be set up by installing the LOMAH bar at any distance with a small power source (battery) and capture shot location miss/hit data. Recently, the LOMAH system was set up on a range that had one half of the range with older installed infrastructure and the other half with newer infrastructure (including a KD berm at 500 meters with an E-type silhouette set on top of the berm with a LOMAH bar).

The Combined Arms Center-Training commander observed the different range infrastructure capabilities as well as the prototype stand-alone capabilities during a live-fire event. He was very impressed with how effective and efficient this system could make small arms training events. Providing shooter feedback of shot location on targets at distance is invaluable to the shooter and provides for more effective engagements overall.

The new system was also fired on by an automatic rifleman shooting a M249 at 500 meters. After the first engagement of a three-to-five-round burst, the gunner was able to see his cone of fire from the first to the fifth round due to the fact that the system numbers the shots as they are detected. The shooter had never observed his cone of fire on or near a target at distance. He immediately sharpened his fundamentals and re-engaged the target.

This system has the capability to provide shooters — from those using M16 and M4s to machine gunners and snipers — an ability to be more effective shooters at distance with instant feedback. Machine gunners could zero at distance versus shooting the 10-meter paper target. Leaders could also teach more effective traverse and search techniques at distance. Any Soldier who has been on a few qualification ranges can make the connection of how efficient and effective a system like this could make shooters and how much more effective shooters would be on collective training events or combat engagements.

SFC (Retired) Matthew Golden is the target development team chief with TCM-Live Range Modernization Branch at Fort Eustis, Va. His active duty assignments included serving with the 82nd Airborne Division and 101st Airborne Division (Air Assault) and drill sergeant duty with the U.S. Army Infantry School, Fort Benning, Ga.

MAJ (Retired) Dennis Terry served in every type of Infantry unit during his 26 years in the Army. He served in the enlisted ranks from E-1 to E-7 prior to attending Officer Candidate School. He is currently serving as a combat developer/senior training analyst in a support contractor position with TCM-Live Range Development at Fort Eustis.
