

Evolution of the **BMP**

CAPTAIN DAVID F. McDERMOTT
CAPTAIN SCOTT R. GOURLEY

When the first BMP arrived on the scene in 1967, it was characterized in the West as "an entirely new type of light armored vehicle combining the features of a light tank, antitank guided missile carrier, and armored personnel carrier." In short, it represented something of a technological revolution in combined arms doctrine. Before that time, Soviet infantry had the option of accompanying tanks either in armored personnel carriers, essentially battle taxis, or else mounted on the tanks themselves. To support the tanks, the infantrymen would have to dismount from their APCs, thereby exposing themselves to small arms and indirect fire. In such cases, the tanks, to maintain the pace of the offensive, would either outrun their infantry — with disastrous results — or slow their pace and lose their offensive momentum. With the BMP, the world's first true infantry fighting vehicle, the Soviet infantrymen could now fight on the move while accompanying the tanks.

Obviously, U.S. infantry leaders must understand the maneuverability that the BMP has given to Soviet combined arms formations. But they need to understand, too, the design evolution of the BMP during the past 16 years, specifically in terms of the vehicle's organic arma-

ment, its crew and passenger protection (ballistic, chemical, and nuclear), and its automotive performance.

The BMP (*Boevaya Mashina Pekhota*) infantry fighting vehicle was developed during the 1960s apparently as a replacement for the BTR-50P series of tracked vehicles, the most common of which was the armor-topped BTR-50PK. When the BMP was first seen publicly during the November 1967 military parade in Moscow, Western observers initially referred to it as the M-1967 and the BMP-76PB (because they thought it mounted a 76mm main gun). It eventually came to be known as the BMP-1.

A later model, referred to as the BMP-2 (or BMP-A), which featured a number of design changes, was fielded in 1970. The most important changes — a lengthened bow combined with an enlarged bow deflector plate and extended rear deflectors on the tracks — increased the BMP's amphibious characteristics. Other design changes included an additional rocker arm behind the first road wheel, the removal of an exterior tool box on the rear running board, and modified firing ports for the PKM squad machinegun — they were now square rather than circular as on the BMP-1.

(Because both of these versions of the BMP are opera-

tionally comparable, and unless otherwise noted, the designation BMP in this article will encompass both the BMP-1 and BMP-2.)

One of the major difficulties in tracing the evolution of the BMP is the amount of apparently contradictory reference information available. For example, Viktor Suvorov, the pen name adopted by a high-ranking Soviet military defector, tries to explain these contradictions in his newest book, *Inside the Soviet Army*. According to Suvorov, the Soviets now produce two versions of their weapon systems like the BMP, the normal version and an extremely simplified version, which the Soviets contemptuously refer to as a "Monkey-Model." Although it is designed for wartime production only, the simplified variant is turned out in large quantities and exported to countries friendly to the Soviet Union. Suvorov claims that the BMP models Western analysts have obtained for examination have been the "Monkey-Models." He also states that he has seen both models and that there are 63 simplifications in the second version. Regardless of Suvorov's claims, there are some obvious physical changes that can be observed and traced through the BMP's evolution.

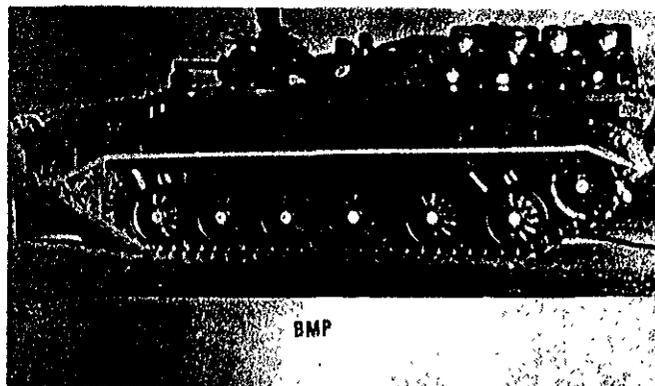
WEAPONS

One of the most intriguing and controversial aspects of the BMP is its organic weapon system, which is incorporated into a one-man turret. This system consists of a 73mm main gun, a SAGGER antitank guided missile (ATGM), and a coaxially-mounted 7.62mm machinegun.

The main gun on the BMP — a 73mm smoothbore model 2A28 low-pressure, short-recoil gun — has a maximum effective range of 800 meters. Although some sources indicate that the gun has an automatic loader, others say the gun has an "autoload" capability that permits the gunner to load rounds semiautomatically. Suvorov attributes this disparity to the simplified variants. He states that, in the Soviet version, the gunner presses buttons and the required rounds slide into the barrel automatically.

At least one early report stated that the 73mm projectile was "thought to be similar to the RPG-7 projectile." Further analysis, though, has confirmed that the main gun fires a fixed, fin-stabilized, rocket-assisted HEAT (or HE-FRAG) round that is similar in design and performance to the one the SPG-9 73mm recoilless rifle fires.

The HEAT round, 40 of which are carried in the BMP, can penetrate up to 335mm of rolled homogeneous armor (RHA), but it has a limited first-round hit probability at ranges in excess of 800 meters. Additionally, the effectiveness of the main gun is handicapped by its limited elevation and traverse capabilities. It can be depressed only four degrees below the horizontal plane, which makes it less able to engage targets while the vehicle is in hull defilade. And it can be elevated only 35 degrees, which prevents the BMP from engaging targets with its main gun at extreme elevations.



Despite the fact that the turret can be traversed 360 degrees, the main gun is automatically elevated to clear the commander's infrared searchlight, which is mounted on the left front side of the vehicle. This always creates a dead space in which the gunner cannot aim his weapon in the direction of the commander's best field of vision. The coaxially-mounted 7.62mm PKT machinegun, at the right of the main gun, suffers from the same limitations.

From the available evidence, many users of the early BMPs and the vehicles patterned after it both inside and outside the Soviet Union had mixed reactions to using a low-velocity, medium-caliber gun, with a limited anti-armor capability, mounted on an infantry fighting vehicle. Too, the main gun was not stable enough to fire on the move. And the fact that it could carry only 40 rounds of 73mm ammunition suggested there might be certain logistical implications during large-scale, sustained combat operations. Because of these difficulties, other weapons were evaluated as possible replacements.

The Yugoslavians fielded a domestically designed IFV, the M-980, in May 1975. The M-980, although it closely resembled the BMP, mounted a 20mm automatic cannon rather than a 73mm main gun. As early as 1978, there were reports of tests being conducted in both the USSR and Poland to replace the 73mm gun with a heavy (14.5mm-23mm) machinegun. But it was not certain at the time whether such versions had been operationally deployed.

Following the Soviet invasion of Afghanistan in 1979, Soviet forces soon realized that the 73mm gun on the BMP could not be elevated enough to engage Afghan guerrillas sited on mountain crests. Speculation then appeared in open sources regarding photographs of BMPs in Afghanistan mounting what appeared to be AGS-17 30mm automatic grenade launchers in place of the 73mm gun.

ATGM

Another major component of the BMP's organic weapon system is the AT-3 SAGGER antitank guided missile (ATGM), four of which are carried on each BMP. The SAGGER, with a HEAT warhead capable of penetrating more than 400mm of armor, is used to engage individual armored targets at ranges between 500 and 3,000 meters. Because of its relatively slow time of flight (it

needs 27 seconds to travel 3,000 meters) and because it is a first-generation ATGM that requires the gunner to track his target and fly the missile at the same time, the SAGGER imposes definite tactical limitations on the use of the vehicle. The SAGGER can be fired effectively only while the BMP is stationary, and this exposes the vehicle to an enemy's fire for a considerable length of time. Besides, the other turret weapons cannot be used when the SAGGER is being reloaded, which can take as long as 50 seconds.

At the beginning of 1978, it was reported that the Soviets had upgraded the SAGGERS in their BMPs and that they were now comparable to the U.S. Dragon and TOW ATGMs. A more recent source has stated that, as of 1980, this retrofitting was limited to BRDM and helicopter-mounted ATGMs as an interim measure pending the full deployment of such second-generation ATGMs as the AT-5 SPANDREL and AT-6 SPIRAL. (Suvorov claims that the export "Monkey Models" of the BMP are equipped with a first-generation "Malyutka" (the Soviet designation for the AT-3 SAGGER) but that the Soviet BMPs are equipped with the "Malyutka-M" (possibly the AT-3C, which has an automatic target guidance system.

For all of its tactical limitations, the BMP's SAGGER has proved to be somewhat more useful in Afghanistan than its 73mm main gun. At least one source has said that the BMPs now deployed in Afghanistan are capable of using their SAGGERS to provide direct artillery fire support for dismounted attacking infantry out to ranges of 3,000 meters.

In 1980 the Group of Soviet Forces Germany (GSFG) reportedly received a new version of the BMP that Western observers, in the absence of any known Soviet description, referred to as the BMP-80. The BMP-80 was believed to have a new two-man turret that incorporated a 30mm cannon and a 7.62mm coaxial machinegun in place of the old one-man turret. In 1981 and 1982, reports confirmed that on a number of BMP-1s, the 73mm main guns had been replaced by 30mm automatic cannon. There is speculation as to whether this new cannon was the same as that fitted to the ZSU-30-6, the possible replacement for the ZSU-23-4.

Then, during the November 1982 Moscow military parade, a new BMP, initially referred to as the BMP-30,



BMP-M1981

was publicly displayed. The current designation for this version is the BMP M1981. The BMP M1981 incorporates a 30mm main gun into an improved turret with what appears to be an AT-5 SPANDREL ATGM mounted on top of the turret itself. The SPANDREL — the first of the second-generation Soviet ATGMs publicly displayed in November 1977 — has a semi-automatic command-to-line-of-sight (SACLOS) guidance system. This improved ATGM enables the BMP M1981 to engage armored targets at ranges up to 4,000 meters within a shorter period of time (20 seconds) while decreasing the minimum engagement ranges from 500 meters for the SAGGER to 100 meters.

Grenade launchers are clearly visible on this vehicle, with banks of three on each side of the BMP M1981's turret. Interestingly, before the public display of this version, several BMP-1s had been fitted with banks of six fixed smoke grenade launchers located on the rear portion of the turret roof. This modification (as well as that on the BMP M1981) augments the BMP's smoke-screening capability (produced by injecting raw diesel fuel into the exhaust manifold of the engine). While in the past, smoke screens were emitted only behind the vehicle, the addition of forward facing grenade launchers provides for some degree of self-screening protection across the BMP's frontal arc.

In a modification that is clearly the correction of an earlier design vulnerability, the commander's infrared searchlight has been moved on the BMP M1981. Now located on the turret, it no longer blocks the full traverse of the main gun. This new design also removes the "dead space" that left the earlier BMPs highly vulnerable to close-in antiarmor weapons fired at them from the left front portion of the hull.

Further refinements in the design of the BMP M1981 include flat, smooth covers over the track support rollers (in contrast to the cube-shaped BMP track cover pattern), and one reliable source has even claimed that another machinegun port has been located forward of the turret in the bow of the hull.

TROOPS

The BMP troop compartment is located in the rear portion of the hull directly behind the turret. This compartment, capable of carrying eight fully-equipped infantrymen, has four firing ports on each side of the vehicle. The forward port on each side is used for firing the 7.62mm PKM light machinegun while the remaining ports are for firing the AKMs (or AKS-74s). The left door at the rear of the BMP also has a firing port. Four heated periscopes located on the roof on each side of the BMP assist in aiming. Each firing port is equipped with a ventilation system to prevent the accumulation of gasses during prolonged firing.

The firing ports permit the troops inside the vehicle to provide a high volume of suppressive fire during high-speed movement while remaining "buttoned up." In addition, the infantrymen are able to operate in an NBC en-

vironment without exposing themselves to contamination.

But this setup, as advantageous as it sounds, has met some serious problems in Afghanistan. During the early stages of the Soviet invasion, for instance, there was a marked reluctance on the part of Soviet infantrymen to dismount from their BMPs, even when they were caught in ambushes. Occasionally, this had disastrous consequences for the Soviet soldiers, because Afghan rebels have reported that the BMPs have a tendency to burn or even explode "spectacularly" when they are hit by light antitank weapons such as captured RPG-7s.

Troops enter and leave the troop compartment through two doors located in the rear of the vehicle. Each door, hinged from the outside, carries a 150-liter fuel cell built into it and connects to the engine by a rubber hose. Although the diesel fuel in these cells is not highly combustible, hits that penetrate the door can result in a significant fuel loss, which will eventually affect the BMP's mobility. On recent versions (BMP M1981), reportedly, both rear doors have been replaced by a single, power-assisted, drop-down ramp that should make it easier for infantrymen to get in and out of the vehicle. The effect of this new approach on the placement of the two fuel cells traditionally located on the rear access doors remains uncertain.

Apparently, the Soviets are satisfied with the automotive performance of the BMP, having retained the 280-hp, water-cooled, six-cylinder diesel engine for all models of it. Although the BMP has been credited with a maximum cruising speed of 55 to 60 kilometers per hour, U.S. drivers testing captured BMPs have been able to achieve top speeds of between 70 and 80 kilometers per hour. Such speeds, though, can be maintained only for short periods of time because of vibration and the strong possibility of transmission failure. Despite certain automotive limitations, the BMP has demonstrated a high degree of effectiveness in its cross-country mobility during combat operations in Afghanistan.

At least one recipient of Soviet-made BMPs has experimented with a different engine. As of 1979, the Egyptian Army had refitted about 150 BMPs with French-made 310-horsepower diesel engines. Furthermore, in 1981 the Egyptians did more engineering work on the BMPs they had received, possibly for production and export purposes.

VARIANTS

The BMP design has become the basis for a number of variants, each of which performs a specific mission. (The designation of each indicates the year in which it was first seen by the West.)

A command version of the BMP, designated the BMP M-1974 command vehicle, differs from the BMP-1 primarily in having additional communications and optical equipment. A redesigned troop compartment incorporates tables and a map board. Externally, additional

radio antennas have been mounted and the firing ports on the right side of the vehicle eliminated or welded shut.

Later command versions of the BMP, the BMP M-1978 command post vehicle and the BMP M-1978 command and communication vehicle, mount large telescoping antennas and additional radios. Unlike the BMP M-1974, however, the BMP M-1978 series is unarmed. It is found at regimental and divisional levels and has been referred to as the BMP-SH.

The five-man BMP M-1975, also known as the BMP-RADAR or BMP-SON, is a target acquisition and battle-field surveillance vehicle. It incorporates the SMALL FRED radar mounted on the rear of a two-man turret, which is equipped with a 7.62mm machinegun. The radar is folded down when not in use. The BMP M-1975 has been seen with 122mm M-1974 and 152mm M-1973 self-propelled artillery units assigned to motorized rifle and tank divisions.

The BMP M-1976, or BMP-R, a command and reconnaissance version of the BMP, has been deployed as a replacement for the PT-76 light tank that is normally found in regimental and divisional reconnaissance units. It has the same enlarged turret as the BMP M-1975 but mounts a 73mm main gun without the SAGGER launch rail. Two instead of four roof hatches are mounted to the rear of the BMP M-1976 turret.

The BMP is currently in service in several countries outside the Soviet Union — some of them friendly to the West. These include Czechoslovakia, Egypt, East Germany, India, Iraq, Libya, Poland, and Syria.

The modifications and improvements that continue to be performed on the BMP indicate that it is still going strong after 15 years. Early modifications to its hull design and suspension system improved the vehicle's mobility. Changes in its weapon systems have increased its flexibility and lethality. With this continuing modernization effort, it is evident that U.S. Infantrymen will be required to study the BMP for many years to come.



CAPTAIN SCOTT R. GOURLEY, a U.S. Army Reserve Field Artillery officer, is an ROTC graduate of the University of California at Los Angeles. While on active duty he served in artillery assignments in Europe and as an instructor in target acquisition and Soviet artillery at the U.S. Army Field Artillery School. He has had several articles published in military journals, one of which he co-authored with Captain McDermott.



CAPTAIN DAVID F. McDERMOTT is an Intelligence officer, also in the U.S. Army Reserve, now serving as assistant S-1, 4th Brigade, 91st Division (Training), at the Presidio of San Francisco, California. A graduate of the U.S. Military Academy, he holds a master's degree from St. Mary's College, Moraga, California. He served at Fort Hood in Military Intelligence assignments while on active duty.