in Arms. The objective of this leadership training should be to understand what makes people work together, what they expect of their leaders, and how leaders can create an environment that is conducive to building cohesion. We must also select the more promising leaders and make sure they are given leadership positions as early and as often as possible.

Professional development schooling should support the professional responsibilities of the leaders and not the perception that a large number of commissioned and noncommissioned officers need college degrees. A code of ethics that outlines what is expected of leaders should be adopted as a guide.

In the final analysis, I believe it is accurate to describe the leader that most soldiers want as smart, flexible, caring, and brave. We should recruit and develop our leaders to match this description. Soldiers will put up with a lot of hardships if they believe that the tough "old sarge" and the smart "young commander" will take care of them and at the same time outwit and defeat an enemy.

A soldier will usually develop and emerge as a formidable warrior if he feels that he is well led, that he is valued as a respected member of a team, and that he has a vital job to do.

Military leaders must remember that their greatest weapon, even in this technological age, is the individual soldier. They must strive to develop and sharpen that soldier's skills. Leaders should work to develop the American soldier's natural intellect and inventiveness, which have been labeled "Yankee ingenuity."

With good leaders and trained soldiers bound together in cohesive units, we can have renewed faith in our Army's competence to defeat all comers.

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Engineers and Infantry

COLONEL GERALD C. BROWN

In a recent issue of INFANTRY, Major John A. Bornmann, in "Ditch Diggers and Lead Slingers," concludes that engineers, to fight as infantry, must be heavily supplemented with combat systems and personnel. (See INFANTRY, November-December 1981, page 14.)

I disagree.

Certainly, when engineers must fight as infantry, the extra personnel and equipment that Bornmann recommends would help the effort. His list includes more Dragons, machineguns, TOWs, communication equipment, tanks or armored personnel carriers, artillery forward observers, air liaison personnel, specialists in air defense, and scouts. But where is the maneuver commander supposed to get these resources to augment his engineers? Usually there are not enough of them for the units that are authorized to have them.

I believe that the engineer on the modern battlefield must be like the Minuteman of early American history. Whenever there was an Indian threat, or when the British were coming, the Minuteman would grab his musket from over the fireplace and join the fray. In short, in an emergency, the Minuteman responded as best he could with whatever he had available.

So it must be with combat engineers. Because they work on the battlefield where enemy contact is expected, they must be prepared to defend themselves at all times at their worksites, on the march, and in bivouacs. And they, too, must fight with the equipment and the supplies they have. In emergencies, when they are reorganized to fight as infantry and no extra resources are available, the engineers must still be ready to lay down their shovels, pick up their rifles, and man the ramparts. This they can do.

but fighting as infantry is only their secondary mission. What infantrymen really need to understand about engineers is the specific support they can provide on the battlefield in their primary role as part of the combined arms team.

Engineers bring to the battlefield a combat system that can help provide a maneuver unit with mobility, countermobility, and survivability. Only the maneuver commander can decide how to use his engineers at any given time, but to make the decision wisely he must take into consideration a number of things.

First, the commander should always include his engineers in his plans and decisions, requiring them to furnish estimates, analyses, and recommendations. And his plans for engineer operations should be developed along with his scheme of maneuver and his fire support plans, not later. The three must be coordinated, complementary, and mutually supporting.

During defensive operations, a maneuver commander's highest priority is usually countermobility, with survivability second, while in offensive operations mobility support is usually given the highest priority, followed by countermobility to foil counterattacks.

To stop or slow the enemy in the defense, engineers should be able to put in a system of obstacles and mines on any terrain that, when well-covered by defending fires, will cost the enemy valuable time and heavy casualties to breach. The enemy may get a few limited forces through the obstacle system early by placing an assault bridge over a tank ditch, for example, or by breaching a lane through a minefield. But many of these early successes should be countered — the assault bridge knocked out or the minefield breach blocked by a disabled tank. Even if the obstacle breaches cannot be completely closed, the enemy attack will be seriously channeled, presenting a significant advantage to the defender.

The construction of obstacles and the placement of mines by engineers takes a lot of time, and maneuver commanders must provide them as much time as possible. Scatterable mines delivered by artillery or aircraft, on the other hand, can be emplaced rapidly to slow, disrupt, or even stop an enemy attack. The engineer should be the staff officer responsible for planning, coordinating, and recording all mine operations, which should include planning scatterable mine delivery systems for likely targets.

Once emplaced, obstacles and mines should be covered by fire. Therefore, the engineer should provide a copy of the obstacle plan to the fire support officer so that indirect fires can be preplanned to cover the obstacles and minefields. In this way, enemy elements that are stopped by the obstacles and mines can be effectively engaged.

Survivability work should also receive the commander's careful consideration. On the next battlefield, piles of dirt and holes in the ground will help soldiers to live longer and will keep their equipment and weapons from being damaged. But such work can easily consume all the available engineer support, so the commander must choose carefully what he wants to have dug in, and he should specify priorities for the work.

DIGGING IN

A commander should consider digging in his key command and control systems, lightly armored weapons, and vital supply points. His exact choices will vary with the situation, the mission, and the tactical plan. For example, in one instance he may decide to dig in his artillery to provide protection, while in another he may elect to have it move frequently to survive longer.

In a defensive situation, the commander will seldom know exactly how much time he will have before an attack, but he should use every bit of time he has — whether it is five minutes or five weeks — to prepare. By making good use of his engineer resources, he can ensure that, with the passage of time, his defenses will become stronger.

A word needs to be said about digging in tanks and other armored fighting vehicles. The combined arms community does not seem to understand the value of hull down positions, even though an armored vehicle in a hull down fighting position is clearly less vulnerable to enemy fires than it is when standing exposed or moving. If a Soviet T62 tank fires on an M60A1 tank at 2,500 meters, for instance, it has a single-shot kill probability of .17 when the M60 is standing exposed, a .09 probability when the tank is moving, but only a .03 probability when the M60 is in a hull down position.

Some people argue that placing a fighting vehicle in a hull down position sacrifices its maneuverability. This is not true, or should not be, because a vehicle in a hull down position doesn't have to stay there any longer than its commander considers necessary. Heavy engineer earthmoving equipment can dig such a position in about twenty minutes.

Notwithstanding these statistics, armored vehicles should be dug in only in special cases and when there is plenty of time and extensive engineer support. Ordinarily, the most heavily armored weapon systems in a commander's arsenal should be very low on his priority list for additional protection. But in those cases where enough time and enough engineer resources are available, the maneuver commander should recognize the value of hull down positions and use them. Once the battle has been joined, certainly, armored vehicles must not be tied to those positions.

It should be noted that the engineers' ability to dig such positions will improve when the M9 armored combat earthmover (ACE) is issued to the field. Their present bulldozers are slow and vulnerable, but the ACE's mobility is comparable to that of other fighting vehicles, and its light armor will allow it to operate in forward areas under fire.

In the offense, to seize the in-

itiative, retain it, and ruthlessly exploit it, commanders must be able to maneuver rapidly about the battlefield to concentrate their combat power. This means their units must be able to cross all obstacles and minefields with little loss of momentum. The engineer element, therefore, must be able to breach minefields and remove obstacles, and it must have assault, gap-crossing equipment.

But the entire combined arms team is involved in mobility support, not just the engineers, and its effectiveness depends upon well-rehearsed battle drills.

Throughout the history of warfare, the most successful commanders have been those who made the best coordinated use of all their available forces. Superior combat power generated by effective leadership will probably be the key to success on future battlefields, and engineers are an important part of that combat power. To command a combined arms team in combat, commanders must study the engineer system, master it, and train with it, as they also must do with their other supporting arms. Those who fail to do so will pay a high price for their shortcoming.

And when they have to, these same engineers can fight as infantrymen. If they can get all the extra personnel, weapons, and equipment that Major Bornmann recommends, that's great. But if they can't, they can still fight, as the Minutemen did, with whatever they happen to have.

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