Bradley Training Devices

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"Steel on target!"

"Live fire is the only way to train."

"If you're not miserable, wet, and dirty, you can't possibly be training."

These seem to be the conventional thoughts on training among infantrymen, but the introduction of high-technology, high-cost weapon systems has forced many to reconsider.

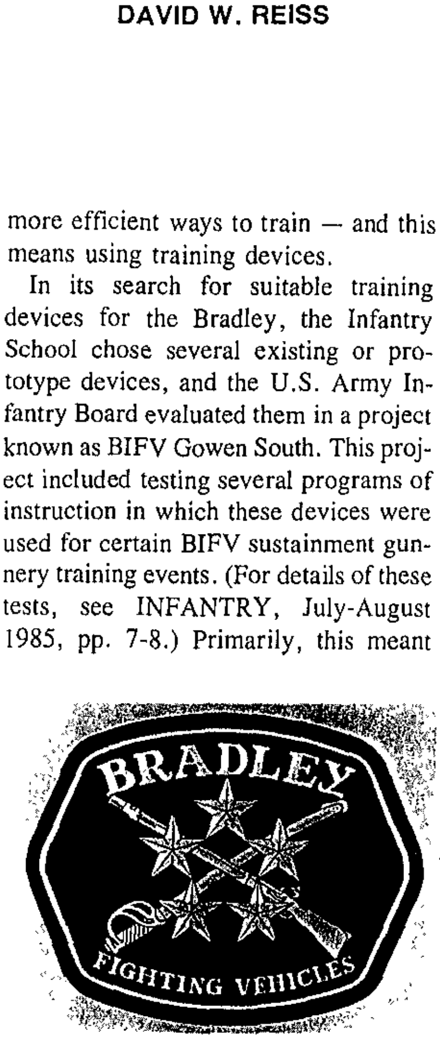
The Bradley infantry fighting vehicle (BIFV) is a perfect example of a high-tech, high-cost infantry weapon system. The ammunition is expensive for its TOW, its 25mm chain gun, and its 7.62mm coaxial machinegun, not to mention the cost of operating the vehicle. In addition to cost, ranges are also a problem. Tanks and Bradleys must compete for the same limited ranges and will do so in ever-increasing numbers in the future.

Both ammunition costs and the shortage of ranges will also limit the number of engagements each Bradley will be able to fire. For example, using the 25mm gun's high-rate-of-fire mode of 200 rounds per minute, a unit could fire its entire year's allocation of ammunition in five minutes. And the crew of a BIFV will get to fire a live TOW only once every four years.

The training challenge for the Bradley is magnified by the need to train alternate crews and gunners. With the M113, any one of the squad members can man the .50 caliber machinegun. This is not so with the Bradley, for special training is required for a soldier to move into its turret. In fact, alternate crews have to be as well trained as primary crews, because there is so much more they have to know.

When all of these factors are considered, the logical solution is to develop more efficient ways to train — and this means using training devices.

In its search for suitable training devices for the Bradley, the Infantry School chose several existing or prototype devices, and the U.S. Army Infantry Board evaluated them in a project known as BIFV Gowen South. This project included testing several programs of instruction in which these devices were used for certain BIFV sustainment gunnery training events. (For details of these tests, see INFANTRY, July-August 1985, pp. 7-8.) Primarily, this meant



comparing the test soldiers' performance on the devices with their live fire performance on the squad combat qualification exercise (SCQE).

When the results of these tests indicated that the devices were effective, the School began formulating a Bradley training strategy that would include the use of some of them. The devices were considered on the basis of what they could do, what they would cost, what they would save, and how easy they would be to use and maintain. (These efforts included, of course, coordination with various departments of the School, higher headquarters, and field units.)

Under the proposed training strategy, still under consideration, the following devices will be used:

- **The Unit Conduct-of-Fire Trainer (U-COFT).** The U-COFT is a full-scale Bradley simulator that uses computer-generated imagery to produce every possible gunnery engagement or situation. It will replace certain of the present stationary vehicle live fire engagements.
- **The Bradley Gunnery Missile and Tracking System (BGMTS).** The BGMTS is an indoor trainer that uses an actual vehicle, 16mm film, and infrared and laser gunnery engagements. It will replace selected subcaliber gunnery tables.
- **The Precision Gunnery System (PGS).** The PGS is an outdoor trainer that uses an eyesafe precison laser to engage targets on an actual range, or vehicle against vehicle, using laser-target interface devices. It will replace certain moving vehicle live fire tables.
- **The Thru-Sight Video (TSV).** The TSV is a recording and critique device that allows for video recording through the Bradley's sights. It allows the crew to see not only what they did but also how well they performed. It will be used on all qualification tables.
- **The Bradley Subcaliber Device (BSCD).** The BCSD is a specially designed training device that uses the M16 rifle. It will be used in place of the BGMTS until that device can be procured.

The devices will be used for train-up gunnery exercises only. They will not be used for qualification firing.

With the devices, therefore, home-station gunnery training will take on new importance and significance. If a unit establishes and maintains a device-based program of three to four hours a month for each crew, this training strategy will pay dividends, because over an annual gunnery cycle, the devices will enable a crew to increase its number of engagements from 121 to more than 1,400. (These figures are based on 40 engagements per hour for three to four hours per month using both the U-COFT and the BGMTS.)

At the same time, these devices will save on ammunition and vehicle operation costs; will reduce planning time, range congestion, and range personnel requirements; and will enable a unit to train more soldiers.

In the final analysis, the Infantry School can only recommend how these training devices should be used. Their integration into unit training will be a task for leaders in the field. But they *will* work. In fact, given the live-fire limitations, they *must*.

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Why Deflection?

MAJOR PETER R. MOORE

In INFANTRY's November-December 1985 issue, there appeared an article entitled "Mortaring: Can We Now Move Forward?" by Warrant Officer-1 Keith F. Hoyle of the British Army. The author, then attached to Fort Benning as part of a U.S.-British exchange program, discusses some problems with our current mortars and considers some possibilities new technology will make available. I am in partial agreement with Mr. Hoyle's proposals and would like to address one particularly interesting question — specifically, his proposal that we do away with deflection and lay mortars by azimuth, thereby simplifying fire direction procedures.

Field artillery has been laying on deflection angles ever since modern panoramic sights (6400 mil) were invented around the turn of the century, and mortars eventually adopted the same system.

Azimuths increase as the barrel turns clockwise, so the rule is Right Add, Left Subtract (RALS). Deflections increase as the barrel turns counterclockwise, so the rule is Left Add, Right Subtract (LARS) (or, as the Marines say, Port Increase, Starboard Subtract). Although fire direction center (FDC) students find this distinction a bit confusing, they eventually get used to it.

Mr. Hoyle is most unusual in refusing to take deflection for granted, in investigating the matter, and in concluding that deflection should be abolished. Indeed, it seems that plotting and laying on azimuths is simpler, and simplicity is certainly to be desired. Mr. Hoyle is slightly in error, however, in the following statement from his article:

The sight scale rings, now numbered progressively in a counterclockwise direction, should be numbered in a clockwise direction in the same way as the aiming circle. This very simple modification would allow the complicated and unnecessary use of deflection to fade into obscurity.

This implies that deflection is a counterclockwise angle. Although this does seem natural — when deflection increases, the barrel traverses left (counterclockwise) — deflection is actually a clockwise angle. The coarse deflection scales on the M53 sight are numbered counterclockwise simply because the index is stationary — if a sight is set at 0 deflection and then the micrometer knob is turned to cause the telescope to rotate clockwise, one can see that the coarse scale also goes clockwise and the number against the index increases.

In short, the sight is already like the aiming circle, which is why a mortar can be reciprocally laid with the sight of another mortar substituted for the aiming circle. If the sight were changed to read counterclockwise angles, then something would have to be done either to the aiming circle or to its procedures.

Most mortarmen are not even aware that the sight reads clockwise, and most would have difficulty defining *deflection*. This is not surprising, because the mortar manuals that discuss the sight and the aiming circle don't define *deflection* either. They do provide some diagrams of deflections, but these diagrams are not all drawn consistently.

For example, Figure 42 of FM 23-92 (4.2-Inch Mortar, M30) shows a mortar with an M53 sight (that is, it has two deflection scales), but it shows a deflection angle that would be measured by an M34 sight (for an M53, the reading should be 5200 mils instead of 2000). Another example is Figure 43 in the same manual, which is geometrically equivalent to the true situation but which shows angles equal to 3200 minus the actual deflection. In fact, more than half of the