AVP:
Increasing Laser Target Location Accuracy at Max Ranges

By Sergeant First Class Stephen R. Hekeler

One fire support observation at the National Training Center (NTC), Fort Irwin, California, is that, too often, lasing teams inaccurately engage targets of opportunity with indirect fire. This occurs even when they use the highly range accurate ground/vehicular laser locator designator (G/VLLD). Targets viewed through the 13x optics for the G/VLLD in daylight and with no obscuration can distinguish between friendly and enemy vehicles at 7,500 meters. Enemy targets acquired by lasing systems normally are engaged at ranges of 3,000 to 5,000 meters from the observation post (OP) instead of maximizing the system and lasing them at 7,000 to 8,000 meters.

Any azimuth inaccuracies applied to the lasing system are amplified the farther away the target is from the lasing system. During force-on-force battles at the NTC, observer teams are commonly inaccurate in determining their observer-to-target azimuths by as much as 120 mils. If the target had been lased at 7,000 meters, the initial indirect fires would incur a target location error (TLE) of as much as 840 meters to the left or right of the target.

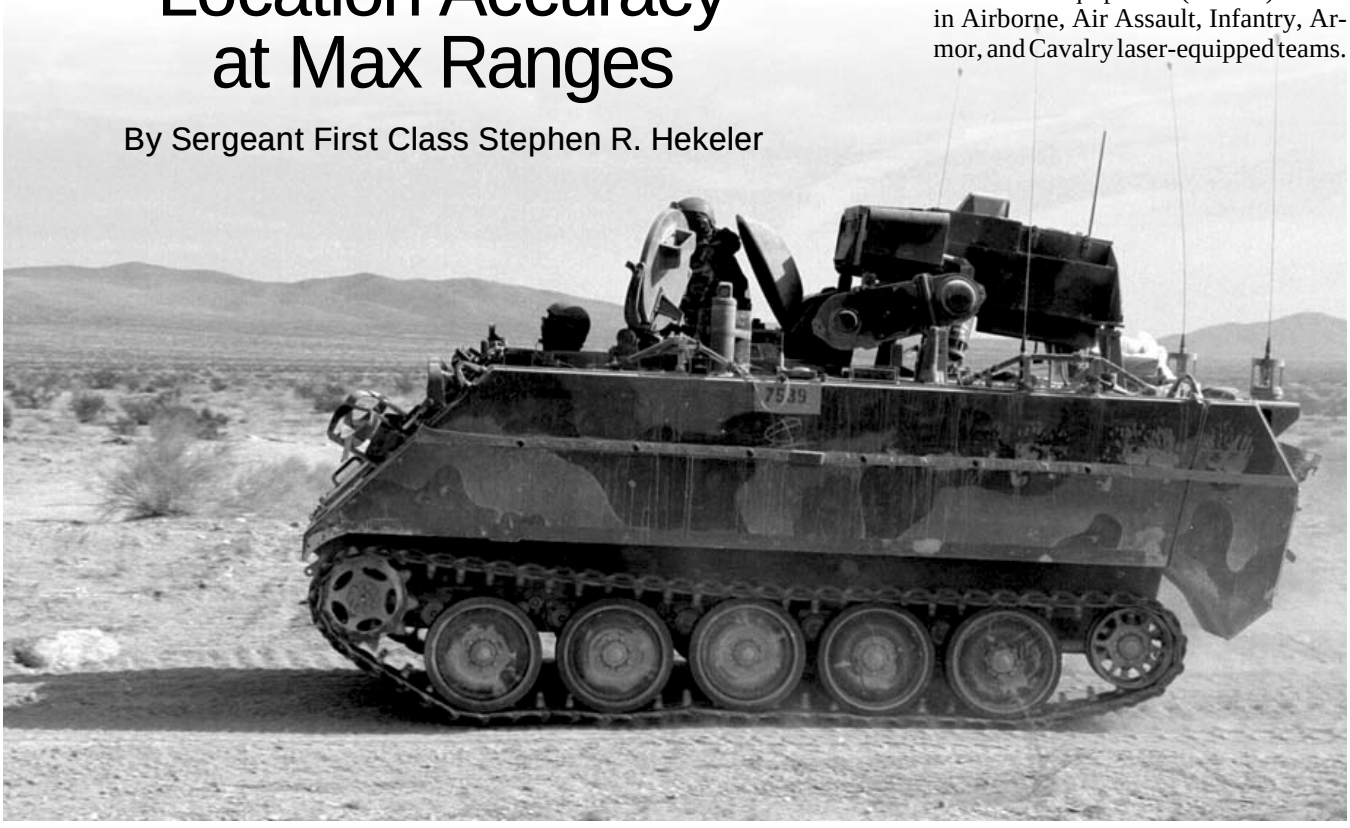
The G/VLLD is range accurate to +/- one meter at 9,999 meters and azimuth accurate to +/- 1 mil; however, it requires manual input of the most accurate azimuth possible. Yet observers seem to have difficulty determining accurate azimuths to input into the G/VLLD and other lasing systems.

Current doctrinal minimum standards for the M2 compass are not accurate enough to engage targets effectively at the maximum potential of the lasing system. In the Soldier's Training Publication (STP) 6-13F 14 Soldier's Manual (SM)-Training Guide (TG**)** Task No. 071-074-000, "Determine a grid azimuth using an M2 compass," a soldier is allowed a +/- 60 mils error in determining a grid azimuth to a target. At this tolerance rate, a first round fire-for-effect at 7,000 meters could have a 420-meter TLE left or right of the target location.

In response to this deficiency, I researched and developed the azimuth verification point (AVP) method. Once implemented as an additional step in the existing OP occupation battle drill, the AVP greatly increases the determination of a grid azimuth to an average of only +/- 12 mils in error. When the AVP method was compared to FA battery survey points (OS/EOL), the AVP, on an average, matched these points at +/- 12 mils.

To determine more accurate target locations at greater ranges and increase the accuracy of indirect fires, laser-equipped units must use current technology effectively and incorporate the AVP method. The AVP is a fixed point on the ground determined by using the precision lightweight global positioning system receiver (PLGR). The observer team can reference this point for updates throughout its operations at the OP. The AVP can be an existing terrain feature or a manually installed point established by the observer team.

The AVP system can be applied with the standard modified table of organization and equipment (MTOE) found in Airborne, Air Assault, Infantry, Armor, and Cavalry laser-equipped teams.



FIST-V at the NTC.

This article discusses tactics, techniques and procedures (TTP) for AVP to increase the accuracy of the G/VLLD (and other systems) and the effectiveness of indirect fires at their maximum observable range.

TTP for AVP. The observer prepares to use the AVP method by assembling the right equipment. He needs a lasing system, PLGR and a visible marking device. In limited visibility, observers can use a chemlight, infrared beacon or strobe light.

1. The lasing system must be operational and stabilized or sandbagged. The observer can use the G/VLLD or Hellfire ground support system (HGSS) in the dismounted mode, the G/VLLD/HGSS mounted in the fire support team vehicle (FIST-V) or the mini eye-safe laser infrared observation set (MELIOS) on the tripod. An operational PLGR must be set up to record/display in grid azimuth and mils.

2. The observer determines the location of the AVP. The AVP is established during the "position improvement" phase of the OP occupation battle drill: security, location, communications, terrain sketch, observation and position improvement (SLoCTOP).

• Defensive Operations. During defensive operations, the observer usually has the time and ability to enter the engagement area (EA). The AVP site can be either close in or out in the EA during EA development. The observer can use target reference points (TRPs), battlefield debris, prepared obstacles or trees as the AVP.

• Offensive Operations. Because of the tactical nature of offensive or reconnaissance and surveillance operations, the AVP is positioned close to the OP. It should be positioned under the cover of darkness. If the observer is unable to move forward of the OP, he can position the AVP behind the OP, perhaps in the vicinity of the OP's hide position. He also can establish it on the left or right limit of the OP. In the desert where trees are almost nonexistent, the team can carry a short u-picket to establish the point. The observer must take precautions to minimize movement in the area of the OP and reduce the risk of detection.

3. The observer locates the laser in the PLGR. (The remainder of these steps detail a team employing the AVP near its OP. If the AVP is employed in the EA, the team can apply the steps to the selected feature.) The lasing team places the PLGR on the laser in the "averaging mode," averages the satellite "hits" to 500 times and then "marks as waypoint" the laser in the PLGR, naming it "OP1." This takes seven to 10 minutes, if done correctly.

4. The observer locates the AVP in the PLGR. One member of the observation team moves down either the left or right limit lines of the OP's observation fan for a distance of 150 to 300 meters. He verifies with hand-and-arm signals or, if at night, predetermined infrared flashes with PVS-7s that he is at a point visible from the OP. He then pounds a short u-picket stake into the ground. He tapes the chemlight in the "U" of the picket oriented back toward the OP, masking the chemlight on the enemy side. He then sets the PLGR on the picket while in the "averaging mode" to average 500 times. This takes approximately 10 minutes; the soldier should take up a prone position and pull local security. Once the averaging is complete, he marks the u-picket as a waypoint in the PLGR, naming it "AVP1." The soldier returns to the OP.

5. The observer calculates the grid azimuth from waypoint to waypoint (OP1 to AVP1) and inputs it into the lasing system. He uses the PLGR "distance calculate" to determine the grid azimuth from the OP to the AVP. He then orients the lasing system, for example the G/VLLD, on the AVP, and manually inputs this azimuth into the traversing unit of the G/VLLD tripod.

6. The observer records the AVP and data on the terrain sketch. If the AVP is to the rear of the OP, the data is recorded in the margins of the terrain sketch.

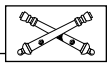
7. The lasing team orients the laser to the AVP every two to three hours to verify the azimuth. The traversing unit of the G/VLLD tripod can "drift" off azimuth as much as three mils an hour. If there is more than a five- to eight-mil difference, the traversing unit realigns to the original AVP azimuth—see *TM 9-2350-266-10 Fire Support Team Vehicle (FIST-V),* Page 2-286, Paragraph 16. Traversing unit drift is very common in older and heavily used equipment.

AVP for MELIOS. To correct any azimuth inaccuracy in the MELIOS, the observer uses the 12-step alignment method before stabilizing/sandbagging the tripod. When manually inputting the declination into the compass/vertical angle measurement (CVAM), he only adds or subtracts the difference necessary to bring the MELIOS on line with the grid azimuth to the AVP. Although the operator's using CVAM is more accurate than using an M2 compass, the CVAM (+/-20 mils) can be taken to further accuracy with the AVP (+/-12 mils).

FIST-V Turret Operations. The north-seeking gyro (NSG) integrated into the head of the FIST-V, which gives the G/VLLD orientation, is quite accurate. But changes in its accuracy occur each time it is updated and realigned. The observer can employ the AVP to provide an azimuth on which to reference the system after the NSG is realigned. Although there is no way to alter the azimuth in the turret system manually, discrepancies can be noted by the operator and applied to the grid conversion.

Determining accurate grid azimuths is a challenge for observers at the NTC. This is a perishable skill that has to be trained on a consistent basis in various conditions and at various ranges during home-station training. Successful units at the NTC have junior leaders and soldiers who can execute these TTP to standard in combat conditions. Incorporating the AVP in training will improve the accuracy of target location with all lasing systems at greater ranges and, ultimately, the accuracy of fires.

The fire support observer is responsible for one of the five requirements of accurate, predicted fire: target location. The effectiveness of fires massed by the artillery battalion on a target at a specific time and place depends on the observation team's locating the target accurately.



Sergeant First Class Stephen R. Hekeler, until recently, was an Observer/Controller (O/C) at the National Training Center, Fort Irwin, California, and had been since January 1998. He was Tarantula 27C, the Light Task Force's Fire Support and Light Combat Observation Team (COLT) Trainer for 33 rotations, including more than 165 force-on-force battles and more than 90 live-fire battles. He researched and developed the Azimuth Verification Point (AVP) method while serving as an O/C. Currently, he is in B Battery, 4th Battalion, 11th Field Artillery as the Fire Support NCO (FSNCO) for the 2d Battalion, 1st Infantry, 72d Infantry Brigade (Separate) at Fort Wainwright, Alaska. In other assignments, he served as Company Fire Support Sergeant for the 1st Battalion, 21st Infantry, part of the 25th Infantry Division (Light), Schofield Barracks, Hawaii, and as a COLT Chief and Forward Observer for the the 1st and 3d Battalions, 11th Field Artillery, at Fort Lewis, Washington.