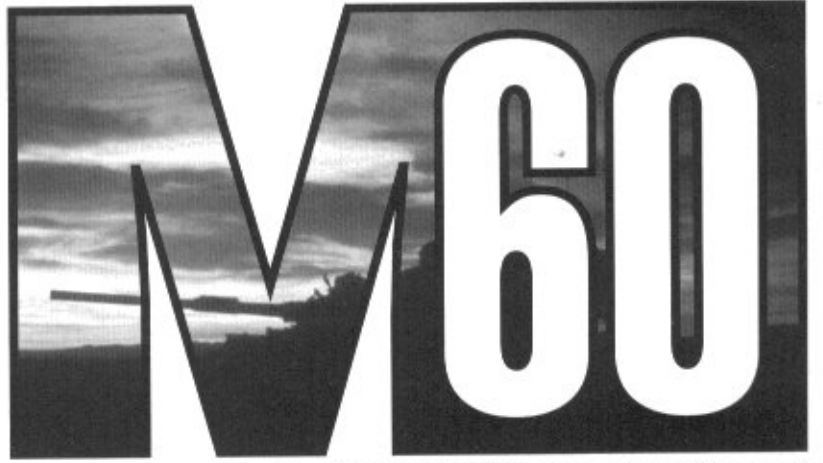


# M60

by Michael Green & Greg Stewart





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#### Front Cover

An USMC M60A1 fitted with reactive armor tiles poses for the  
camera. (Greg Stewart Photo)

#### Back Cover

Detail of USMC 1st Tank Battalion M60A1 showing reactive armor  
on turret and hull. (Greg Stewart Photo)

# INTRODUCTION

The U.S. Army's M1 Abrams Main Battle Tank has dominated the civilian press and the military trade journals since the first production model rolled off the assembly line in February, 1980, with untold numbers of stories about its development, fielding, and problems both real and imagined.

Unfortunately, forgotten by many is the fact that the M60 family of tanks will still make up over fifty percent of the U.S. Army's inventory of main battle tanks until the late 1990's.

With the recent thaw in cold war tensions and the announced defense cutbacks by the U.S. Army, use of the M60 tank could last into the 21st Century both with the U.S. tank fleet and foreign armies.

The history of the M60 tank begins in 1959 when a modified version of the M48A2 Patton was introduced with a new front hull, a diesel engine, and a 105mm gun. To highlight the improvement over the earlier vehicle, it was redesignated as the 105mm gun tank M60. The M60 series of tanks had, since the beginning of its production run in early 1960, been considered to be only an interim vehicle intended to serve the U.S. Army until the ideal tank could be designed and built. But, 15,000 tanks later, the M60 tank is still in service around the world. Numerous development programs helped to extend the useful life of the tank and kept it viable as a combat vehicle. Fortunately, the basic design was sound and easily accommodated the many modifications added to it over the years.

The last production version of the M60 tank was the M60A3, which was first introduced into U.S. Army service in 1978.

The external appearance of the M60A3 tank is not very different from the M60A1 tank model. Only the thermal shroud on the gun tube, the wind sensor on top of the turret bustle, and the laser safety shield on the right side rangefinder blister distinguish it as an A3 model.

Unique features of the A3 are its M1 tank type fire control system, which include a laser rangefinder, solid state electronic computer, and a tank thermal sight (TTS for short).

The (TTS) provides a large improvement over image intensification sights as found on earlier models of the M60 tank. It employs thermal technology so that its detection range is not dependent on moon or starlight. It "sees" as well in total darkness as it does in daylight and can detect targets through smoke, fog, and dust. It can also penetrate camouflage because it senses the heat of objects hidden by natural or manmade materials.

The thermal sight is made up of the head assembly and the gunner's views. The M60A3 tank commander also has a display, which is nothing more than a light pipe that sends an image from the gunner's sight to the commander's sight. The electronics unit fits into the aperture at the top of the turret.

In simulated combat, M60A3 tanks equipped with the (TTS) easily defeated tanks using the older image intensification devices. The (TTS) demonstrated an average 7 to 1 loss-exchange rate during war-game scenarios.

The M60A3 tank also has an engine exhaust smoke system, copied from the Soviets, which provides a dense smokescreen capability when in combat. The system consumes one gallon of fuel per minute and can be run intermittently or continuously.

While a large number of other improvements have been proposed for an M60A4 tank model, including more armor protection, low profile commander's cupola, etc., this was never type classified by the U.S. Army. The U.S. Army's and Army National Guard's fleet of M60A3 tanks will hopefully be replaced by M1 Abrams tanks by 1997, if funding is available. In the meantime, improvements to the M60A3 tank will be limited to those related to safety and protection of the environment. The Army would rather spend its limited funds on improvements to the M1 tank than an older generation tank.

## **Acknowledgements:**

Special thanks for cooperation in putting this book together all due to Yves Debay, Chris Foss, Dick Hunnicutt, and the U.S. Army; especially Sergeant Jim Edwards, Pentagon Public Affairs Office.

The most modern U.S. tank at the end of World War II was the M26 Pershing tank. Armed with a 90mm gun, the Pershing tank was classified as a heavy tank. Its long, low silhouette was a radical change from the existing U.S. tanks like the M4 medium tank. (U.S. Marine Corps Photo)



Next to be developed was a modified M26, the M46. With a new engine and additional improvements, the M46 was used successfully during the Korean War. (U.S. Army Photo)



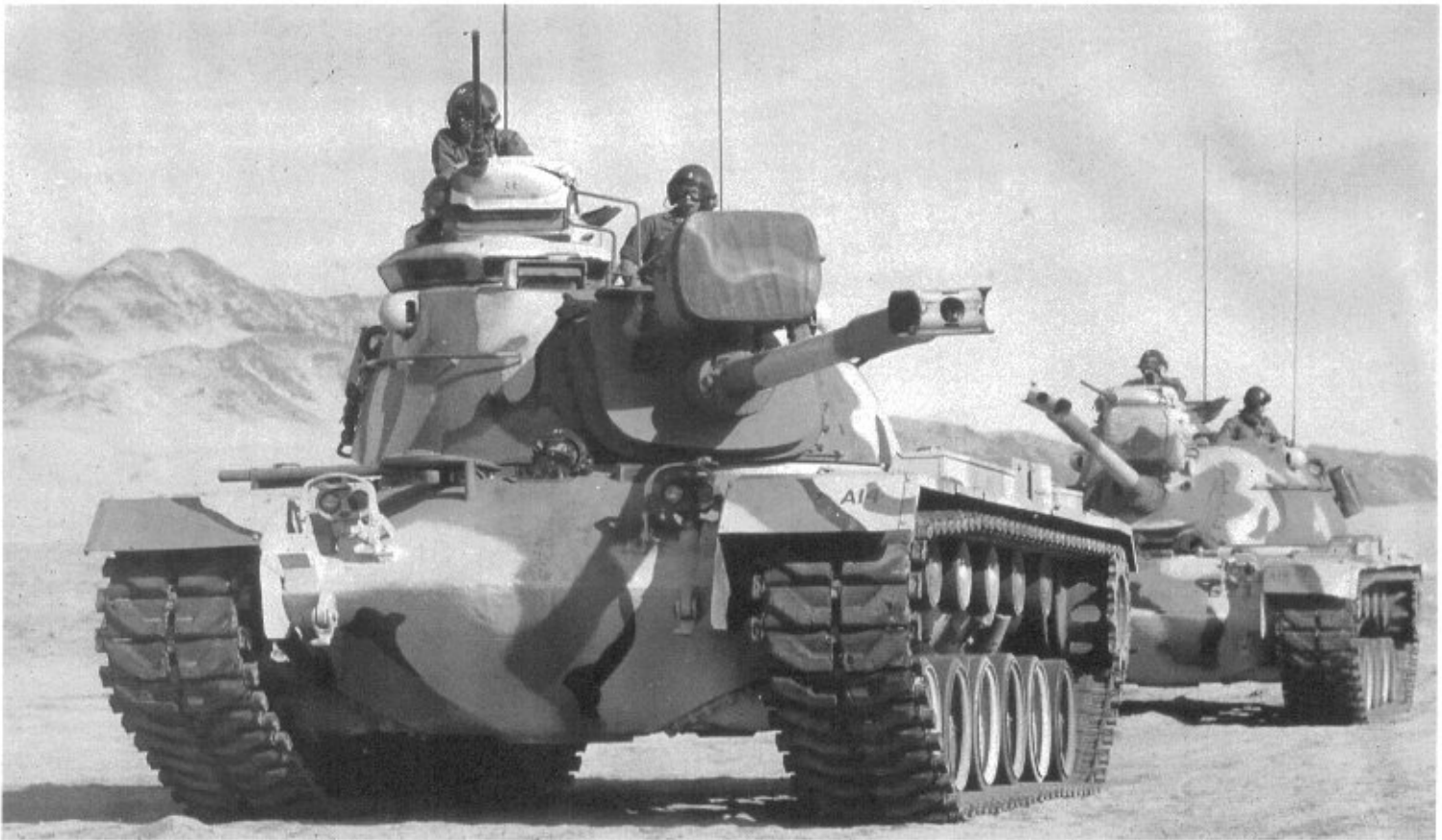
Following the M46 was the M47. While the hull and suspension system were practically the same as the M46, the turret of the M47 was new in practically all aspects including its size, shape, controls and sighting equipment. The greater slope of the turret frontal armor helped increase ballistic protection. (U.S. Army Photo)



In 1953, the M48 90mm gun armed tank was introduced. This tank had a boat-shaped hull and hemispherical turret to provide better ballistic protection against antitank projectiles. There were improved ammunition storage methods and a more efficient fire control system. The M48 had a crew of four in contrast to the five found in earlier U.S. Army tanks. (Mike Green Photo)



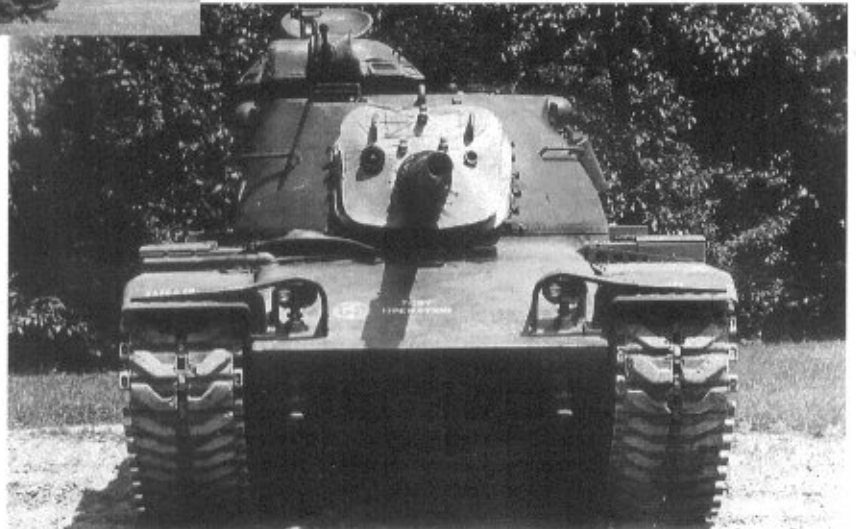
The M48 tank had a number of early production problems, but once these were resolved in later models, the M48 tank proved to be a very satisfactory vehicle in U.S. Army service. The A3 model of the M48 tank saw widespread service during the Vietnam War. (U.S. Marine Corps Photo)



The U.S. Marine Corps also made widespread use of the M48 tank. Pictured is a pair of Marine Corps M48A3 tanks during desert training in 1976. (U.S. Marine Corps Photo)



While the U.S. Army was very happy with the 90mm gun armed M48 series of tanks, the Soviet Army introduced into service in late 1947 the T-54 main battle tank. Armed with a 100mm D-10T rifled tank gun and heavily armored, the T-54 was on paper a superior weapon system to the M48 tank. As a result, the U.S. Army quickly rushed to build an improved M48 tank with a bigger gun than the T-54. Fortunately, the British had already developed a new 105mm gun. With a redesigned breech this gun was mounted onto a heavily modified M48A2 tank that had a new front hull and a diesel engine. To emphasize the improvements over the earlier M48 tanks that it descended from, it was redesignated as the M60 tank. (U.S. Army Photo)



Although the M60 was obviously just a product improved M48 tank, the M60 was never called a "Patton" tank. The nickname applied to only its earlier cousins, the M46, M47 and M48 tank series. Looking much like the M48 tank, the main spotting features that distinguish the early model M60 tanks from the M48 tanks are the new, flat front hull plate, a new larger cupola for the tank commander, the 105mm gun which featured a bore evacuator half-way down the barrel, plus redesigned roadwheels and fenders. (U.S. Army Photo)

The M60 could be fitted with an M9 bulldozer blade kit. Normally, one tank per company was fitted with this device. (U.S. Army Photo)



To protect the M60 tank from mines, a mine plow was developed. Fitted at the front of the vehicle, it would plow-up the ground ahead of the vehicle depositing any mines along the sides of the vehicle. The chain and bar located between the plow blades were used to detonate any mines that the plows missed. (U.S. Army Photo)



The first production run of M60 tanks were sent to U.S. Army units in Western Europe in late 1960. While the U.S. Army was very happy with its new 105mm gun equipped tank, they were unhappy with the turret shape and felt that a turret with a better ballistic shape could be built to defeat newer Soviet Army anti-tank weapons. As a result, in 1962, a new turret was fitted to M60 hull. This new turret featured an elongated nose which provided better ballistic protection than the earlier M48 type turret fitted to early model M60 tanks. The new turret was wider than the old style. It also had a pronounced rear bustle making much more interior space available to the four-man crew of the vehicle. This new variant of the M60 tank was designated the M60A1 tank by the U.S. Army to reflect the major changes made to the vehicle. (U.S. Army Photos)





For deep water wading across rivers and streams, the M60 could be made watertight. To provide air for the crew and engine, a wading tower could be attached to the loader's hatch on the turret. Depending on how deep the water conditions were, extra sections could be added or deleted if needed. The wading tower was large enough for the vehicle's commander to stand in the top of the tower during water crossing operations to direct the driver. (U.S. Army Photo)

During the 1970s the U.S. Marine Corps took the M60A1 tank into service to replace their M48 Patton tanks. (U.S. Marine Corps Photo)



The M60A1 was also fitted with an Xenon searchlight for nighttime combat conditions. Later model M60A1 tanks featured offered both infrared and visible light capability. (U.S. Marine Corps Photo)



For combat operations from landing craft, the Marine Corps fitted their M60A1 tanks with fording kits. The vehicle could not be submerged completely under water, but with watertight snorkels fitted to the engine compartment, the M60 tank could wade ashore through very deep surf conditions, if needed. (U.S. Marine Corps Photos)





To keep up with new Soviet tanks being built and fielded in large numbers by the Warsaw Pact in Eastern Europe during the early 1970s, the U.S. Army conducted a three-part improvement program to upgrade the M60A1 tank. (U.S. Army Photo)

The first upgrade to the M60A1 tank was an add-on stabilizer (AOS) system. The new system allowed the M60A1 tank to fire accurately on the move, something the Soviet T-62 main battle tank could not do. Other improvements included new track pads, plus the addition of a top-loading air filter. With these improvements the M60A1 was called the M60A1 (AOS) tank. (U.S. Army Photo)



The next block of changes to the M60A1 tank was a new diesel engine, plus various other engine improvements. Being part of a reliability improvement of selected equipment (RISE) program, the first newly engined M60A1 tanks entered into U.S. Army service in 1975. They were designated M60A1 (RISE) tanks. (U.S. Army Photo)

The last series of improvements to the M60A1 tanks was the fitting of passive night sights, plus a deep water fording system. In this final configuration, the tank was designated the M60A1 (RISE/PASSIVE). (U.S. Army Photo)



Other small improvements to the M60A1 tank have been extra armor added to the turret, new hydraulic fluid for turning the turret, and starting in 1979, the addition of new smoke launchers fitted to either side of the turret. (U.S. Army Photos)





The M60 tank could be, if need, flown almost anywhere in the world by U.S. Air Forces C-5A Galaxy transport planes. (U.S. Army Photo)



Since tanks can be very frightening creatures to untrained infantry in a wartime environment, the U.S. Marine Corps had at one time come up with a very special program to get their troops used to tanks - by forcing their soldiers to lay flat on a road and running an M60A1 over them!! (U.S. Marine Corps Photo)

U.S. Army M60A1 tank firing at night. (U.S. Army Photo)



M60A1 tanks being cleaned with high-pressure water jets, the only way to get the mud, dust and dirt off that cakes itself on to the tanks during training. (U.S. Army Photo)



U.S. Army M60A1 tanks in the street of West Berlin. (U.S. Army Photo)

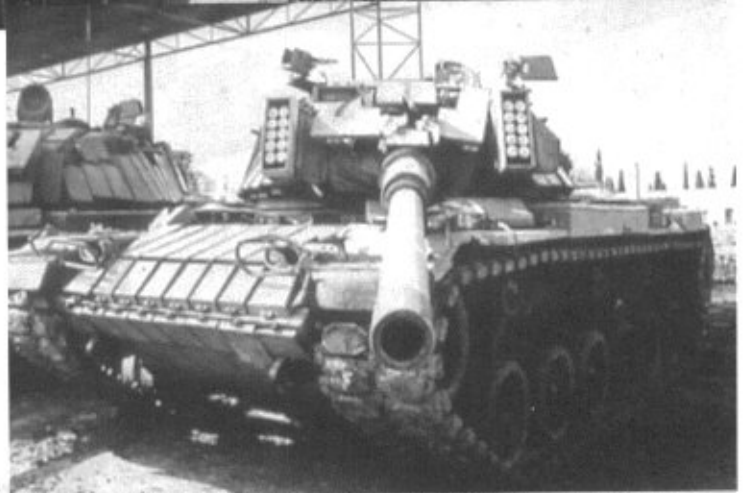


Israeli Army M60A1 tanks during the 1973 Yom-Kipper War. Israel has been the biggest user of M60A1 tanks in combat. (IDF Photos)





When the Israeli Army invaded Lebanon, their M60A1 tank had been modified with the addition of reactive armor tiles and a new commander's cupola, and banks of smoke dischargers on either side of the 105mm gun. (IDF Photos)





OTO Melara Company of Italy built 200 M60A1 tanks for the Italian Army with another 100 coming directly from the U.S. production lines. (OTO Melara Photo)



The Austrian Army bought 120 M60A1 tanks from U.S. production lines many years ago. They are now rebuilding their M60A1's to M60A3 tank standards. The Steyr-Daimler-Puch Company is doing the rebuilds. (Austrian Army Photos)



Other countries that have used M60 tanks over the years include Iran, which bought almost 460 vehicles under the Shah's rule. Ethiopia was supplied with a small number, but nobody knows what has happened to them? Saudi Arabia was delivered 158 M60A1 tanks between 1977 and 1979. Countries such as Bahrain, Jordan, Oman, Tunisia, and even North Yemen have gotten M60 tanks over the last decade. Shown is a Saudi Arabian M60A1. (U.S. Army Photo)



U.S. Army M60A1 tanks during winter training. (U.S. Army Photo)



Pictured is a United States Air Force M60A1 tank used by an Explosive Ordnance Demolition (EOD) Team in Saudi Arabia. (U.S. Army Photos)



The hull of the M60 tank is a homogeneous rolled armor steel casting. The hull is separated by an armor steel bulkhead into two sections: the driver's compartment and crew compartment in the front section, and the engine compartment (engine and transmission) in the rear section. (Greg Stewart Photo)

The M60A1 turret, which fits into the hull opening, is a one-piece homogeneous armor steel casing. Openings are provided in the turret to accommodate the 105mm gun cannon and combination gun mount, sighting and fire-control instruments, ventilating blower, loader's hatch cover, commander's cupola, and antennas. (U.S. Army Photo)





The gun elevating and turret traversing system consists of mechanical, electrical, and hydraulic components so arranged as to permit either the gunner or commander to traverse the turret 360 degrees in either direction or to depress and elevate the 105mm gun cannon. (U.S. Army Photo)



M60A1 of B Co., 1st Marine Tank Battalion firing a 105mm round down range. (Greg Stewart Photo)



The crew compartment is ventilated by an electrically-controlled blower that draws outside air into the turret. When the gun is being fired, the ventilating blower, located on the upper left (M60) or upper right (M60A1) corner of the turret ceiling, helps to purge the driver's and crew compartments of spent powder gases. (U.S. Army Photo)



The cupola is a self-contained unit mounted and secured to the top of the turret. The cupola mounts the .50 cal. machine gun and contains the necessary controls to lay and fire the machine gun in azimuth (deflection) and elevation. (Greg Stewart Photos)



Located in the commander cupola, the .50 cal. machine gun is an automatic belt-fed (disintegrating metallic link), recoil-operated, air-cooled weapon with a dual rate of fire. (Greg Stewart Photo)



The M60 tank is equipped with a torsion-bar type suspension which by means of individually suspended road wheels that are supported by support arms splined to the torsion bars, gives optimum riding characteristics over all types of terrain. (U.S. Army Photo)



The U.S. Army was the first to try out the reactive armor concept on their M60 tanks, but decided not to go with the program. Instead, the U.S. Marine Corps decided to equip its M60A1 tank units with the reactive armor tiles originally intended for U.S. Army M60 tanks in Korea. (Greg Stewart Photo)



The reactive armor tiles are mounted to the exterior of the tank's hull and turret, and consists of 91 armor tiles (49 M1 tiles and 42 M2 tiles) which attach to mounting hardware using retaining clips and machine bolts. Some of the outside tow cables and brackets have had to be modified and/or relocated due to the installation of reactive armor. (Greg Stewart Photo)



A total of 91 armor tiles are required for the basic M60A1 (RISE/PASSIVE) tank. Forty-nine M1 tiles, which are 11.5 inches by 11.5 inches x 2 inches in size, and forty-two M2 tiles, which are 11.5 inches x 17.5 inches x 2 inches in size. Dummy (inert) tiles are used on currently fielded M60A1 Marine Corps tanks. The real tiles are stored until needed in a wartime environment. Marine Corps tanks stored on Marine Prepositioned Ships (MPS) are outfitted with live tiles. Since the dummy tiles weight less than the real tiles, weighted tiles have to be left on the turret main gun mantel to keep the 105mm main gun in balance. (Greg Stewart Photo)

USMC personnel prepare to remove the powerpack from a 1st Tank Battalion M60A1 MBT using an M88 armored recovery vehicle. (Greg Stewart Photo)



The engine and transmission are referred to as the powerpack and are removed and replaced as a unit. (Greg Stewart Photo)



USMC 1st Tank Battalion mechanics work on the engine of an M60A1. Electrical cables and fuel lines connected to the tank allow the engine to be run before being replaced in the tank. (Greg Stewart Photo)





A USMC 1st Tank Battalion M60A1 maneuvers in the hills of Camp Pendleton, California. The upside-down V painted on the turret's reactive armor indicated this tank belongs to A Co. (Greg Stewart Photo)

A reactive armor equipped USMC 1st Tank Battalion, A Co. M60A1 moves into a firing position on a tank gunnery range at Camp Pendleton. The three white rings painted on the barrel indicate this is a 3rd platoon tank. (Greg Stewart Photo)



Marine Corps M60A1 tanks deployed to Saudi Arabia during the early stages of "Operation Desert Shield". These tanks of the 1st Marine Tank Battalion are lining up for gunnery practice. (Yves Debay Photos)



USMC M60A1 test firing live ammunition in Saudi Arabia. (Yves Debay Photo)



"American Express" M60A1 with reactive armor tiles during a training exercise in Saudi Arabia prior to Operation Desert Storm. Note the spare tracks and the amount of personal gear hanging on the side of the turret. (Yves Debay Photo)



To supplement the firepower of the 105mm gun on early model M60 and M60A1 tanks, the U.S. Army decided to mount the newly developed Shillelagh anti-tank missile system on an M60 tank chassis. At the time, during the mid-Sixties, this new missile system on paper seemed to have both superior range and much better accuracy than the 105mm gun could then offer. (U.S. Army Photos)



After many development problems, the U.S. Army took delivery of the first anti-tank missile system equipped tanks, known as the M60A2, in 1974. Production lasted until 1975, with 540 vehicles built. (U.S. Army Photo)



The M60A2 tank was operated by a four-man crew: driver, gunner, loader, and tank commander. (U.S. Army Photo)

The turret had an attached platform and could rotate 360 degrees in either direction. The platform had stowage facilities for ammunition and operating stations for the gunner and loader. The turret contained electro-hydraulic controls and interphone and radio communications systems. Openings in the turret accommodated an independent rotating cupola, the 152mm gun/launcher mount with 7.62mm machine gun and crew hatches. (U.S. Army Photo)



The very large commander's cupola was a self-contained unit in the top of the turret. The cupola and platform could rotate hydraulically and traverse 360 degrees in either direction, independent of turret rotation or hull movement. When the system was stabilized and the cupola was aligned to the 152mm gun/launcher, the commander could fire either the 7.62mm machine gun or the gun/launcher. Only the commander could fire the cupola-mounted .50 cal. machine gun. (U.S. Army Photo)



The SHILLELAGH missile was a solid propellant guided missile launched from a vehicle-mounted 152mm gun/launcher and guided by the vehicle-mounted guidance and control set through an infrared data link. The missile was similar to a conventional round of ammunition with respect to handling, storage, and loading characteristics. Although the missile consisted of two major sections, the warhead section and the missile body section, it was issued and handled as a complete round of ammunition. (U.S. Army Photo)

Of the 540 M60A2 tanks built, most of them were stationed in West Germany. (U.S. Army Photo)



Due to the complex nature of the M60A2 fire control system, the U.S. Army tankers who manned these vehicles nicknamed them the "Starship". (U.S. Army Photo)



Unfortunately, the M60A2 tank was never a real success in service use. With improvements in ammunition and fire control technology, the M60A1 was soon able to take on the task of long-range tank duels, something the U.S. Army had built the M60A2 for. With continual technical problems with the M60A2's armament system, the U.S. Army felt the tank was no longer worth the trouble and quickly withdrew the vehicle from service use in Europe. While the turrets were junked, the M60A2 hulls were used for special purpose vehicles like the bridgelayer M60 tank. (U.S. Army Photo)



This latest and possibly last version of the M60 tank, the M60A3 vehicle, was first introduced in 1978. The current subvariant is designated M60A3TTS. (Mike Green Photo)



The Army's production run of M60A3 vehicles ended in 1985, giving them over 5,000 M60A3 tanks in service. The production line was kept open for a number of years afterward to produce this well respected vehicle for the Egyptian Army, which needed to replace quickly aging Soviet produced vehicles. (Mike Green Photo)



This latest version of an old warhorse, the M60A3TTS has considerable punch, one of the most important features being its fire control system. While the current M60A3TTS is fitted with the same 105mm cannon as the first M60 model vehicles produced, a new fire control system featuring a ruby laser rangefinder built by Hughes Aircraft and solid state ballistic computer has been installed. This new fire control system gives the M60A3TTS tank a significant improvement in daylight accuracy over earlier models equipped with standard coincidence rangefinder systems. (Mike Green Photo)



To improve fighting ability in environments hostile to optics and targeting systems (night, smoke screens, dust, rain, fog, battlefield clutter, etc.) the M60 was the first vehicle in Army inventory to be equipped with a Tank Thermal Sight (TTS). M60A3 tanks so equipped are designated M60A3TTS. All versions of the Army M1 tank are also equipped with equivalent thermal systems. (Mike Green Photo)



Detail of right side of M60A3 turret showing (TTS) Tank Thermal Sight and rangefinder with armored cover in open position. (Greg Stewart Photo)

Thermal sights are a revolutionary improvement permitting near daylight tactical operations under conditions of limited visibility or total darkness. Thermal imaging is independent of any outside light because it senses heat emitted by a target (ranging from an infantryman to a main battle tank) and forms an image on a screen. The system is passive, in that it does not emit any signals which might be detected as opposed to an active system such as radar, which sends out signals. The TTS in the M60A3TTS tank has a remote viewing screen for the tank commander, allowing him to view the same scene as the gunner. This enable the tank commander to aim and fire the cannon from his station. (Greg Stewart Photo)



A tanker is bore-sighting his 105mm gun armed M60A3 tank. (Greg Stewart Photo)



A 4th Infantry Division, 185th Armored Battalion tanker installs a boresighting device into the barrel of the main gun of an M60A3. (Greg Stewart Photo)





The M60A3TTS tank also has been equipped with a wind drift sensor, mounted on the rear of the turret that automatically inputs the ballistic computer with wind speed and direction, enabling the computer to compensate the main gun's point of aim. (Fort Knox Public Affairs Office Photo)



Another improvement to the M60A3TTS tank, one of the few that alters the outward appearance when compared to earlier models, is the addition of a thermal shroud on the main gun tube to aid in heat distribution. This shroud is mounted on the gun tube to minimize barrel distortion resulting from uneven heating that has, in the past, been a major cause of inaccuracy. (Greg Stewart Photo)

M60A1 of the 2nd Marine Tank Regiment during an exercise. The crew is putting on a camouflage netting on the tank. (Yves Debay Photo)



M60A1 tanks, besides being used in Western Europe for the last few decades by the U.S. Army, have been widely exported to other countries. Here, an U.S. Army M60A1 tank during exercise in Europe. (U.S. Army Photo)

The armament consists of a 105mm gun cannon mounted in a combination gun mount M116, or M140, a coaxially mounted 7.62 machine gun mounted on the combination gun mount, a .50 cal. machine gun mounted in the commander's cupola M19. The 105mm gun cannon consists of a gun tube, evacuator chamber group, breech operating group, breech ring group, and breechblock group. (Greg Stewart Photo)





An M60A1 at sunset. (Greg Stewart Photo)



A reactive armor equipped USMC M60A1 on maneuver at Camp Pendleton. (Greg Stewart Photo)



USMC M60A1 tank firing at night. (Greg Stewart)

The reactive armor tiles provide improved survivability to the M60A1 (RISE/PASSIVE) tanks used by the Marine Corps. They have been in use since 1988. (Greg Stewart Photo)



USMC M60A1 maneuvers in the desert terrain of the Air-Ground Combat Center (AGCC) at 29 Palms, California. (Greg Stewart Photo)



M60A1s of the USMC 1st Tank Battalion, C Co. participate in a combined arms exercise (CAX) at the USMC's Air-Ground Combat Center at 29 Palms, California. (Greg Stewart Photo)



Bombing up of "Syracuse Express" in Saudi Arabia. Marine Corps M60A1 tanks were the first American main battle tanks to arrive in Saudi Arabia for Operation Desert Shield. (Yves Debay Photo)



USMC M60A1s in position and ready for the onslaught into Southern Kuwait, January 1991. The tanks are now painted with the inverted V invasion marking. (Yves Debay Photos)



The U.S. Army has modified over 3,000 older M60 series tanks to the A3 standards and had also ordered from General Dynamics close to 2,000 new M60A3 tanks. (Fort Knox Public Affairs Office Photo)

Carried aboard the M60A3TTS tanks are 63 rounds of ammunition, 26 rounds located on either side of the driver in the hull, 13 ready rounds next to the gun, 21 in the rear of the turret, and 3 right under the main gun. A good, well-trained crew can fire six to eight rounds per minute. (Greg Stewart Photo)



Most M60A3 tanks in West Germany only came out in large numbers during the annual Return of Forces to Germany (REFORGER) exercise. (Yves Debay Photo)



REFORGER was designed to demonstrate the United States ability to rapidly transport both troops and equipment by ship and aircraft to Europe in case of war. An M60A3 tank crew taking a break, in a heavily wooded German forest. (Yves Debay Photo)

REFORGER exercises have been held in West Germany for 20 years, demonstrating United States resolve to support the North Atlantic Treaty Organization (NATO). Pictured is an Army M60A3 tank in the middle of a small German country town. (Yves Debay Photo)



The value of a tank mounted bulldozer for clearing obstacles or debris under fire was clearly demonstrated during WWII. During the postwar period bulldozer kits were designed to be fitted to the entire series of Patton tanks, from M46 thru M60A3. Pictured is an U.S. Army M60A3, with a bulldozer blade mounted, hiding in a wooded cove in West Germany. (Yves Debay Photo)

Pictured is a head-on photo of an M60A3 tank in West Germany during REFORGER 1988, mounting a M9 bulldozer kit. The blade is raised for traveling mode. (Yves Debay Photo)



This M60A3 tank in West Germany has been covered with a few dabs of white paint to make it blend in with the countryside. (Yves Debay Photo)

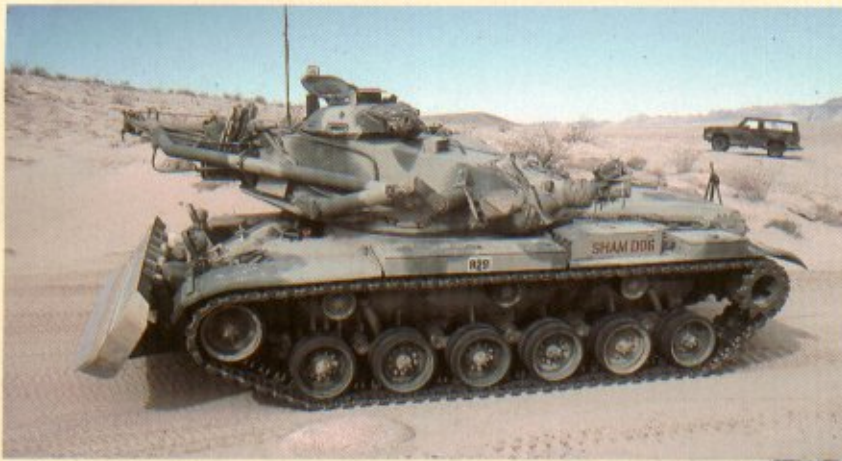


A 4th Infantry Division M60A3 at the National Training Center in May of 1990. Soon afterward the 4th ID was equipped with the M1 Abrams. (Greg Stewart Photo)



An M60A3 of the Egyptian 3rd Mechanized Division entrenched on the sand berms which marked the border between Kuwait and Saudi Arabia, awaiting the ground war phase of Operation Desert Storm. (Yves Debay Photo)





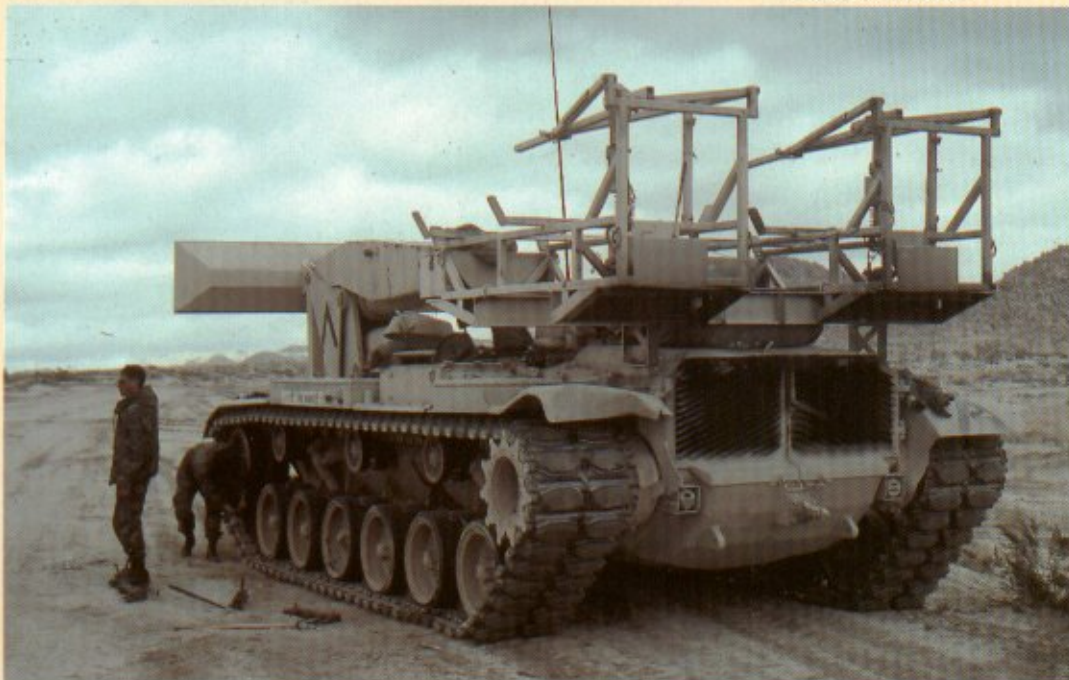
An M728 Combat Engineer Vehicle (CEV) belonging to the National Training Center OPFOR 87th Engineer Co. (Greg Stewart Photo)



A 155th Armored Brigade M60 AVLB recovers a bridge span. The span can be connected at either end, allowing it to be recovered after the M60 AVLB passes over it. (Greg Stewart Photo)



The M60 AVLB weights a little over 61 tons with a 60 foot bridge on board. There is also a 43 foot bridge that can be carried by this vehicle (Mike Green Photo)



1st Cavalry Division engineers work on the track of their AVLM at the NTC. The MICLIC boxes normally carried in the rack on the rear of the vehicle are missing. (Greg Stewart Photo)



While still equipped with the excellent M68 105mm cannon, the M60A3TTS tank's firepower is surpassed in size by many Soviet armored vehicles mounting larger bore weapons. This size difference may be seen as a disadvantage; however, the lethality of ammunition is of greater importance. The M60A3TTS takes advantage of American advancements in munitions technology allowing it to compete against Soviet tanks with larger main guns but firing inferior ammunition. The U.S. Army uses tank rounds such as the M735A1, which is a hyper velocity, discarding SABOT, armor piercing round utilizing depleted uranium cores. This round and others under development will keep the 105mm gun an effective tank killer on the modern battlefield. (U.S. Army Photos)





An 185th Armor M60A3 being loaded with 105mm main gun ammunition on a livefire range at the National Training Center. (Greg Stewart Photo)

185th Armor tankers transfer 105mm ammunition from one M60A3 to another. (Greg Stewart Photo)



In addition to the 105mm main gun, the M60A3 tank is equipped with a Belgian designed M240 7.62mm coaxial machine gun and a M85 .50 caliber machine gun fitted on the commander's cupola for use against troops and lightly armored vehicles. (Greg Stewart Photo)



For added protection the M60A3 tank is equipped with British designed smoke grenade launchers mounted on both sides of the turret which, when fired from inside the vehicle, will lay down a brief but dense smoke screen in front of the tank to hide it temporarily from enemy gunners. To produce a thicker and longer lasting smoke screen, the M60A3 is equipped with a vehicle engine exhaust smoke screen system developed by Teledyne-Continental Motors Corporation. It consists of a device that injects diesel fuel into the exhaust system. Atomized and expelled, the fuel produces a thick, white cloud of smoke. Effective use of smoke can significantly help screen American vehicles from enemy view and fire, permitting our vehicles to maneuver and bring effective fire upon enemy forces. (Mike Green Photo)



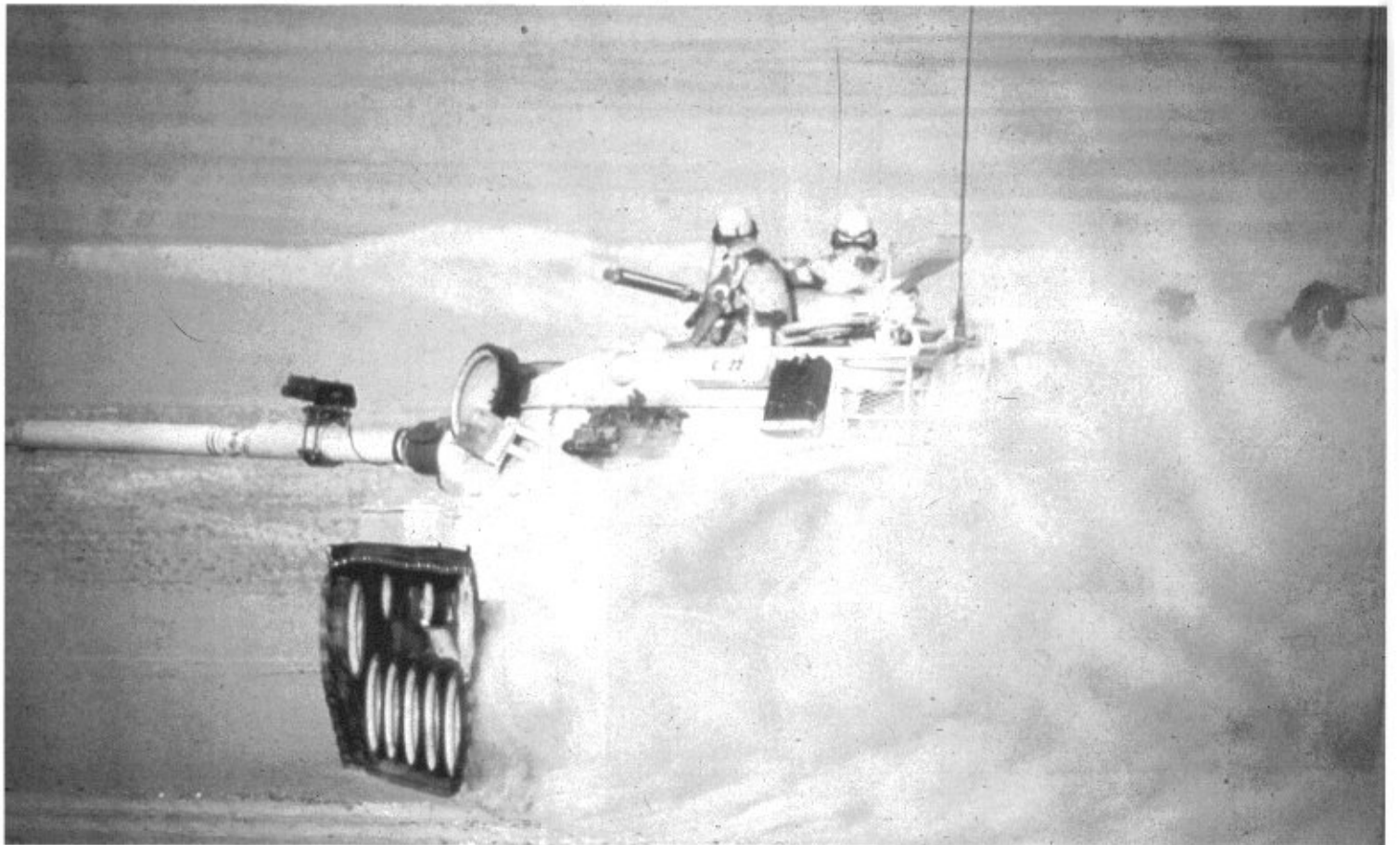
U.S. Army M60A3 tank being protected by a soldier armed with a stinger missile. (Mike Green Photo)



California National Guard M60A3 tanks. (Mike Green Photos)



M60A3 tanks in Egypt during "Operation Bright Star". (U.S. Army Photos)



Because of the heavy damage that tanks did to farmers fields in West Germany, they were often restricted to roads only, so as not to cause many problems with local farmers. (Yves Debay Photo)



An M60A3 tank is seen here fitted with the M9 bulldozer kit, minus the bulldozer blade. You can clearly see the hydraulic supports needed to raise and lower the bulldozer blade. (Yves Debay Photo)



Unfortunately for U.S. Army tankers, training in West Germany often conducted in all types of weather conditions, including the very cold German winters. (Yves Debay Photo)

M60A3 tanks maneuvering during REFORGER exercise in West Germany. (U.S. Army Photo)



This M60A3 lost its tracks and is being retrieved by an M88. (U.S. Army Photo)



U.S. Army M60A3 at the NTC painted in a sand color. Notice the front roadwheel is missing. (Greg Stewart Photo)



185th Armor tankers atop their M60A3 watch another tank down range fire at targets on a live fire range at the National Training Center. (Greg Stewart Photo)



An 185th Armor crew waits their turn to fire on a tank range at the National Training Center. (Greg Stewart Photo)



A U.S. Army camouflaged M60A3 at the National Training Center. (Greg Stewart Photo)





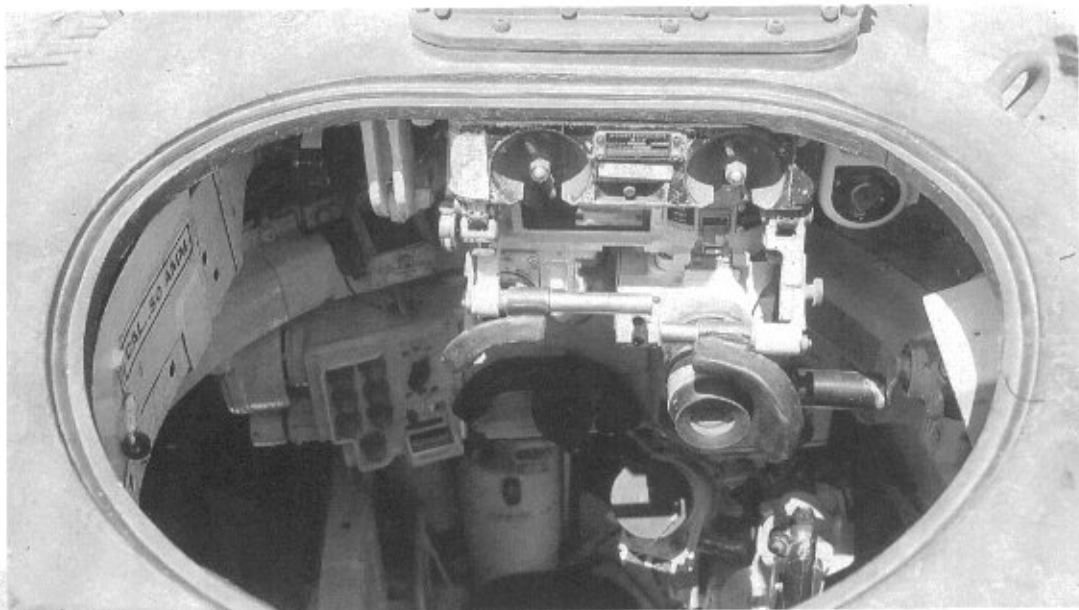
Saudi Arabia received 100 new M60A3 tanks in 1984 and 1985 to boost their military tank fleet. With the 158 M60A1 tanks being upgraded to A3 standard, Saudi Arabia now has a total of 258 M60A3 tanks in service. This M60A3 belongs to the 4th Mechanized Brigade and is preparing for the assault into Kuwait in January 1991. (Yves Debay Photo)

The Egyptian Army has during the last decade become one of the biggest users of the M60 tanks. As their Soviet-built military equipment wears out due to heavy use and lack of spare parts, they have reequipped themselves with the M60 tanks. General Dynamics built a number of brand new M60A3 tanks for the Egyptian Army. The Egyptian Army took delivery of over 700 vehicles in the early 1980s. (Yves Debay Photo)



Egyptian Army M60A3 of the 4th Armored Division accompanied by an M113 advances towards Al Rukh during Operation Desert Storm. (Yves Debay Photo)

Looking down into the tank commander's cupola of an M60A3 tank. (Greg Stewart Photo)



M19 commander's cupola, which houses an M85 .50 cal. machine gun, also provides a handy resting spot for a tired tanker. (Greg Stewart Photo)



Tank commander of an M60A1 inside the turret with his right hand on the turret controls. (U.S. Army Photo)



The tank commander of an M60A3 tank looking into his thermal viewer. (Mike Green Photo)



From the loader's position of an M60A3 tank looking up at the tank commander who's staring through the vision blocks in his closed M19 cupola. (Mike Green Photo)



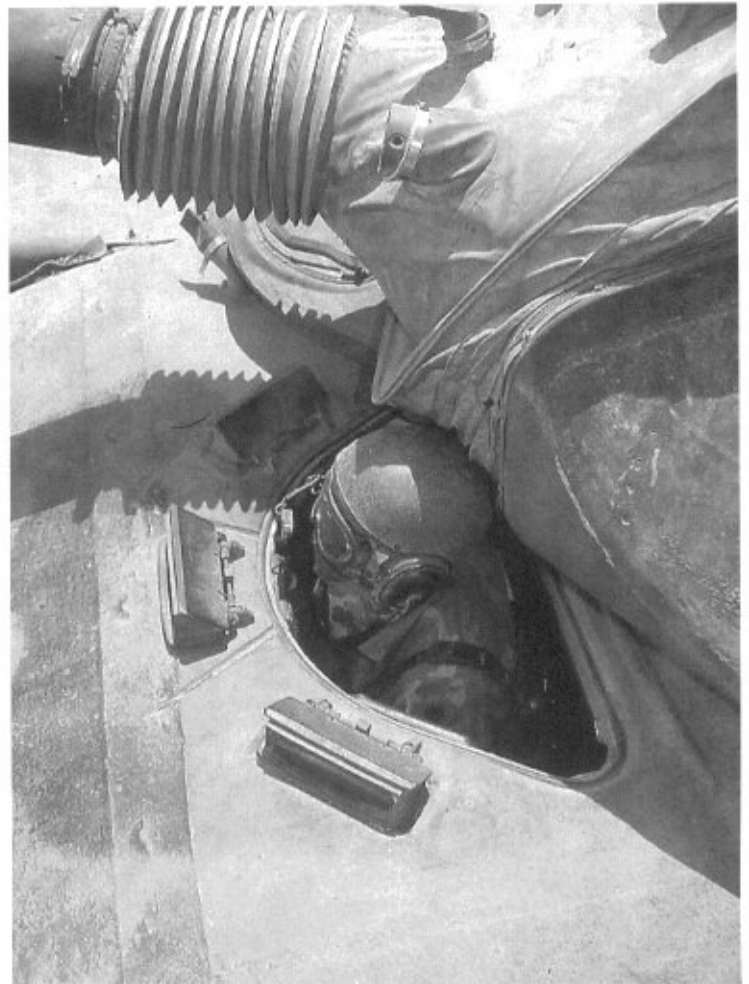
Gunner's position on an M60A1 tank. (U.S. Army Photo)



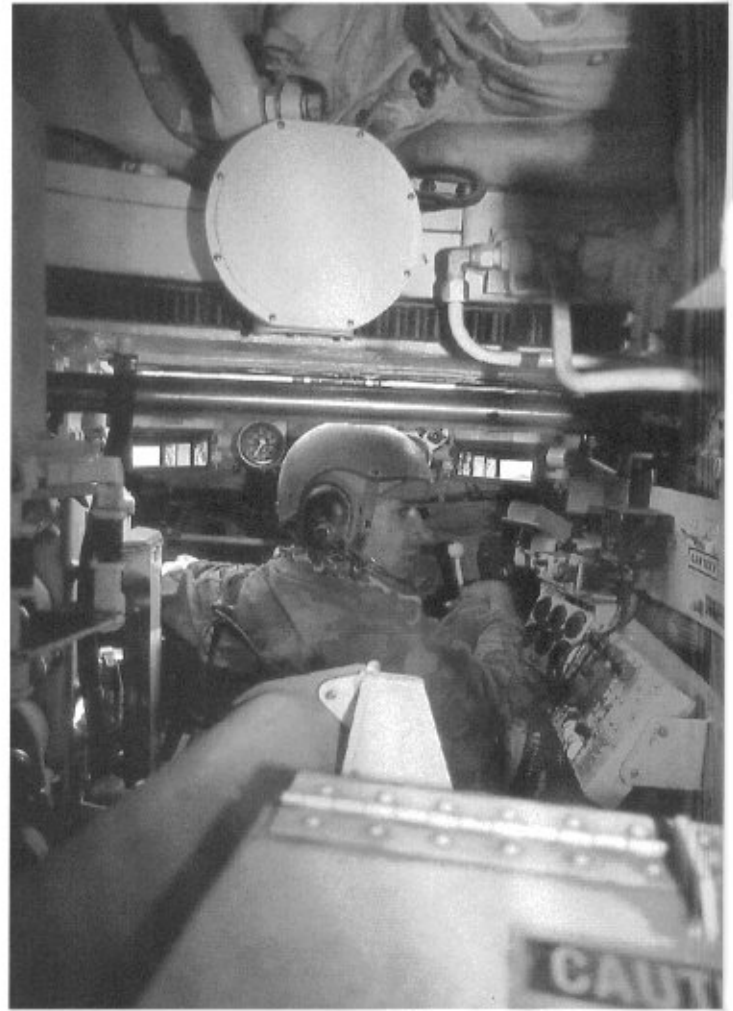
Two photos of the loader's position on an M30 turret trainer. The M30 is a training aid used to train personnel in the operation of the turret, the 105mm gun cannon, and the sighting and fire-control equipment of the M60 tank. The M30 trainer is a modified M60 tank turret mounted on a stand. The turret is provided with platforms and cut-out areas to allow the instructor to observe the trainee under actual operating conditions. It is powered from a rectifier power supply which replaces vehicle power. (U.S. Army Photos)



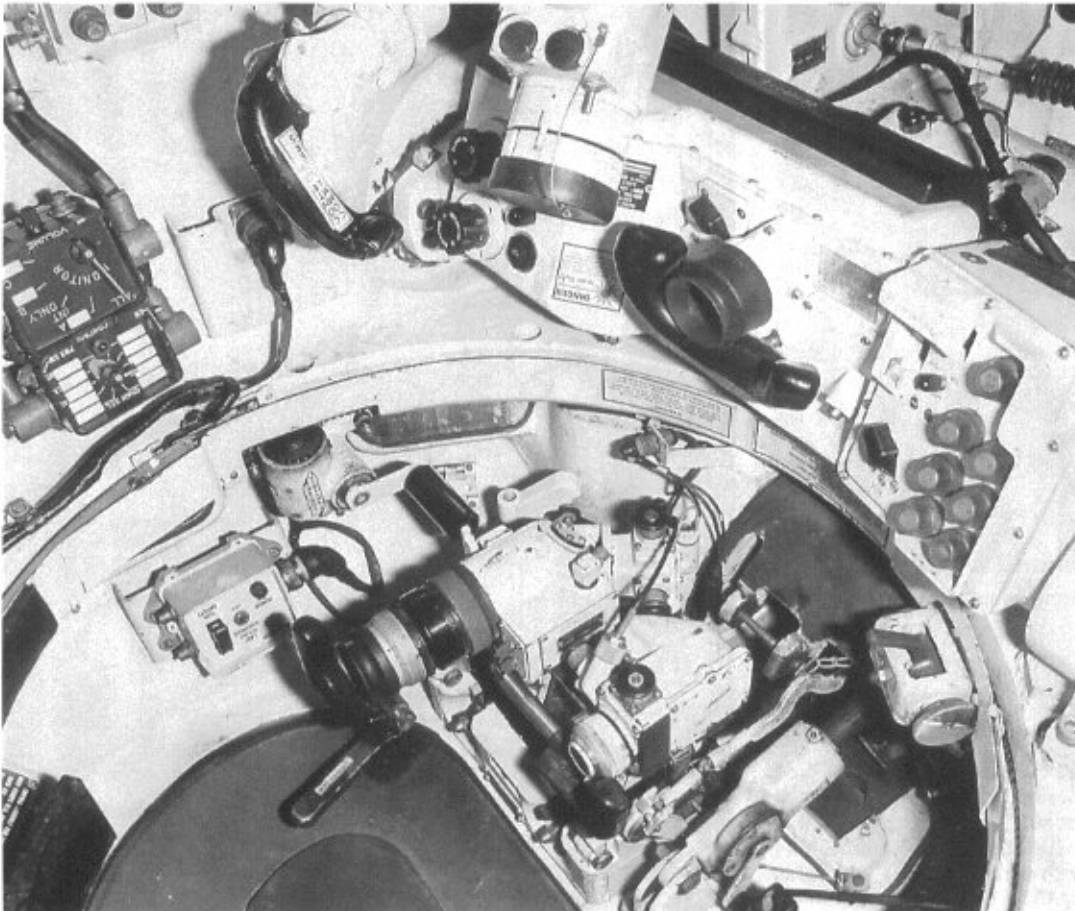
Gunner's position on an M60A3 tank. (U.S. Army Photo)



Driver's position on an M60A3 tank. This compartment contains controls and instruments necessary to operate and drive the tank. Three openings with spring loaded covers are provided around the periphery of the driver's hatch for installation of daylight M27 periscopes. A mount is provided in the driver's hatch cover for installation of an infrared M24 periscope for viewing during night driving with infrared service headlights turned on. (Mike Green Photo)



Looking from the turret of an M60A3 into the forward driver compartment. (U.S. Army Photos)



A picture of the inside of a M19 tank commander's cupola looking up from the turret floor. (U.S. Army Photo)



The M728 Combat Engineer Vehicle (CEV), which was issued to U.S. Army units beginning in 1966, was a specially designed version of the M60 tank produced for use by Army combat engineering units. Intended to clear any type of obstacle that may slow down the advance of other armored vehicles such as tanks and armored personnel carriers, the CEV could remove roadblocks or damaged vehicles under combat conditions. (U.S. Army Photo)



Equipped with a large "A" frame boom mounted on the turret of the CEV, the boom could lift almost nine tons. (U.S. Army Photo)



The CEV was also fitted with a M9 bulldozer blade on the front of the vehicle. The CEV's bulldozer blade is wider than its hull, hence it can excavate a full-width tank position, suitable for both M60 and M1 tanks, in a single pass. (Greg Stewart Photo)



Located in the rear of the CEV turret is a 25,000 pound capacity winch for towing other vehicles out of difficult terrain. To destroy enemy pillboxes or bunkers, the CEV was fitted with a short-barrelled 165mm gun based on a British-made L9A1 cannons. Because of the size of the 165mm round, only thirty rounds can be carried by the CEV. Combat loaded the CEV weights 57.5 tons. Over 243 CEVs were built between 1966-1972. A few even saw service in the Vietnam War. (Mike Green Photo)



Overhead photo of an U.S. Army M728 Combat Engineer Vehicle with dozer blade raised and A-frame in travelling configuration, somewhere in Saudi Arabia. (U.S. Army Photo)



The 24th Mechanized Infantry Division deployed a number of M728 Combat Engineer Vehicles to Saudi Arabia in 1991. The vehicles were mounted a brand new mine clearing rake. Created for sand or loose soil, the 12-inch rake was used by both Army and Marine Corps combat engineers in Saudi Arabia to breach a 180-inch path through Iraqi minefields. This is wide enough to allow an M1A1 to pass. (DoD)





When the M60 series tank entered into production in the early 1960s, the U.S. Army quickly moved to develop an armored vehicle launched bridge (AVLB) based on the M60 chassis. The first M60 AVLB vehicles entered into U.S. Army field units in 1963. (Mike Green Photo)

Almost 400 of the AVLB vehicles were built for the U.S. Army. A few were deployed to South Vietnam where they were highly successful in use. (Greg Stewart Photo)



The M60 AVLB has a two-man crew located below the turret ring of the vehicle, in the hull. Both crewmen have their own vision cupolas. (Greg Stewart Photo)

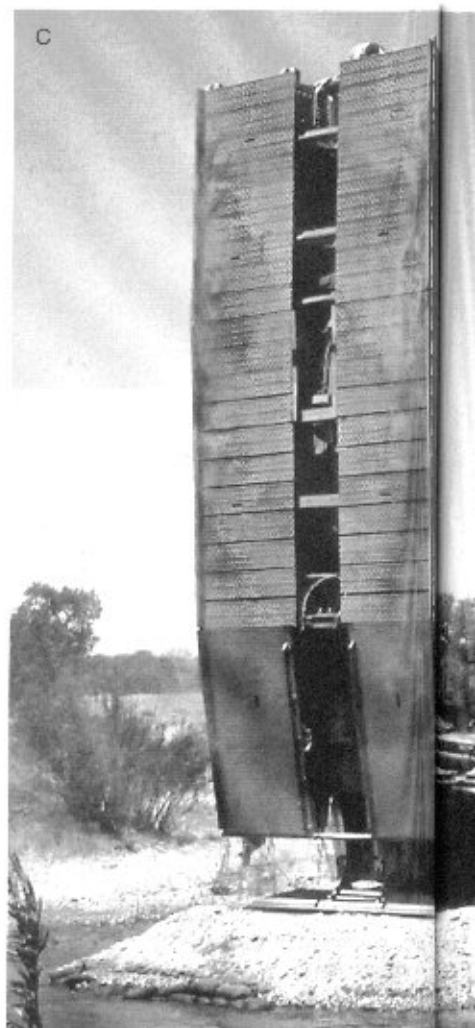
The bridge spans are made of aluminum and steel and weight about fourteen tons. (Mike Green Photo)

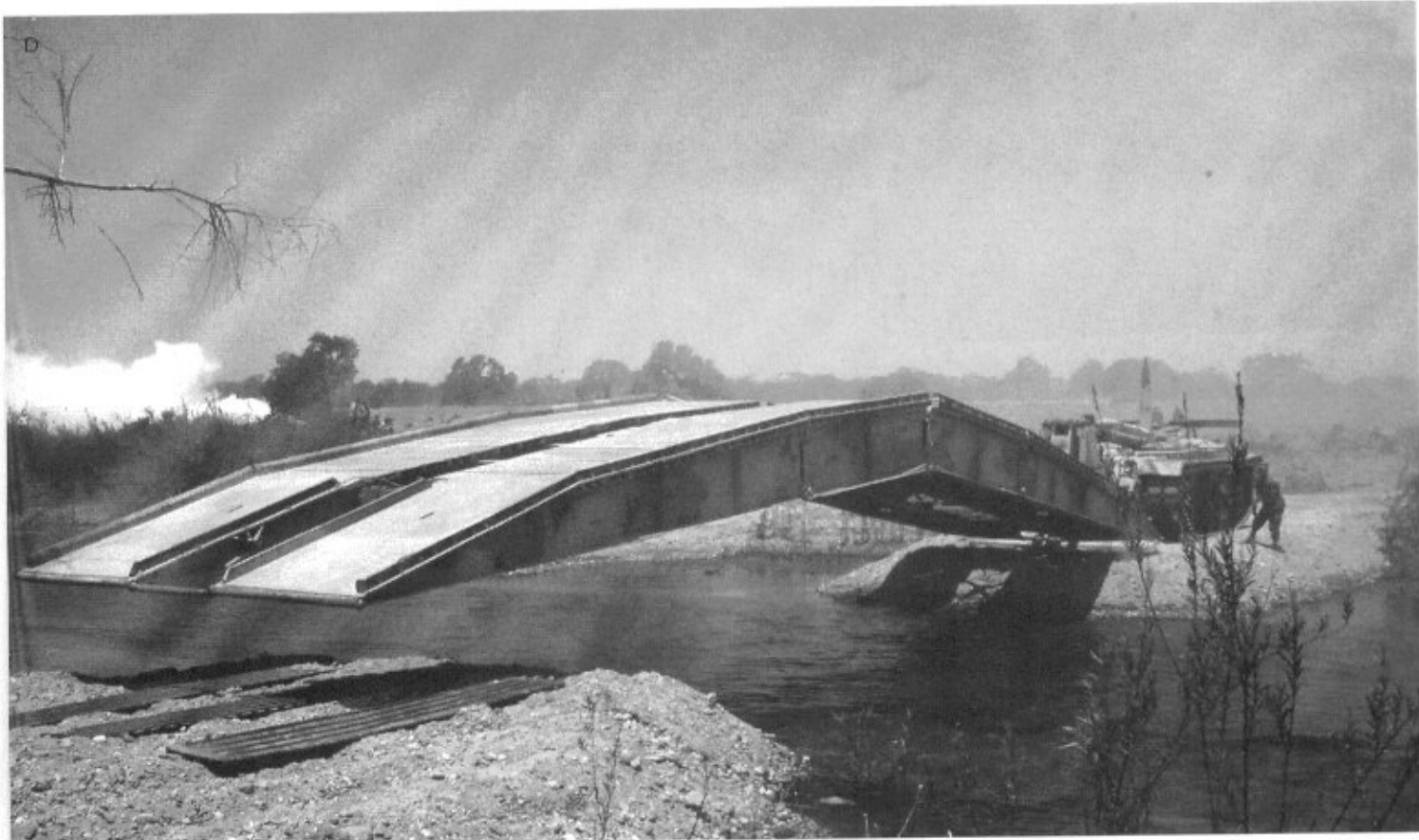


Once the AVLB has launched its bridge, it can recover the bridge from either side of it. (Mike Green Photo)



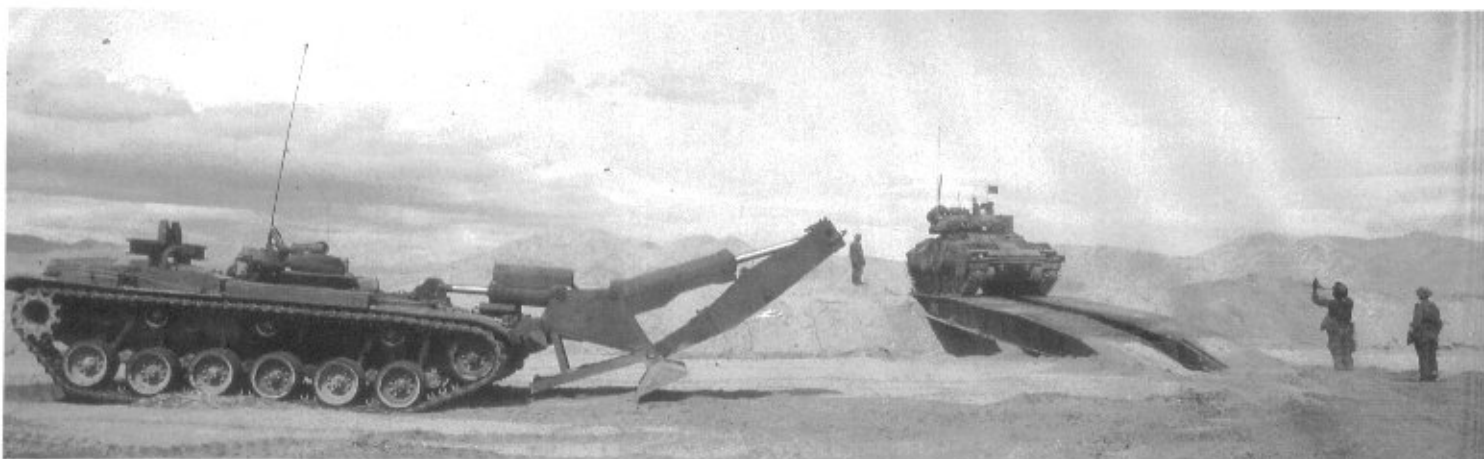
An M60 Armored Vehicle Launched Bridge (AVLB) moves forward to lay a bridge span across a tank trench at the National Training Center. (Greg Stewart Photo)





Under the best conditions it should only take two minutes to lower the bridge on the M60 AVLB and about ten minutes to recover it. (Mike Green Photos)





A 155th Armored Brigade M2 Bradley IFV crosses a tank trench on a bridge span laid down by an M60 AVLB. (Greg Stewart Photo)



The ROBAT is a remote-controlled mine clearing vehicle now under development that is expected to become the U.S. Army's first countermine vehicle. The ROBAT is designed to accompany assault forces. Under remote control, it will destroy mines by launching rocket-propelled lines of explosives. These explosives detonate sequentially across the minefield and cause nearby mines to explode, clearing a path for other vehicles. The ROBAT can then be remotely steered across this patch to explode any remaining mines, while marking the cleared lanes with luminescent "light sticks." The ROBAT prototypes are modified M60A3 tanks, each with the turret replaced by a large heavy armored base plate. Two armored pods containing the explosive lines are mounted atop the base plate. The crew of two (driver and vehicle commander) will sit in tandem, between the two armored pods. A stowage area was designed into the remaining space below the crew compartment. (U.S. Army Photo)



General Dynamics Land Systems Division, builders of the M60A3 and M1 tanks, developed a mine roller system that can be fitted to all M60 tanks. Already in use by U.S. Army units, the system was based on tests of captured Soviet-built PT54 and KMT5 tank mounted mine clearing rollers. (U.S. Army Photo)

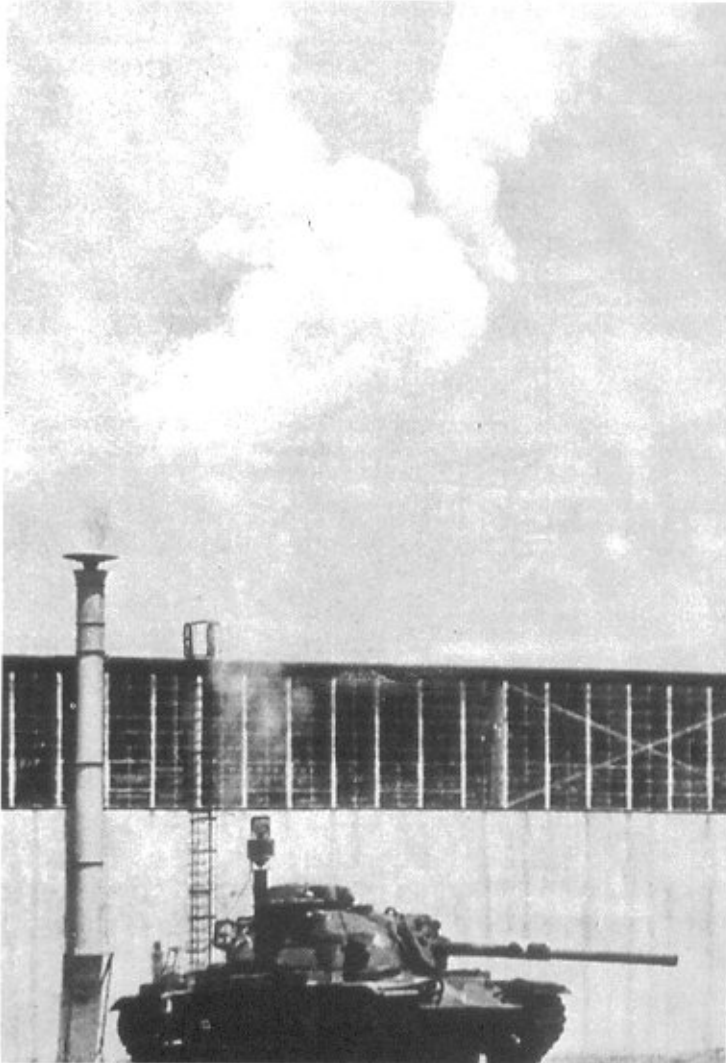


Some M60 AVLB have been converted to Armored Vehicle Launched MICLICs (AVLM) to carry two Mine Clearing Line Charge (MICLIC) systems. The MICLIC is capable of sending a line charge into a minefield and upon detonation clearing a 100 by 8 meter path. (Greg Stewart Photos)





For test purposes, the U.S. Army attached a "breadboard automatic defense system" to an early model M60 tank. The system was designed to detect anti-tank missiles and to launch smoke grenades or thermoflares as countermeasure. (U.S. Army Photo)



Teledyne Continental Motors, General Products Division, developed in 1981 as a private venture a high performance version of the M60 series tank. A standard M60A1 was fitted with a 1,200 hp diesel engine, four-speed hydromechanical transmission, a hydropneumatic suspension system, and an add-on armor package. (Teledyne Photo)

Pictured is the same vehicle which has just launched a thermoflare to confuse a heat seeking missile. (U.S. Army Photo)

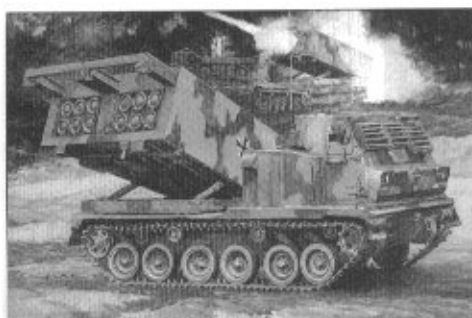
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3516 M1A1 w/MINE PLOUGH "DESERT STORM"

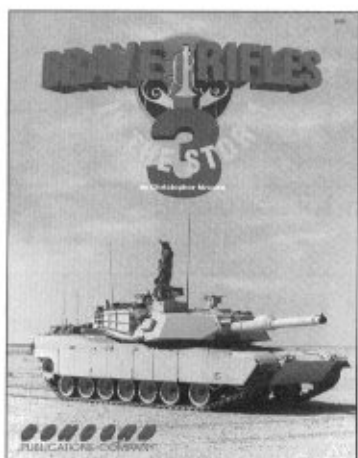
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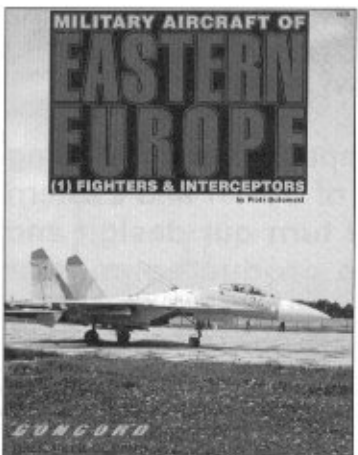
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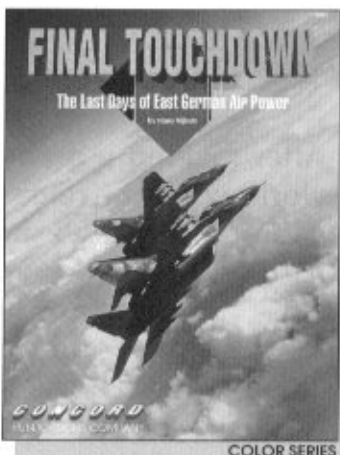
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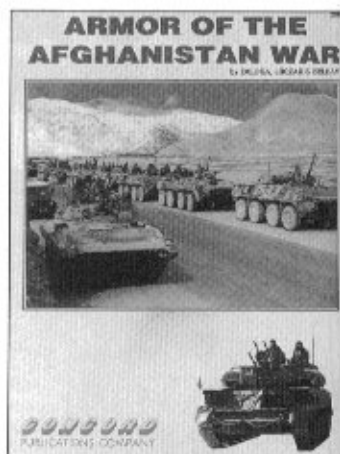
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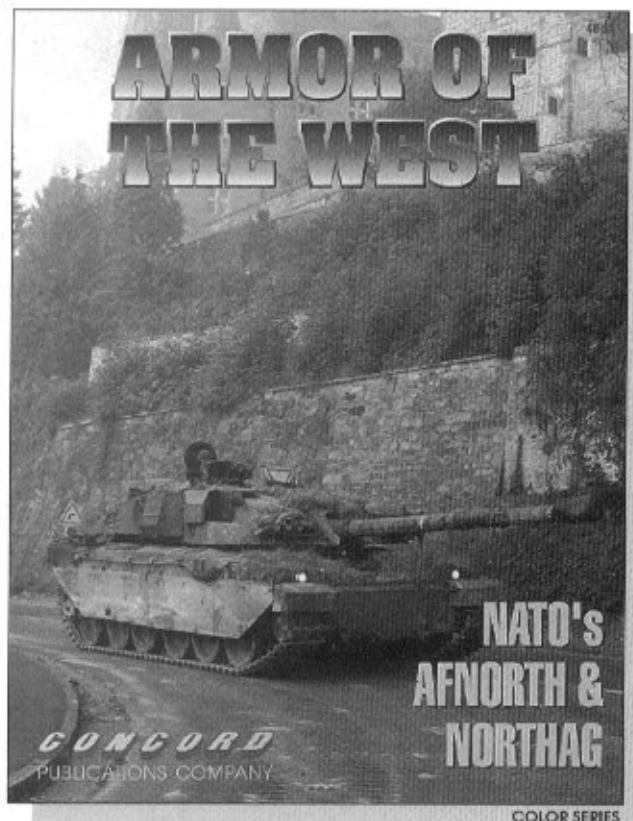
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