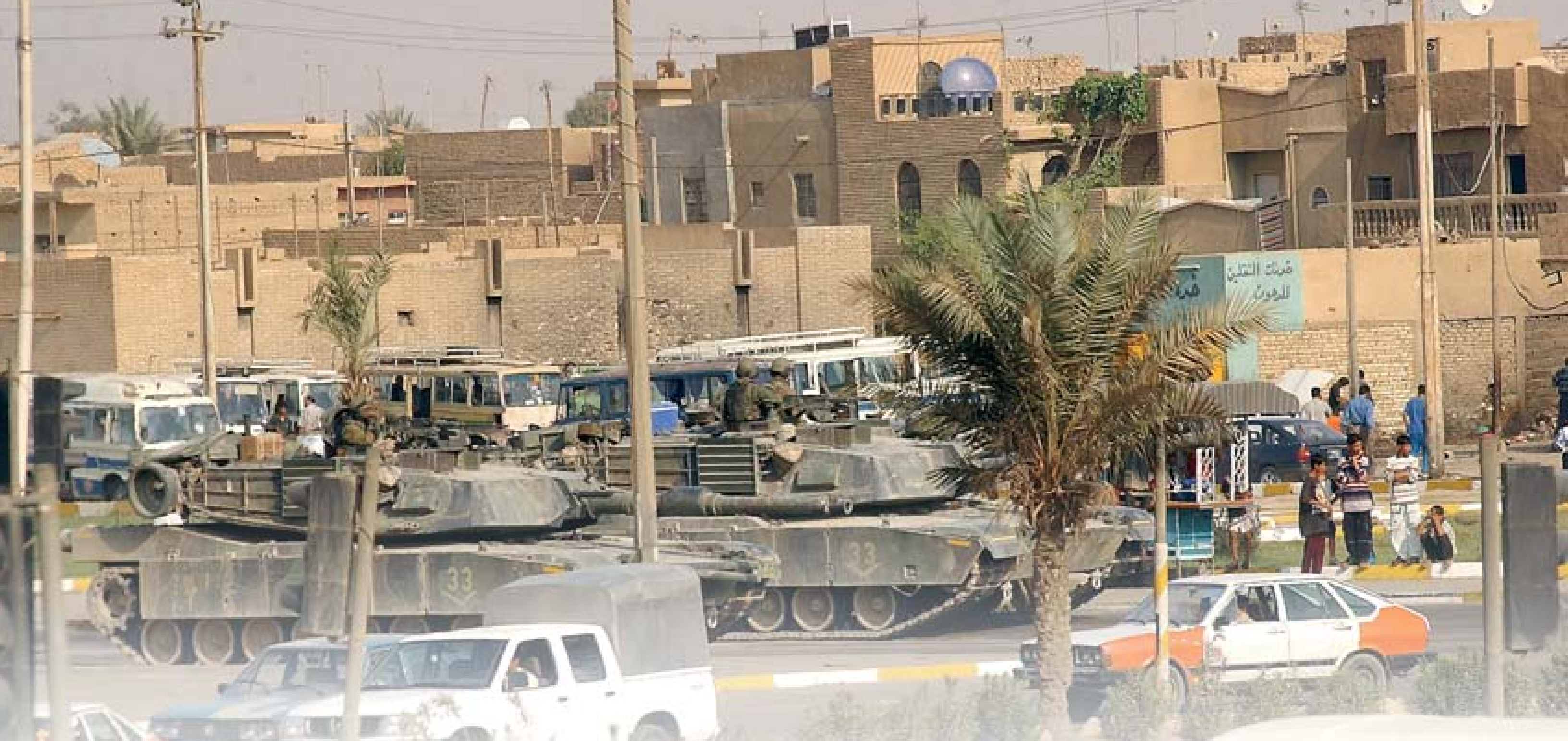

Armor and Future Urban Warfare

by Professor Richard M. Ogorkiewicz

U.S. Army Field Manual 17-10, published in 1942 in the middle of World War II, stated that, "Armored units avoid defended towns and cities." This view has been widely accepted and was reinforced 53 years later by the fate of Russia's armor, who in January 1995, ventured into the Chechen capital of Grozny and lost 105 of its 120 tanks and other armored vehicles.

The Grozny debacle can be ascribed to incompetence, but armor ran into trouble in urban environments on other occasions as well. One of them was the attempt by Israel's armor to seize the Red Sea port of Suez toward the end of the 1973 Yom Kippur War, which was repulsed by its Egyptian defenders. Such events tended to confirm the prevailing view that urban operations were not for armor but were strictly the domain of dismounted troops.

However, historical analysis shows that using tanks significantly reduced infantry casualties in the urban operations conducted in Western Europe in the latter part of World War II. Since then, tanks played an important role in the U.S. Armed Forces recapturing Seoul from the North Koreans in 1950, and in clearing the North Vietnamese out of Hue in 1968. Israeli armor also played an effective role in the siege of Beirut in 1982. Much more recently, of course, U.S. tanks led in the capture of Baghdad and British tanks in the capture of Basra.

Armor clearly makes an important contribution to successful urban operations and should therefore be prepared to play a major role in them. Moreover, even if armor wanted to, it could not avoid towns and cities because of the growing urbanization of the world. More than one half of Western Europe is already urbanized and there is massive urbanizing elsewhere, particularly in the developing countries. As a result, almost half of the world's population is said to reside in urban areas.

The Need to Adapt

To operate in future urban environments, armor will have to adapt its equipment to urban conditions, as it has already done in other cases. For example, during World War I, the original tanks were adapted to the barbed-wire obstacles and trench defenses of the contemporary battlefield. Armor also adapted to the very different conditions of mobile combat in open terrain against hostile armored forces. In the latter part of World War II, a part of British armor adapted to yet another situation created by the need to attack fortifications and other defenses in northwestern Europe, which led to forming a division of specialized armored vehicles, the 79th Armored.

Adapting to urban operations is likely to have an impact on all aspects of future close-combat platforms, from firepower and protection to mobility.

Changes in Armament

As far as firepower is concerned, the most obvious change is the decreased requirement to engage hostile armor at long range with armor-piercing, fin-stabilized discarding sabot (APFSDS) rounds. Instead, the emphasis is likely to be on the use of high explosive (HE) ammunition, including high explosive squash head (HESH) or high explosive plastic (HEP). HESH was invented in England during World War II specifically for use against concrete fortifications, and although it has also been used successfully against tanks, it remains a particularly effective type of ammunition against buildings. Inert squash head ammunition would also be useful for punching holes in walls with minimal collateral damage. In other, less constrained circumstances, combat vehicles might also be expected to use thermobaric ammunition, which creates considerably more blast than conventional explosives and is particularly effective against enemy troops inside buildings and bunkers.

Guns mounted in combat vehicles could well retain the prevailing 120mm caliber, but should be provided with more depression to avoid the situation that faced Russian tankers in Chechnya when they could not return fire coming from basements of buildings because the depression of their guns was only four degrees. Guns would also need more elevation so that they could be used to engage targets behind buildings by indirect fire. The experience of Israeli armor in the 1973 Yom Kippur War has already brought out the need for an indirect fire capability and has led to installing 60mm mortars in Merkava tanks.

Their value was shown 9 years later in the 1982 operations in Beirut where they were found to be more effective than the tanks' high velocity guns on occasions.

The Swiss RUAG defense research organization demonstrated a possible alternative approach by installing a 120mm tank gun in an M109 in place of its 155-mm gun howitzer, converting it into an indirect as well as direct fire weapon. The practicality of developing such a dual weapon is further indicated by the fact that the HE projectiles fired by the 120mm gun of the Swedish Leopard 2 tanks is basically the same as the HE mortar bombs of the 120mm Stryx mortar. However, 120mm tank guns are impractical because their long tubes make turrets difficult to traverse in urban environments. These long tubes are not essential in urban environments because they are needed only to generate high-muzzle velocities for APFSDS projectiles. In view of this, 120mm gun mortars with shorter tubes could well be a more practical alternative and Russians have been developing them for some time.

As a direct result of their experience in Chechnya, the Russians have built prototypes of a new close combat platform — a heavily armored automatic weapon vehicle. The Russians call it a "tank support combat vehicle" and describe its function as that of neutralizing hostile infantry. The development of this vehicle, designated BMPT, was preceded by the appearance in 1997 of the BTR-T heavy armored personnel carrier (APC), modeled after the T-55 tank chassis with which BMPT is often confused. The BTR-T constituted yet another misguided attempt to combine the functions of a weapons platform with those of a personnel carrier, which resulted in it carrying five dismounts, armament, and crew.

In contrast, the BMPT is designed exclusively for mounted combat. It is also based on a tank chassis, but that of the T-72 with add-on explosive reactive armor that brings its combat-loaded weight to 51.7 U.S. tons. In place of the T-72's 125-mm gun turret, it has a two-man low-profile pancake turret, originally fitted with an externally mounted 30mm automatic cannon, such as the BTR-T. However, the second version of BMPT has two 30mm cannons, as well as a coaxial 7.62mm machine gun and four launchers of Ataka (AT-9) antitank guided missiles. In addition, there are two forward-facing 30mm automatic grenade launchers, each operated by a gunner located on either side of the driver.

The 30mm cannons have an elevation of 45 degrees, which makes it possible to fire at upper floors and rooftops of buildings as well as other targets. This would make up for the limited elevation of tank guns for which the Russians tried to compensate in Grozny by using ZSU-23-4 self-propelled quadruple 23mm air-defense cannons.

Protection Alternatives

Not unlike their armament, the protection needed by combat vehicles in urban operations is bound to differ from that of existing vehicles, which were designed for mobile warfare in open terrain. One of the reasons for this is they are less likely to be exposed to attack by large caliber kinetic energy projectiles, which are the major threat in mobile warfare. Instead, the predominant threat will come from short-range, shoulder-fired, shaped charge weapons, as has already happened in Iraq.

Moreover, the threat will come from all directions, whereas the protection of ex-

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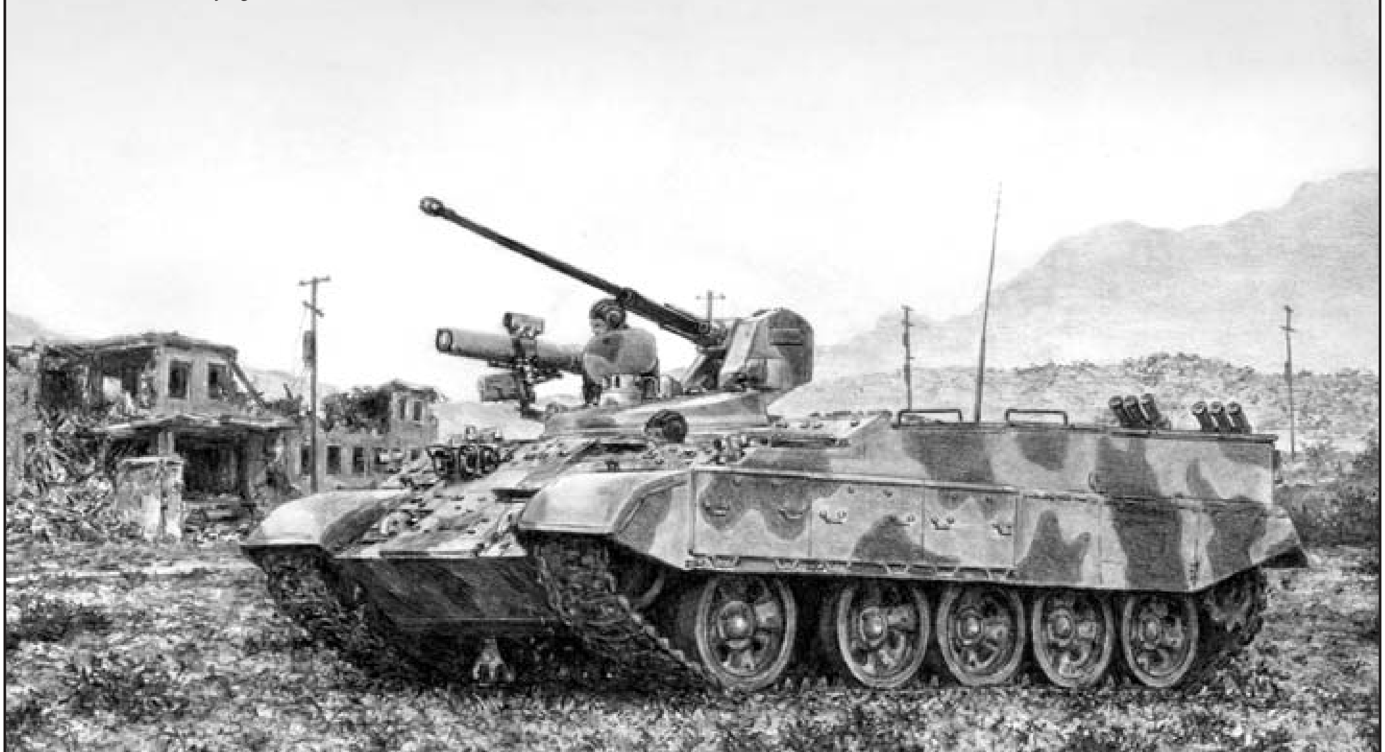

"To be protected against RPGs, all combat vehicles would have to be fitted with more armor, but adding standard armor would significantly increase their weight. As it is, an M1A2 weighs 69.5 tons and the British Challenger 2 weighs 68.9 tons. Unfortunately, there are few alternatives to this kind of armor."

isting combat vehicles has been designed primarily against attack within their frontal arc. In fact, only the Israeli Merkava is well protected against rear attack and has no vulnerable engine deck.

Where it has been applied, the armor of existing tanks has proved highly effective against contemporary short-range antitank weapons, as was demonstrated by U.S. and British tanks in Iraq. For example, one British Challenger 2 tank survived eight rocket-propelled grenades (RPGs). However, the RPGs used so far have been generally of the original type and have only half the armor penetration capability of the latest versions. To be protected against RPGs, all combat vehicles would have to be fitted with more armor, but adding standard armor would significantly increase their weight. As it is, an M1A2 weighs 69.5 tons and the British Challenger 2 weighs 68.9 tons. Unfortunately, there are few alternatives to this kind of armor.

One alternative is explosive reactive armor (ERA), which can be three to nine times as effective, in relation to its weight, as steel armor against shaped charge weapons. As a result, ERA can provide protection against RPG-7s, even for vehicles up to 20 tons.

Although the use of ERA was pioneered by Israeli armor, its principal exponents have been the Russians. They have not only adopted ERA on a large scale but have been developing it further. This has resulted in Contact 5 ERA, which is effective not only against shaped charge jets, but also against long-rod kinetic energy projectiles. More recently, they have developed Relikt ERA that is claimed to be even more effective, and have followed it with two more generations of ERA.

As effective as it might be, using ERA is open to the very serious objection that it constitutes a danger to dismounted troops. It does so especially in urban operations where it can be a danger to civilians who might be present — particularly in peace enforcement operations.

A potential and much safer alternative to ERA, which is currently being developed, is electric or, more precisely, electromagnetic (EM) armor. The United Kingdom's Defence Science and Technology Laboratory has already demonstrated that EM armor could protect a vehicle of about 20 tons against RPG-7s. However, it remains to be seen whether EM armor will be equally effective against other threats.

Much hope is pinned on the development of active protection systems (APS), particularly for protecting future combat systems platforms. Following the lead established by the former Soviet army during the 1980s with the Drozd system, APS are now being developed by the U.S. Army, as well as French, German, and other armies. However, they are being developed for use in open terrain, rather than urban operations, and may not be equally effective or acceptable in the latter. For example, in the early 1990s, the French Eirel and Russian Shtora APS were introduced; however, "soft kill" attacking missiles by electronic spoofing may not be effective in urban environments because of their short ranges and short reaction times. Other APS, such as the Russian Drozd, or the much more recent French SPATEM and German AWISS, which kill missiles by firing fragmentation grenades or rockets, are open to the same objections in urban environments as ERA.

Ultimately, the most effective form of protection might be provided by APS incorporating laser-based directed energy weapons as countermeasures. A model for this exists in the directable infrared countermeasures (DIRCM), which is already used to protect aircraft against missiles and have been successfully tested by the U.S. Army on a ground platform. But even if APS are used, combat vehicles will still need sufficient conventional armor to absorb the impact of disabled or shattered missiles, which light armored vehicles of 20 tons or less might not have.

Mobility Issues

Mobility's contribution to the survivability of combat vehicles is likely to be considerably less in urban environments than in open terrain. It remains important for vehicles to be agile and have the ability to accelerate rapidly. But sustained high speeds and advanced active suspension systems, which are being developed, are going to be of little value.

As the importance of mobility is reduced, the case for employing wheeled vehicles in urban environments becomes weaker. The principal argument against employing wheeled vehicles, except in peacekeeping operations, is that they are bound to be more vulnerable than tracked vehicles. This is primarily because they cannot weigh much more than 20-odd tons, and therefore, cannot have much added protection unless they are fitted with ERA or APS. To some extent, it is also due to the inherent vulnerability of their tires, even to sniper fire.

Light tracked vehicles are also vulnerable, of course, but at least their conventional, pin-jointed metal tracks are not as vulnerable as tires. Moreover, the running gear of tracked vehicles is easier to protect, which should be done in both cases, to reduce the risk of mobility kills because immobilized vehicles become very vulnerable during urban combat. Using rubber band tracks, which are currently enjoying a worldwide revival of popularity, would reduce the vulnerability of wheeled vehicles. Their lighter weight makes them more attractive and acceptable for peacekeeping operations because they cause less damage to roads; however, they are more vulnerable to damage caused by, among other things, sharp-edged concrete rubble.

This article implies a number of changes that need to be considered if armor is to adapt successfully to future urban operations.

Richard M. Ogorkiewicz is a professor at the United Kingdom's Royal Military College of Science, where he has been lecturing on armored vehicle technology since 1979. During the past 30 years, he has been involved in armored vehicle projects in the United States, as well as the United Kingdom, Brazil, Italy, South Korea, and Turkey. He has authored four books and published more than 500 articles on armor in various military journals. He is an honorary life member of the U.S. Armor Association and has contributed more than 75 articles to ARMOR.