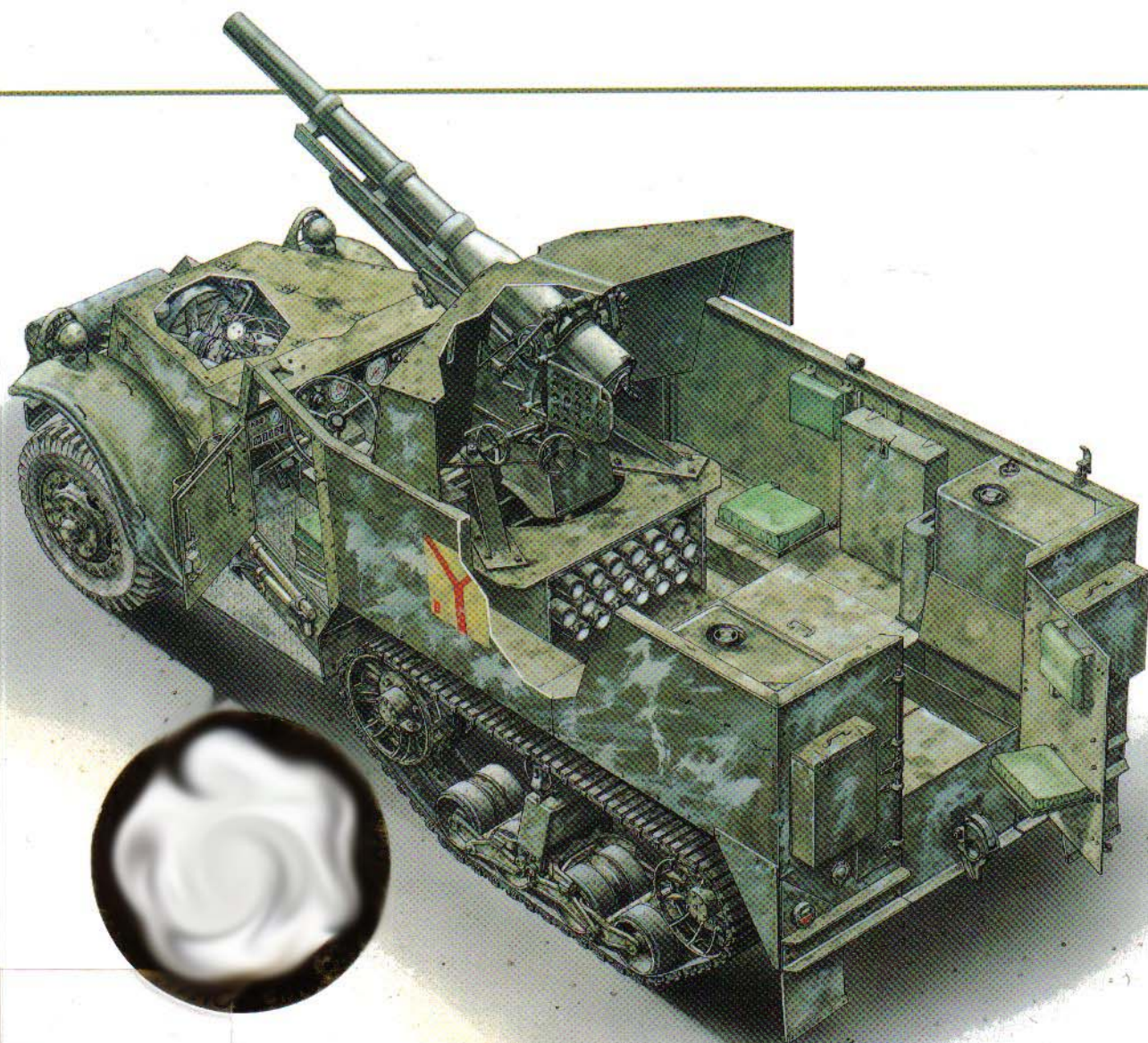


M3 Infantry Half-Track

1940–73



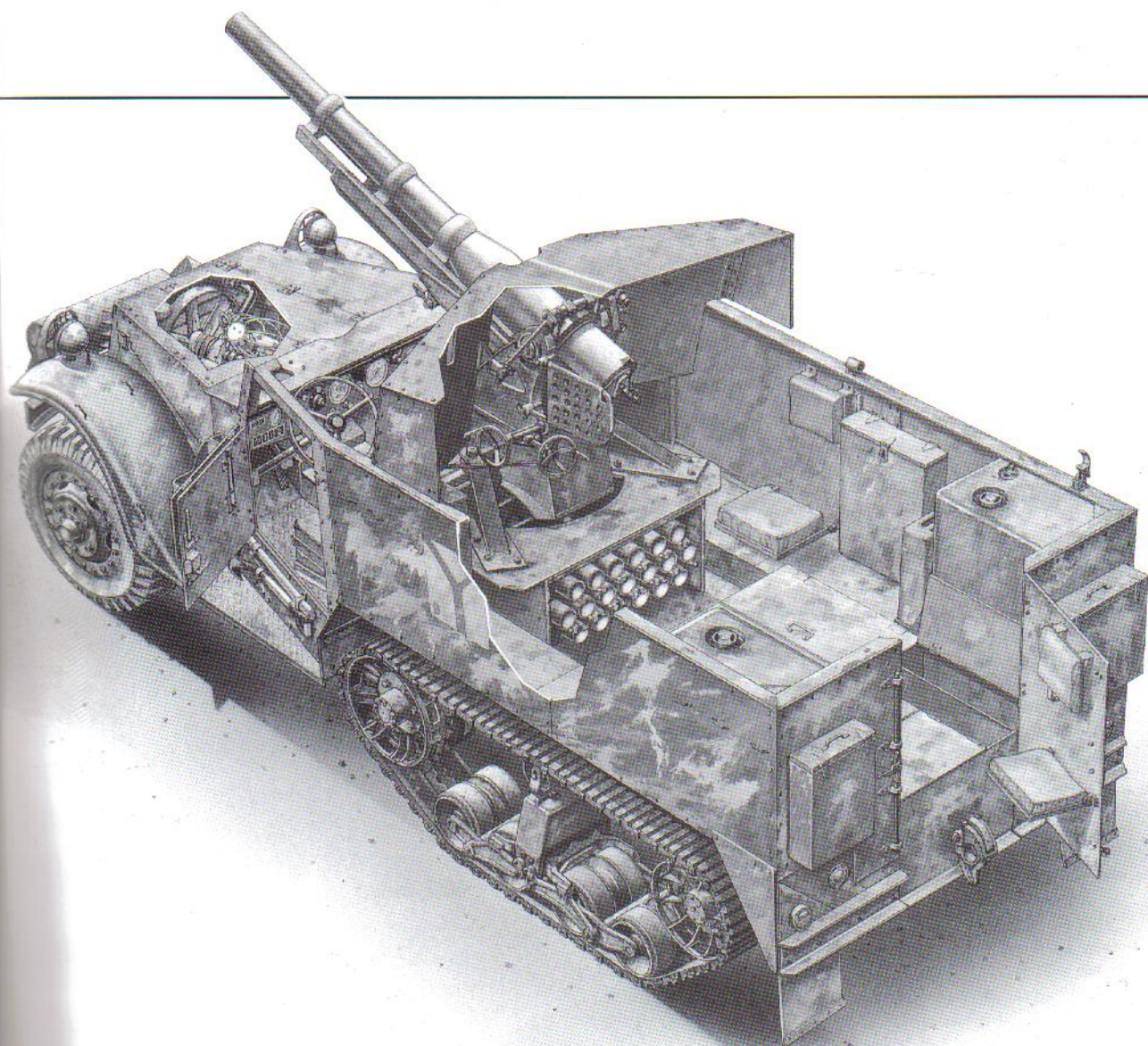
Steven J. Zaloga • Illustrated by Peter Sarson

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M3 HALF-TRACK

DESIGN AND DEVELOPMENT

Early experience with armoured warfare in the First World War made it clear that tanks could not fight in isolation. As armoured warfare tactics matured, mechanised infantry became a key ingredient in what we now call 'combined arms' doctrine. For the US Army of World War 2, the most important technical aspect of infantry mechanisation was the development of the M3 half-track personnel carrier. This vehicle, and its relatives, became the centrepiece for armoured infantry units throughout the entire war.

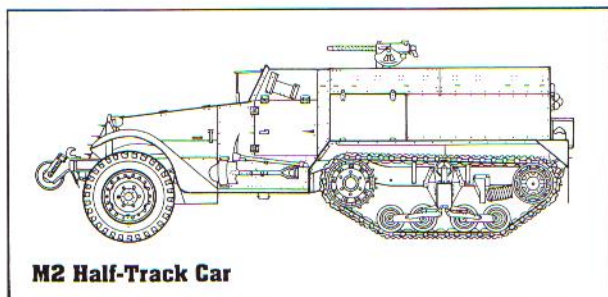
The need for infantry mechanisation did not become apparent until the 1930s. In the case of the US Army, the stagnation in tank design due to threadbare defence budgets meant that the WW1-vintage 6-ton Tank Model 1917 became the standard vehicle for over a decade. This tank was

so slow that infantry could easily accompany it into battle. As new light tanks became available in the latter half of the 1930s, it became increasingly apparent that such vehicles were becoming too fast to be accompanied by infantry on foot. Infantry could be motorised, using trucks, but these had two significant shortcomings on the battlefield: lack of armour made them very vulnerable and wheeled vehicles had much higher ground pressure compared to tanks due to the narrow 'footprint' of their tyres. As a result their cross-country mobility, especially in mud and snow, was poor.

One possible solution was the adoption of a fully-tracked vehicle to carry the infantry into combat. This was never seriously considered by the US Army due to the assumption that such vehicles would be prohibitively expensive. (Britain was the only country to employ fully tracked personnel carriers in the Second World War, the famous Universal Carriers.) Instead, attention was focused on the use of half-tracks. In the United



A M2 half-track car of the 14th Field Artillery Regiment during pre-war exercises near Leesville, Louisiana in September 1941. As was often the case with US Army half-tracks, the vehicle is armed far in excess of regulation, with no fewer than three .30cal. Browning water-cooled machine guns. This particular unit used their M2 half-track cars as prime movers for M1897 75mm field guns. Early half-tracks like this one lacked the anti-scurf ring on the front wheels that became standard on later wartime half-tracks. (US Army Signal Corps)



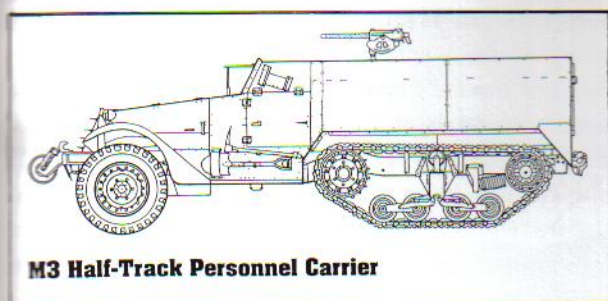
States, half-tracks can be traced back to the Holt Tractor Company in 1914 which began experiments with the substitution of a tracked assembly on trucks in lieu of the usual wheeled rear axle on commercial vehicles. The main advantage of half-track configurations was that the track reduced the overall ground pressure of the vehicle and made it more mobile in mud and snow. There was extensive experimentation with half-track trucks through the 1920s and 1930s for many specialised applications, especially artillery prime movers. The T9 half-track truck of 1935-1936 was an important milestone in the technical evolution of these vehicles, since it proved the feasibility of synchronising the powered front wheels with the powered rear track assembly for better cross-country performance. The main disadvantages of early half-tracks were the low durability of the tracks,

and their slow speed compared to conventional wheeled vehicles.

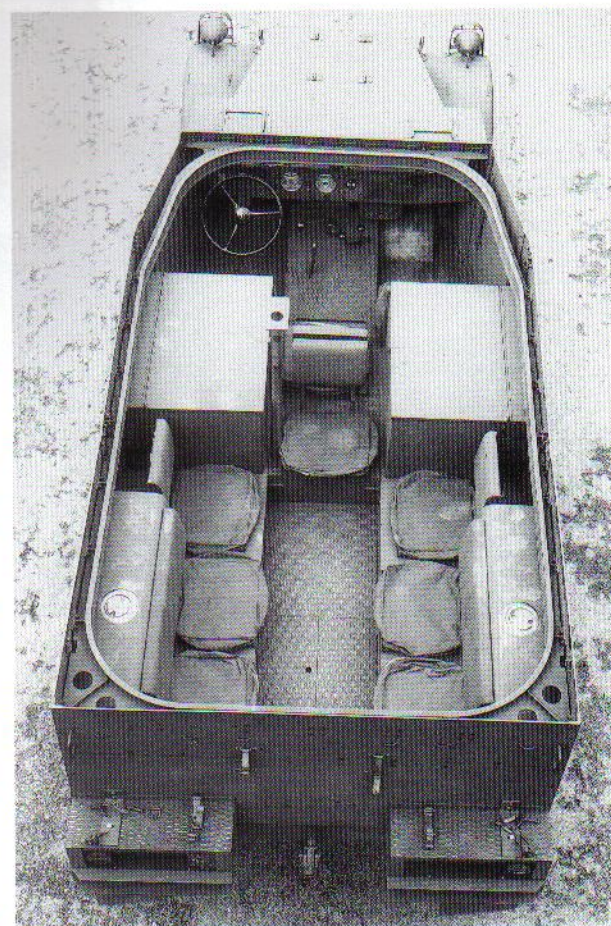
The first US Army armoured half-tracks were prompted by cavalry rather than infantry requirements. The US Cavalry used wheeled armoured cars for reconnaissance missions, but found that their heavy weight and high ground pressure often resulted in vehicles becoming hopelessly bogged down during rainy weather. In 1938, a M3 scout car was converted into T7 half-track configuration by the addition of the Timken rear bogie assembly from a T9 half-track truck. The experiment proved the viability of the concept, but also showed that the M2A1 scout car was badly underpowered. In December 1939, the artillery branch requested the development of a similar vehicle to serve as a prime mover for artillery in the new armoured divisions. Designated as the Half Track Scout Car T14, it resembled the T7 but was fitted with an uprated engine. This design was tested through the summer of 1940 when the US Army solicited bids from industry to manufacture 424 of the new vehicles as the Half Track Car M2 to satisfy artillery requirements for a half-track prime mover and ammunition carrier for the 105mm howitzer. It was later decided to use the M2 half-track in armoured infantry regiments to carry machine-gun squads, and in armoured



Capt. Paulick and 1Lt. Gioia of the 601st Tank Destroyer Battalion examine a map in front of a M2 half-track car during the battle for El Guettar on 23 March 1943. During the fighting, this battalion lost 21 of its 36 M3 75mm Gun Motor Carriages, like the one seen in the background, but inflicted severe losses on German tanks assaulting the 1st Infantry Division. (US Army Signal Corps)



M3 Half-Track Personnel Carrier



A good overhead view of the M2 half-track car showing the internal layout. The M2 was distinguished by a shorter hull, large centre-mounted stowage bins and a

skate rail for the machine guns. The fuel tanks are located in the rear corners, while on the M3 half-track they were in the centre. (White/Volvo)

reconnaissance units until specialised vehicles (the M8 armoured car) became available.

During the trials of the T14, infantry officers examined the new vehicle and were convinced that it would be a practical solution to the infantry mechanisation problem. The Ordnance Department gave the Diamond T Motor Company a contract to develop the T8 half-track personnel carrier in early 1940. This vehicle was virtually identical to the M2 half-track car, but had a longer rear body in which to accommodate additional troops in the rear. This configuration was standardised as the M3 half-track personnel carrier in the summer of 1940.

The M2 and M3 half-tracks were being developed as the US Army was in the process of major peacetime expansion. With war engulfing Europe and the Pacific, the Roosevelt administration was convinced that American entry into the conflict was only a matter of time. An important element in this expansion was the creation of the first US Army armoured divisions, and these new units had prodigious equipment needs. The US Army had no experience with such large armoured formations, and looked to Europe for inspiration. The stunning German victories in France in May-June 1940 thrust the Panzer divisions forward as the model for the US armoured divisions. German mechanised infantry units employed the SdKfz 251 half-track, which reinforced US Army interest in the new M3.

The US Army initially awarded the Autocar Company a contract for the first M2 half-tracks, but in September 1940 changed the plans due to the realisation that no single company could possibly meet the enormous needs for these new vehicles by 1941. As a result, the two other low-bidders in the competition, White Motor

Company and Diamond T Motor Company, were also issued contracts. On 28 September 1940, the US Army Ordnance Dept. held a meeting with the senior leadership of the three companies to ensure that the vehicles were manufactured identically and achieved complete parts interchangeability. The M2 half-track car and the M3 half-track personnel carrier were approved for production on 17 October 1940.

The first armoured infantry regiments were formed in July 1940, even though there were still few tanks or other armoured vehicles available. A total of 14 armoured infantry regiments were raised through 1941, and half-tracks were gradu-



Half-tracks were far less common in the Pacific theatre than in Europe since there were fewer armoured units and no armoured infantry. This is an M2

half-track car being used as a radio vehicle by a USMC unit in the Marshall Islands, 1 February 1944. (US Army Signal Corps)

ally provided to units as they became available. The first M2s were accepted by the Army in May 1941, and the first M3s in June 1941.

M3 half-track configuration

Both the M2 and M3 shared the same basic configuration. They were laid out like a conventional truck with a front-mounted engine, centre driving compartment and rear passenger compartment. Both were powered by a White 160AX gasoline (petrol) engine. The wheeled front axle was a powered Timken F35-HX-1 using 8:25-20 combat tyres. The rear mounted Timken 56410-BX-67 bogie was fitted with endless rubber band track, and powered off a Spicer 3641 transmission/transfer case. The track was manufactured by vulcanising rubber over steel cabling, with metal track guides running down the centre. The driving controls were essentially the same as those in a commercial truck to avoid the need for specialised driver training. Either type could be fitted with a front-mounted winch which had a variety of uses, particularly unditching vehicles that became



The M2A1 half-track car was modernised by the addition of a M49 machine gun mounting which replaced the skate rail used in the earlier M2 version. This appears to be a M2 rebuilt to M2A1 standards as the mine storage racks

usually seen on new production M2A1s are missing. This XX Corps vehicle in France in January 1945 is finished in an impromptu winter camouflage finish of lime whitewash over the usual olive drab. (US Army Signal Corps)

trapped in mud. The vehicle's top speed was a respectable 45 mph.

Seating capacity was ten in the M2 and 13 in the M3. The internal configuration of both types was significantly different. Since the M2 was

intended as an artillery prime-mover and ammunition carrier, two large storage bins were fitted in the centre of the hull, immediately behind the driver's compartment. These could be accessed through armoured doors on the hull side. These large bins created a barrier between the driving compartment and the rear troop compartment, with the narrow space between them occupied by forward and rearward facing set of seats. The two fuel tanks were located in the rear corners of the troop compartment. The M2 was provided with a skate race for the M2 Browning HB .50cal. heavy machine gun. The skate race meant the M2, unlike the M3, had no rear access door fitted.

In contrast to the M2, the M3 was completely open from the driving compartment aft, with the rear seating consisting of two sets of five seats facing towards the centre. The fuel tanks were located behind the driving compartment, roughly where the storage bin was located in the M2. The M2 Browning HB .50cal. heavy machine gun was fitted to a pintle mount located in the centre of

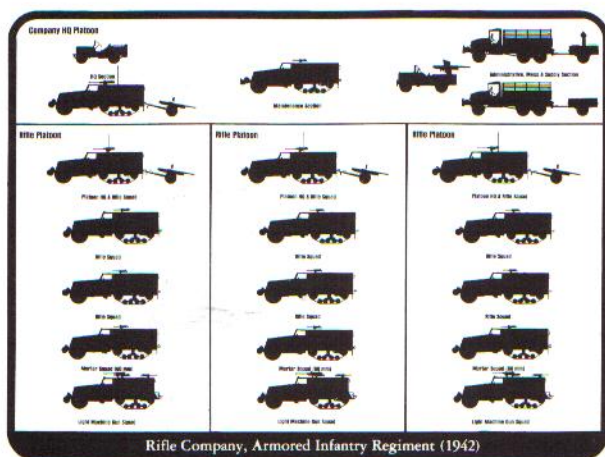
the vehicle. One of two types were used: a M32 anti-aircraft (AA) mount with superior high-angle traverse, or a pedestal mount which was better suited to horizontal fire. A small door was provided at the rear of the hull for easier crew access. Although the M2 could be fitted with a winch, it was more common on M3 half-tracks. The skate race on the M2 and both the pintle and pedestal mounts on the M3 were to prove unpopular

Early combat

Although intended for the armoured infantry regiments of the armoured divisions, M3s were widely distributed in many other related units to perform utility roles. When the Provisional Tank Group was deployed to the Philippines in November 1941, it was equipped with 46 M2/M3s. These were used primarily in HQ and reconnaissance companies. Strangely enough, this was the only US tank unit in World War 2 equipped with a significant number of British Army Bren Carriers, which were diverted to Manila from their

By 1944, the M2A1 was usually confined to special roles, in this case as a prime-mover for a M1 57mm anti-tank gun, the US licence-built copy of the British 6-pdr. anti-tank gun. Here, the crew unlimbers the gun during the bloody fighting for Aachen on 15 October 1944, the first major German city reached by the Allies. This vehicle has the added side armour shields for the 57mm gun stored on the vehicle side in the mine racks, a common practice with anti-tank prime movers. (US Army Signal Corps)





intended destination of Malaya with the outbreak of the Pacific War on 7 December 1941. Initially the M2 and M3 suffered their share of shortcomings. The front suspension leaf springs were found to be too fragile in cross-country use. There was also a tendency to throw tracks, and there were failures of the power train and frames – both problems were later traced to lack of proper track tensioning by inexperienced crews and incorrect wheel alignment in the track system. Radio reports from the Philippines helped the Ordnance Dept. to prepare improvements on new production vehicles. The officers of the Provisional Tank Group were also critical of the thin armour and the lack of overhead armour protection.

Nevertheless, the M2 and M3 were much preferred to the Bren Carrier, which was regarded as too small, rather fragile and much more vulnerable to enemy fire.

The combat debut of the M2 and M3 half-tracks in their intended roles came in November 1942 with 'Operation Torch', the invasion of French North Africa. US Army armoured divisions in 1942 had two armoured regiments (each with 100 half-tracks) and an armoured infantry regiment with 230 half-tracks. Half-tracks were widely used throughout the division, including artillery and reconnaissance units, some 733 being listed under the 1942 Table of Organization & Equipment (TO&E). The first unit to see extensive infantry combat in the half-tracks was the 6th Armored Infantry Regiment of the 1st Armored Division, which had been the first US Army regiment to mechanise in May 1940. This unit suffered heavy losses during the battles near Sidi-bou-Zid and Kasserine Pass in January-February 1943.

The half-tracks were extremely unpopular, being dubbed 'Purple Heart Boxes' – a grim reference to the US Army's decoration for combat wounds. The main complaints were that the half-track provided no protection from overhead artillery airbursts and its armour was inadequate against heavy machine guns. When Gen. Omar



Cochran of the 82nd Reconnaissance, 2nd Armored Division moving through Rebera, Sicily, on 25 July 1943. This M3 has the side mine racks fitted; field kits for fitting them to older vehicles were autho-

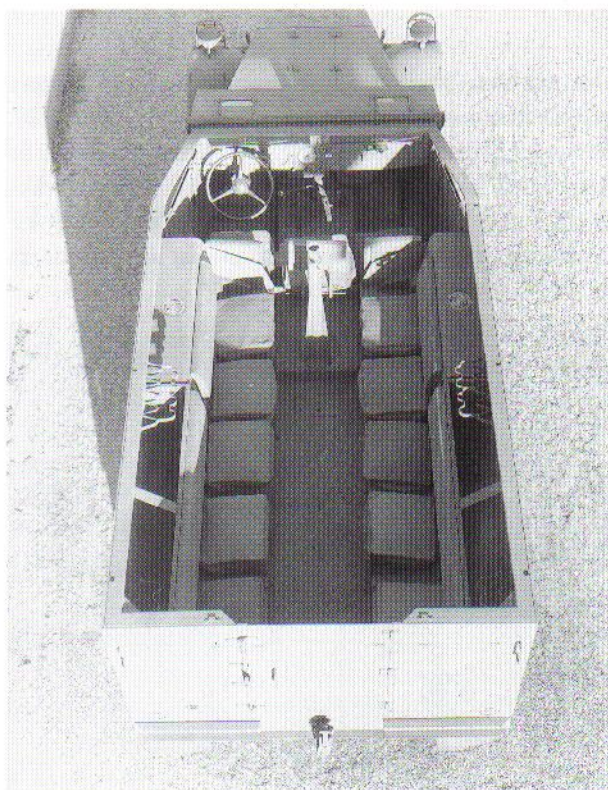
rised in February 1943. This vehicle is fitted with the standard automotive headlights which were replaced on new production M3s in November 1942 with dismountable headlights. (US Army Signal Corps)

Bradley questioned a young rifleman whether the side armour could be penetrated by German machine gun fire, he remarked (with more than a hint of sarcasm): 'No sir, it does not. As a matter of fact, bullets generally only come in one side and rattle around a bit.' Infantry officers were unhappy about the amount of maintenance the half-tracks demanded from their troops, and felt that they were wasteful of road space in convoys since they carried fewer troops than a normal 2½ ton truck. These were summarised in an after-action report which concluded: 'Experience to date has not justified the carrying of infantry in an expensive armoured vehicle which is difficult to maintain and which in protection...is practically nil against bombing and artillery.'

The widespread criticism of the half-track, and US equipment in general, was not shared by the top leadership of the US Army, particularly Gen. Omar Bradley. He felt that too many senior officers were unfamiliar with the needs of mechanised infantry and criticism of maintainance demands reflected their hidebound resistance to new tactics. Bradley recognised that the infantry units in

North Africa were inexperienced and that many of the problems could be traced to the unpreparedness of the US Army against seasoned opponents like the Afrika Korps. Bradley's own assessment of the half-track was that it was '...a competent and dependable contrivance. Its bad name resulted from the inexperience of our troops who attempted to use it for too many things.'

There were mixed feelings about the half-tracks after 'Operation Husky', the Allied invasion of Sicily in 1943. The commander of the 2nd Armored Division, Gen. Hugh Gaffey, argued that the 'gypsy caravan' of the 41st Armored Infantry should be replaced by a more tidy column of 2½ ton trucks. The armoured infantry felt otherwise. Since the North African campaign, many of the armoured infantry regiments were commanded by young officers who were more comfortable with



This overhead view of a M3 personnel carrier clearly shows the layout of the interior. As compared to the M2 half-track car, the hull interior is open in order to fit more seating, and the

vehicle is fitted with a rear door and longer hull. The pedestal mount for the machine gun was not popular and was replaced by the M3A1. (White/Volvo)



M3 with the 37th Reconnaissance Troop in action on Bougainville on 10 March 1944. This is a relatively late M3, characterised by the new model dismountable headlights. This half-track is armed with a single Browning

.30cal. machine gun, the typical official armament of this vehicle in most rifle platoons except for the platoon leader's vehicle, which had a .50cal. Browning M2 heavy machine gun. (US Army Signal Corps)

the novel technology than their pre-war counterparts who had predominated in 1941-42. Col. Sidney Hinds argued that the half-tracks gave the armoured infantry the capability to follow tanks across terrain that was inaccessible to trucks. Furthermore, the armour protection, in spite of its

admitted limitations, allowed the half-tracks to dismount the infantry much closer to their objectives than if they were using standard trucks. The armoured infantry advocates also noted that the half-tracks could follow the infantry more closely even when the objective had to be assaulted on foot. The proximity of the half-tracks allowed the infantrymen to go into action unencumbered with heavy gear, since this could be left on the half-track. This made the armoured infantry more effective, since they didn't exhaust themselves as quickly as ordinary infantry. Indeed, one of the main problems that many older officers had with the new units was their rag-tag appearance. The half-tracks inevitably became cluttered with additional gear, much of which senior officers regarded as unsightly and unmilitary. In spite of the debate, the Army Ground Forces command remained committed to the armoured infantry concept, and their faith would prove well founded the following year in France.

Improving the breed

Combat lessons from North Africa led to both tactical and technical changes in the the M2/M3. The armour layout of the half-track remained its most controversial feature. The basic armour was



M3 personnel carrier of the 1st 'Big Red One' Infantry Division on Sicily in July 1943. This is an intermediate production type with the original style headlights, and the later external mine racks. (US Army Signal Corps)

Table 1: Half-track improvement table

Date	Modification
5/42	Install heavier bogie springs
6/42	Improve radiator fan
7/42	Introduce body hand grips
8/42	Substitute track chains for grouser for improved traction in mud and snow
8/42	Change carburettor fuel filter
8/42	Add dual air intake engine air cleaner
8/42	Add side mine racks on new production vehicles
9/42	Add surge tank to radiator to improve cooling
9/42	Substitute improved fire extinguisher
9/42	Add a spring loaded idler to suspension to prevent track throwing
11/42	Use demountable headlamps
11/42	Change radio suppression to resistor-bond shielding
1/43	Add tyre plate to prevent tyre scuffing
2/43	Add universal joint boot
2/43	Retrofit side mine racks on fielded vehicles
3/43	Standardise lubrication fittings
4/43	Add idler post braces
4/43	Adopt military standard oil filter
5/43	Modify idler shackle to permit addition of ice scraper
5/43	Add heavier front springs
7/43	Substitution of synthetic rubber tracks, bogie wheels
9/43	Add luggage racks and winterisation equipment

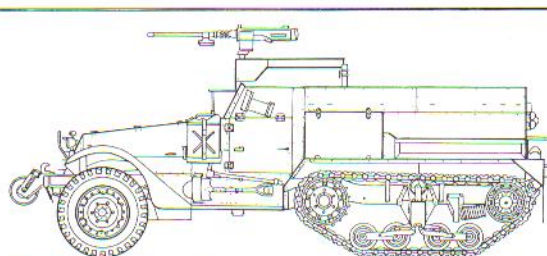
1/4 inch face-hardened steel which would resist standard German armour-piercing (AP) 7.92mm ammunition at 200 yards. The armoured visor in front of the driver was made from 1/2 inch steel. The reluctance of the Ordnance Dept. to consider thicker armour came from the recognition that any significant weight increase would seriously degrade the mobility of the vehicle. Development of a virtually new design to restore the vehicle's off-road performance (with heavier suspension, more powerful engine and more complicated transmission) was regarded as impractical. The M2 and M3 had been designed to make maximum use of readily available civilian automotive components so as to facilitate mass production; the use of heavy duty military-standard components would have inflated the unit cost and reduced the number of half-tracks acquired. By way of comparison, the M3 half-track cost only \$10,310 to produce, while the M8 armoured car, using few civilian parts, cost \$22,587. The Ordnance Dept. did conduct limited tests with overhead armour in

1943 on the T16 prototype, but this only served to reinforce the existing bias against extra armour. An official report on the T16's overhead armour concluded that 'the slight additional protection was not worth the (access and visibility) restrictions.'

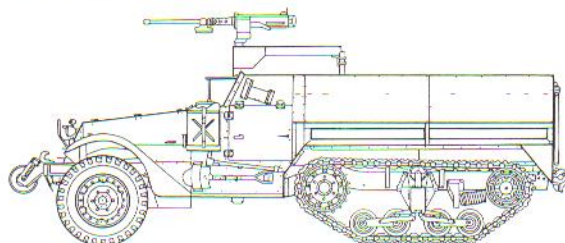
Although the Ordnance Dept. resisted the pressure to uparmour the half-tracks, it did support a continuing programme of product improvement. These changes are summarized in Table 1 above.

The M2A1/M3A1 half-tracks

One of the main complaints from North Africa was that the skate rail and pintle machine gun mounts in the M2 and M3 were unsatisfactory. The skate rail was extremely awkward to use if a target suddenly appeared from another angle, and the pintle mount proved dangerous when troops were in the vehicle due to the proximity of the barrel. In April 1943, the Ordnance Dept. built the M2E6 half-track prototype that substituted a M32 truck ring-mount over the right-hand seat in the driving compartment. This was incorporated into the new M49 mounting which was authorised in May 1943; vehicles with this feature were redesignated as M2A1 and M3A1. Production of the M2A1 and M3A1 began in October 1943. A total of 5065 M2s were rebuilt as M2A1 models.



M2A1 Half-Track Car



M3A1 Half-Track Personnel Carrier



A classic view of the M3 personnel carrier in action with the 46th Armored Infantry, 5th Armored Division near Wittenmoor, Germany, on 12 April 1945. Like most half-tracks in combat for any length of time, it has become encumbered with the crew's equipment. The hull rear is fitted with a luggage rack which was first authorised in September 1943. This particular vehicle is fitted with the winch on front, and a .50cal. machine gun, usually the sign of a platoon leader's vehicle. (US Army Signal Corps)

Lend-Lease

By early 1942, US government commitments to the Allies required an expansion of half-track production beyond the capabilities of the existing three plants. The 11 February 1942 Army Supply Program envisioned ordering 188,404 half-tracks through the end of 1944. International Harvester Company (IHC), was capable of manufacturing such vehicles, but certain components would have to be changed to facilitate using this new supplier. Instead of face-hardened 1/4 inch armour plate, the new half-tracks would use 5/16 inch homogeneous plate armour. The body would be of welded construction, first explored in the M2E1 and M3E1 prototypes. The use of homogenous armour was forced on the Army by factory limitations; it added weight to the vehicle, and could be penetrated by 7.92mm AP rounds at 300 yards instead of 200 yards for the face-hardened armour on the M2/M3.

Other changes on the new half-tracks included the IHC RED-450-B engine, 9:00-20 combat tyres, IHC 1370 front axle, RHT-1590 rear axle and IHC 1856 transfer case. Prototypes were ordered in April 1942 as the M2E5 half-track car and M3E2 half-track personnel carrier. When accepted for production, the International Harvester Vehicles were designated M5 half-track personnel carrier for the M3 equivalent, and M9 half-track car for the M2 equivalent. The first

production M5 was completed in December 1942. The new M5 and M9 were heavier than the M2 and M3 half-tracks, but performance was essentially similar. They could be externally distinguished by two main detail changes: the front fenders were simple flat stampings instead of the automotive style on the M2/M3 and the rear corners of the hull were round instead of being butt-jointed. The other significant difference between these two families was in the body configuration. The M9 did not use the shorter body of the M2, nor was it fitted with external doors for access to the forward stowage bins. The only main difference between the M5 and M9 was the internal configuration; externally, they were difficult to tell apart.

The M5 and M9 underwent much the same modification and upgrade programme as the M2/M3. In May 1943, production began to shift to the M5A1 and M9A1 which, like their M2A1/M3A1 counterparts, were fitted with a M49 pulpit machine gun mounting on the right forward portion of the hull.

The Army Supply Program made serious cuts in projected half-track production through 1942 due the substitution of other equipment for half-tracks, such as the M8 armoured car and M5 high-speed tractor in place of the M2/M9. From a peak in February 1942 when 188,404 were planned, the requirement had dropped to 87,302

An older M3 rebuilt to M3A1 half-track standards by the addition of a M49 machine gun ring mount serving in Germany with the 61st Armored Infantry, 10th Armored Division, on 17 April 1945. It is evidently not a new production M3A1, as it lacks the side mine racks. This vehicle was retrofitted with the rear luggage racks. Note the extensive, and unofficial, assortment of machine guns including a .50cal. heavy machine gun and two .30cal. machine guns including one with a water-cooled barrel. (US Army Signal Corps)

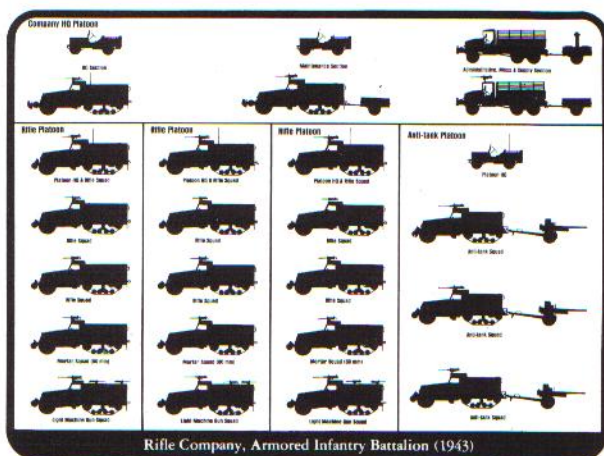


in the 23 October 1943 programme. To limit the logistical complications of combining M5s and M3s in US Army units, the International Harvester half-tracks were classified 'limited standard', being earmarked for Allied armies through Lend-Lease. Some were retained in the US for training, but so far as is known none were shipped overseas for combat use by American troops. Great Britain was the main recipient of the M5 and M9, receiving about half of total M5/M9 production (5238 of 11,017). The only other major recipients were the Soviet Union (420) and Canada (20). The British Army did not employ the half-tracks extensively in the mechanised infantry role since by this time it had already standardised on the Universal Carrier. The half-tracks were issued instead to motor battalions in some infantry regiments in place of 15 cwt. lorries for towing 6-pdr. and 17-pdr. anti-tank guns. Additionally, British half-tracks served as armoured utility vehicles with the Royal Engineers, and as command vehicles.

Half-track trucks

The US Army Field Artillery branch was not entirely happy with the M2 half-track as a prime mover for its 105mm howitzers. The vehicle's mobility was less than ideal in rough terrain and its carrying capacity was too limited. Mack Truck Company had already built a heavy half-track

truck, the T3, in 1941 as a possible contender for this requirement but it was not accepted for production. After deciding that the proposed T14 requirement was impractical, in the spring of 1942 the Ordnance Dept. entertained proposals from three manufacturers for a half-track truck large enough to serve as an artillery prime-mover for the 105mm howitzer, its crew and ammunition. These new designs were sometimes called 'three-quarter-tracks' as their longer rear suspensions were designed to minimize the tendency of the M2 and M3 to become hung-up on obstructions between the wheels and track assembly. Diamond T began work on its T16, Autocar on the T17 and Mack on the T19 versions of the half-track truck. (T18 was a proposed Mack design with a GM 6-71 diesel engine.) Initial demonstrations of this trio were conducted at Aberdeen Proving Ground on 25 June 1943. By the time these designs were completed their chances of being accepted were practically non-existent, production of existing half-tracks having already been curtailed. By March 1943, the Field Artillery was already beginning to acquire M5 high-speed tractors for its prime-mover requirement, and the new 'three-quarter-tracks' offered no significant advantage over the M3 in the personnel carrier role. None of the three types was accepted for production, though experimental work on the chassis continued into 1944.



Tactical improvements

The North African fighting in 1943 prompted the US Army to reorganise its armoured divisions. The aim was to create a better balanced force that would be easier to control in the field. Instead of its previous organisation of two armoured regiments and one armoured infantry regiment, it switched to three tank battalions and three armoured infantry battalions. The new 1943 armoured infantry battalions were reinforced; each of its companies added an anti-tank platoon with towed 57mm anti-tank guns (the 1942 company had a towed 37mm anti-tank gun in each rifle platoon). The platoons themselves were strengthened

by raising the squad size from 11 to 12, the same strength as 'straight-leg' infantry squads. An important technical innovation was the addition of a M1 2.35 in. rocket launcher (bazooka) to each infantry squad. The changes meant that a 1943 company had 251 troops and 20 half-tracks while the previous company had 178 men and 17 half-tracks.

A 1943-pattern armoured infantry battalion consisted of five companies: a HQ company, three rifle companies and a service company. The HQ company included the battalion HQ, reconnaissance platoon, mortar platoon, assault gun platoon, and a maintenance section. The rifle companies had a HQ platoon, three rifle platoons, and an anti-tank platoon. Each rifle platoon had five M3A1s, each half-track carrying a squad. There were three rifle squads, a light machine gun squad (theoretically on an M2A1) and a mortar squad.

A rifle squad would consist of 12 troops: squad leader (sergeant), assistant squad leader (corporal), nine riflemen (privates) and a driver. Each squad member was armed with a M1 Garand .30cal. rifle, but the driver was issued a M3 .45cal. 'grease-gun'. Each M3A1 squad was issued with a .30cal. Browning M1917A1 machine gun, and generally one M1 or M9 bazooka was carried. The .30 machine gun could be left on the vehicle when dismounting, or could be carried by the squad



M3A1 carrier of the 6th Armored Division passes by a knocked out German PzKpfw IV in Foy, near Bastogne, in January 1945 during the Battle of the Bulge. This is another rebuilt M3, evident from the use of the old automotive-style headlights. It lacks the usual front bumper, but has been retrofitted with both the M49 ring mount characteristic of the M3A1, and the side mine racks. The front tyres and rubber tracks have been fitted with the usual winter snow chains for better traction. (US Army Signal Corps)

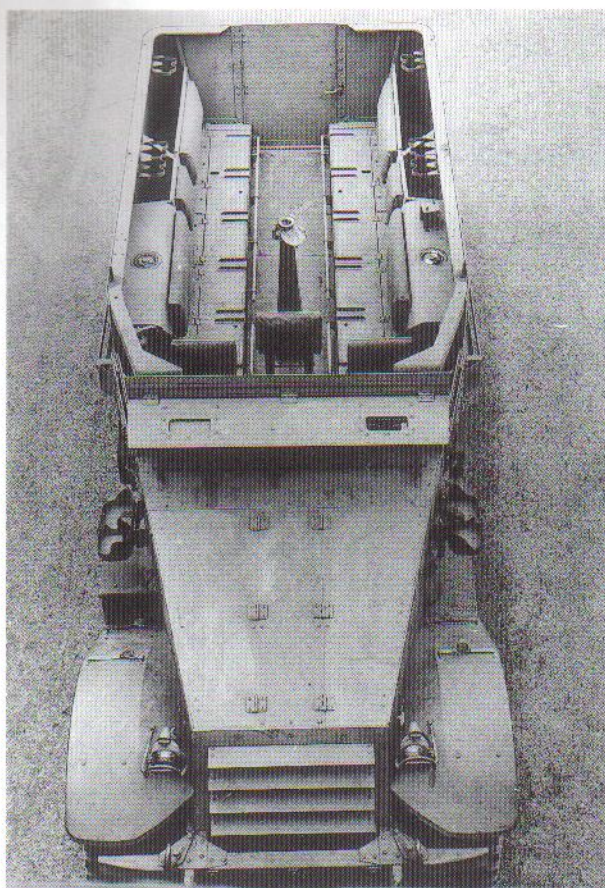
along with a dismountable tripod. The only rifle squad not to follow this pattern was the lead squad commanded by the platoon leader (a lieutenant). The platoon leader's half-track was authorised a .50cal. Browning HB heavy machine gun, and one squad member would be authorised a bolt-action M1903 Springfield .30cal. sniper rifle.

Standard operating procedure (SOP) would have the squad leader in the right seat of the driving compartment, the assistant driver/rifleman in the centre-front seat. The squad leader was responsible for firing the pulpit-mounted machine gun. The assistant squad leader would usually sit in the rear-most left-hand seat. The two riflemen serving as squad scouts would sit in the first two seats behind the driving compartment. The two-man bazooka team sat in the middle of the right side.

The light machine gun squad was armed with a .50cal. Browning HB heavy machine gun and two M1917A1 Browning .30cal. machine guns. Five of the squad were classified as riflemen and armed with M1 Garands, while the gunners and ammo handlers were usually issued M1 or M2 .30cal. carbines. The mortar squad was only eight men, consisting of two 60mm M2 mortar teams. The 60mm mortars were officially supposed to be used from a dismounted position, though some units deviated from the script and developed improvised methods of firing from their vehicles.

The first three armoured divisions kept the 1942 TO&E into 1944, but these changes were implemented in the 4th Armored Division and all subsequent units. Battlefield experience with the early half-tracks led to a distinct shift towards the M3 at the expense of the M2. By 1943, the field artillery was beginning to receive M5 high-speed tractors which reduced the need for M2s as prime movers; likewise, the arrival of M8 scout cars reduced their value in the armoured reconnaissance companies. As a result, M2 production was curtailed in 1943 as compared to the M3.

In January 1943, the Ordnance Dept. took steps to consolidate the M2/M3 into a single design, namely the T29 universal carrier half-track. The first pilot was completed in April 1943 and the T29 was standardised as the M3A2 October 1943. A comparable programme was undertaken for the

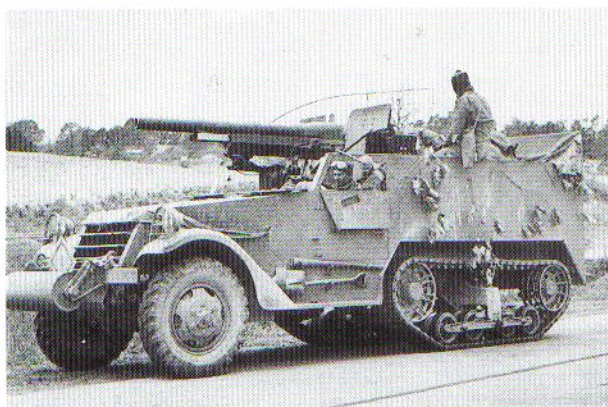


The M5 personnel carrier was the International Harvester equivalent of the M3. As may be seen, the interior seating is essentially the same, and the

vehicle differs only in small details such as the flat fenders, the pattern of the headlight guards and the rounded hull rear corners. (International Harvester)

M5/M9 and the T31 pilot was accepted as a substitute standard and classified as the M5A2. By the time that the M3A2 and M5A2 had been accepted for service, half-track production was being significantly reduced and no series production ensued.

The 1943 reorganisation plan envisioned 48 armoured infantry battalions for the 16 US Army armoured divisions, plus an additional 20 independent battalions that could be committed on their own, or to bolster infantry or armoured divisions for specific missions. Although 66 battalions were eventually formed in 1943, by early 1944, 17 of the independent battalions were disbanded and the concept shelved.



The T12 75mm Gun Motor Carriage was rushed into service for training in 1941, like this one of Co. D, 93rd Tank Destroyer Battalion taking part in wargames on 20 November 1941. The original T12 early produc-

tion vehicles were fitted with the same simple shrapnel shield as the field gun. This is an early production half-track, evident from the front wheels. (US Army Signal Corps)



A M3 75mm Gun Motor Carriage of a tank destroyer battalion in North Africa before being issued to its crew. The production M3 75mm GMC had a more elaborate armoured shield around the gun to protect the crew from small arms fire. This is an early pro-

duction version with the initial pattern of automotive headlamps. The dismountable headlamps were developed specifically for the M3 75mm GMC, as the gun tended to shatter the headlamps when fired. (US Army Signal Corps)

Half-tracks in combat – 1944

The role of armoured infantry in combat depended on the mission. US Army armoured divisions were regarded as offensive exploitation forces. In general, a breach in the enemy lines was created by an infantry division, and then armoured divisions were injected behind the initial

line of resistance. Armoured divisions were not intended for defensive operations, though there were obvious exceptions such as the 7th Armored Division's stubborn action at St. Vith during what became known as the Battle of the Bulge.

The tactical role of the armoured infantry battalions was outlined in Field Manual 17-42. To assist in a tank attack, the armoured infantry would attack and seize terrain favourable for launching a tank attack, and create a base of fire in conjunction with the divisional artillery and tank destroyer battalion. During breakthrough operations, armoured infantry battalions were to follow the tank attack and wipe out remaining enemy resistance; they would then seize and hold terrain gained by the tanks. The armoured infantry were also used to protect tank units in bivouac, in assembly areas and at rallying points. Armoured infantry were the lead element in operations where tanks were not ideal and, in these circumstances, small numbers of tanks would usually provide support. This included forced river crossings, seizure of bridgeheads, creation and elimination of obstacles and barriers, reconnaissance and counter-reconnaissance, and establishment of defensive positions.

In an attack, armoured infantry companies usually deployed two rifle platoons forward, with the anti-tank platoon providing long range cover; the third rifle platoon would be kept in reserve. If the attack was being conducted against weakly held enemy positions, all three rifle platoons would be deployed forward. Half-tracks would carry the infantry squads forward until forced to dismount by enemy fire or by terrain. It was not official practice to conduct mounted attacks of enemy positions, since a single grenade or Panzerfaust could kill the entire squad when it was concentrated in the back of the half-track. In addition, aimed rifle fire from a moving half-track was wildly inaccurate. Nevertheless, mounted attacks did occur, usually against lightly defended objectives in the final months of the war as German resistance began to collapse. Armoured Infantry battalions usually fought intact, with an armoured infantry battalion supporting a tank battalion. On occasion, individual rifle companies would be cross-attached to tank battalions and vice versa for

specific missions. An armoured infantry company might be attached to a tank battalion during an attack on a small village, with the infantry responsible for cleaning out the houses, and the tanks providing the initial shock and firepower. In defensive positions, a company of tanks might support a dug-in armoured infantry battalion. Occasionally, armoured infantry would be carried into combat on tanks (half a squad per M4 medium tank), if the terrain was unsuitable for half-tracks and the objective was particularly important. However, this was not a common tactic in most units.

During the Second World War, US Army armoured infantry were nicknamed 'armoured doughs', or 'blitz doughs' after the US infantry 'doughboys' of the First World War. The standard wisecrack was that you could tell an armoured dough from the regular GI because of a bald spot on the top of his head caused by the helmet liner repeatedly smacking his head from leaps over the side of the half-track. Armoured infantry were notorious for pilfering gear, since unlike normal infantry, they could carry additional equipment with them in the half-tracks. The degree to which

the standard 'Lootin' veerbooten' rules were applied varied from unit to unit, and was generally much stricter in France than in Germany. An account by C Company, 17th Armored Infantry Battalion recalled that 'one advantage of dis-



An M3 75mm GMC partly camouflaged during the fighting in Tunisia in 1943. US units frequently used expedient camouflage in the North Africa campaign, in

this case patterns of mud over the base olive-drab paint to blend in with the local scenery. (US Army Signal Corps)

The M6 37mm GMC proved to be a failure in combat, so some units dismounted the gun assembly and mounted them on M2 half-tracks, like the one seen here belonging to the 41st Armored Infantry, 2nd Armored Division, in England in April 1944. This vehicle has had other changes made including the addition of a rear storage bin, and the removal of the skate rail for attaching machine guns. Instead, the depot has added several socket mounts around the vehicle side. (US Army Signal Corps)





Although the M3 75mm GMC was obsolete by 1943 in Europe, it still soldiered on with considerable success in Marine Corps Special Weapons Companies like this vehicle with the 2nd Marine Division on Tinian, 30 July 1944. Dubbed

'SPMs' by the Marines, they were mainly used for direct fire support rather than anti-tank duties, since few Japanese tanks were encountered during the Pacific war. (US Army Signal Corps)

mounted attack was the opportunities for more thorough investigations of towns and the chance to fill in the deficiency of our K-ration diet.' Half-tracks often became festooned with portable stoves, brooms, wash basins, pails and other amenities. The earlier description of the official armament of rifle squads was usually ignored in experienced units, with half-tracks sporting a variety of additional machine guns and other weapons. Another common, though officially discouraged practice, was to line the floor with sand-bags in the hope of minimising casualties to mines.

Although the armoured doughs were spared some of the foot-slogging misery of their infantry buddies, the armoured infantry battalions suffered extremely high casualty rates. This was not due to any special vulnerability – half-tracks gave the armoured infantry such mobility that they were often called upon to carry out more missions than was common in standard infantry units. A secret report by the US Army Medical Corps noted that:

'In armoured divisions, with too few armoured infantry, the infantry contributes from 80 to 90% of the combat exhaustion casualties, rates becoming extremely high after the third to fifth days of action. In hard, continued action, armoured infantry companies may be down to 40-50 men (out of a strength of 245), with three company commanders casualties in the process. One unit had 150-180% replacements in 200 days; another had 100% turnover in 60-70 days.'

A comparison of infantry carriers

The US Army, while not entirely happy with the M3 half-track, generally preferred it over any other option. The United States manufactured 19,611 T16 Universal Carriers during the war for Britain and other Commonwealth countries, but never seriously considered employing any in combat. It could only carry half the number of troops as a half-track, and its low sides gave even poorer armour protection. Maintenance was also more demanding, and the T16 failed to offer significantly better mobility.

The vehicle most comparable to the M3 was the German Hanomag SdKfz 251 half-track, the standard vehicle for the German Panzergrenadier. The smaller SdKfz 250 half-track fulfilled a similar role to the US Army's M2 half-track car. The SdKfz 251 and M3 were very similar to one another in terms of weight, size, road speed and road handling. The main advantage enjoyed by the SdKfz 251 was marginally better protection: its 8-14 mm armour was angled at 35° while the M3's 6-13 mm armour was at vertical or nearly vertical angles. On the other hand, this armour layout came at a price, with the simple box hull of



Although the T48 57mm destroyer. Here, a Red GMC was intended for Britain, most of the production run was shipped to the Soviet Union where it served as the SU-57 tank

destroyer. Here, a Red Army anti-tank brigade enters a Czech city in April 1945.

the M3 having about 20 per cent greater internal volume than the rakish lines of the SdKfz 251. US armoured infantry officers also preferred the German radiator configuration, which placed the radiator behind a permanently sealed armoured plate; the M3 had an opening cover and the radiators were sometimes punctured by gunfire when the crew forgot to close them. The US Army cap-

The T30 75mm HMC was intended to serve as an assault gun in reconnaissance units and for fire support in armoured infantry units. By 1943, it was being replaced by the M8 75mm HMC on the M5 light tank chassis, but this T30 is still going strong during training in Britain on 13 March 1943. (US Army Signal Corps)



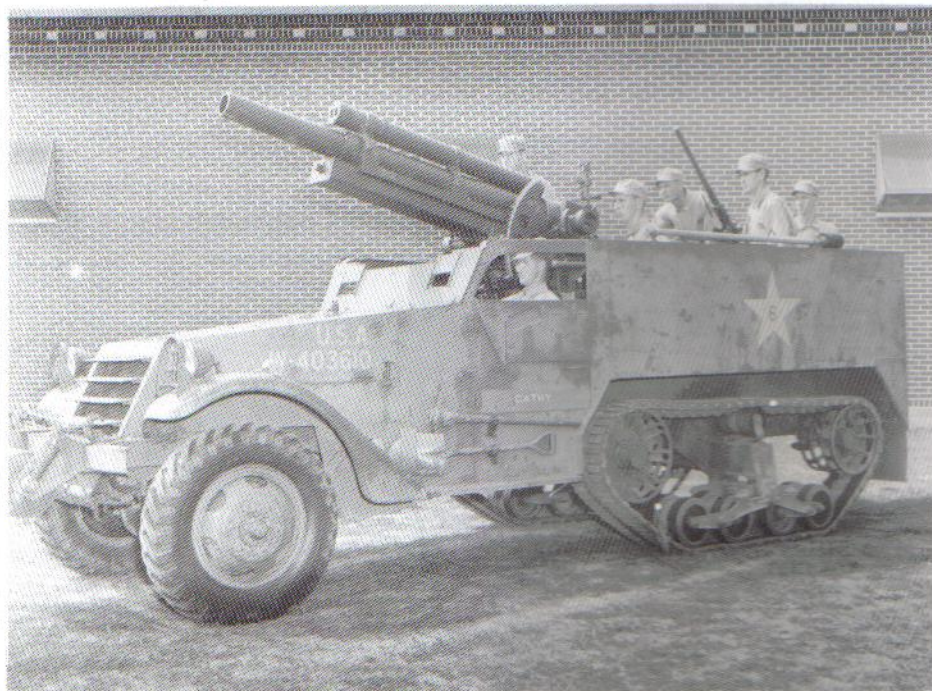


A T30 75mm HMC of the 82nd Reconnaissance, 2nd Armored Division, passes through Ribera, Sicily, on

25 July 1943. This vehicle saw little combat after the 1943 Sicily campaign. (US Army Signal Corps)

tured many SdKfz 251s during the war, but found them to be generally inferior to the M3 because of their poorer mobility. The principal problem was that the SdKfz 251 was not fitted with a powered front axle, and it had about 25% less horsepower than the American vehicle. The lack of a powered front axle resulted in poorer mobility and steering difficulties in mud and snow. The complicated rear suspension on the SdKfz 251 required a higher level of maintenance, and the interleaved wheels became impacted with mud which tended to lead to shedding tracks. A US comparison concluded that the American suspension gave better riding qualities and was much quieter in operation. The SdKfz 251 also lacked a front roller bumper, which made it unable to traverse terrain that could be overcome by the M3.

A study by the US 2nd Armored Division comparing US and German equipment concluded that the M3 'is far superior to any equipment of like type encountered. All designs except the M3 should be eliminated for simplicity's sake, since this type is adaptable to all demands made for a half-track type vehicle.' This did not mean that the armoured infantry thought that the M3 half-track was ideal. Col. S.R. Hinds, commander of



Probably the most over-burdened example of half-track artillery was the T19 105mm HMC, seen here in Memphis, Tennessee, on a 4th of July Independence Day Parade in 1943. This is a good view of the changes incorporated into the basic M3 such as the revised driver's armoured panel. (US Army Signal Corps)

Combat Command B concluded: 'While our half-track is far superior to any other similar vehicle, it falls short of the required cross-country mobility. It should be equal of a tank in this respect. I believe a full track vehicle with slightly more armour on the sides is necessary in order to have the complete support of the armoured infantry when most needed.'

This later viewpoint was widespread. In 1943, the US Army began developing the M39 armoured utility vehicle. Although not intended as a direct replacement for the M3, it provided some experience with fully tracked carriers. After the Second World War, the US infantry concluded that the half-track configuration had outlived its usefulness and should be replaced by a fully-tracked design with overhead armour. This led to the abortive M44 armoured personnel carrier (APC), and finally to the M59, the first series produced APC of the post-war years. This vehicle set the pattern for most post-war APCs. Although there were a number of half-track designs proposed after the Second World War, no major army has used such a configuration again, preferring advanced wheeled designs, or fully-tracked configurations. After its experiences in the Second

World War, the US Army has refused to seriously consider wheeled designs, and has remained with fully-tracked armoured infantry vehicles up to the present incarnation, the M2 Bradley infantry fighting vehicle (IFV).

International half-tracks

As mentioned previously, the M5 and M9 half-tracks were officially earmarked for Lend-Lease after October 1943. The UK was the single largest recipient of half-tracks, and many of these were provided to Commonwealth forces as well as those under British direction such as the Free Polish and Free Czechoslovak armies. Only ten M2 and two M3 half-tracks were supplied for technical evaluation. The US Army also provided 1431 half-tracks to the Free French forces which included 176 M2/M2A1s, 245 M3/M3A1s, 1196 M5/M5A1s and 603 M9/M9A1s as well as their variants. The Soviet Union received 1158 half-tracks consisting of 342 M2s, two M3s, 401 M5s and 413 M9s. The Red Army used the half-tracks primarily as headquarters vehicles in tank units. Small numbers of half-tracks were provided to the 1st Brazilian Infantry Division of the Brazilian Expeditionary Force that fought in Italy during

The M13 MGMC was the first anti-aircraft machine gun version to see service, here with the 105th AAA Battalion near San Pietro, Italy on 8 January 1944. The M13 MGMC was in service only briefly before the upgunned M16 MGMC with four .50cal. machine guns replaced it. (US Army Signal Corps)





The M17 was the International Harvester equivalent of the M16 MGMC, but based on the M5 half-track instead of the M3. Like this example

most were shipped to the Soviet Union. This example is with a Red Army unit in Czechoslovakia in April 1945. (Ivan Bajtos)

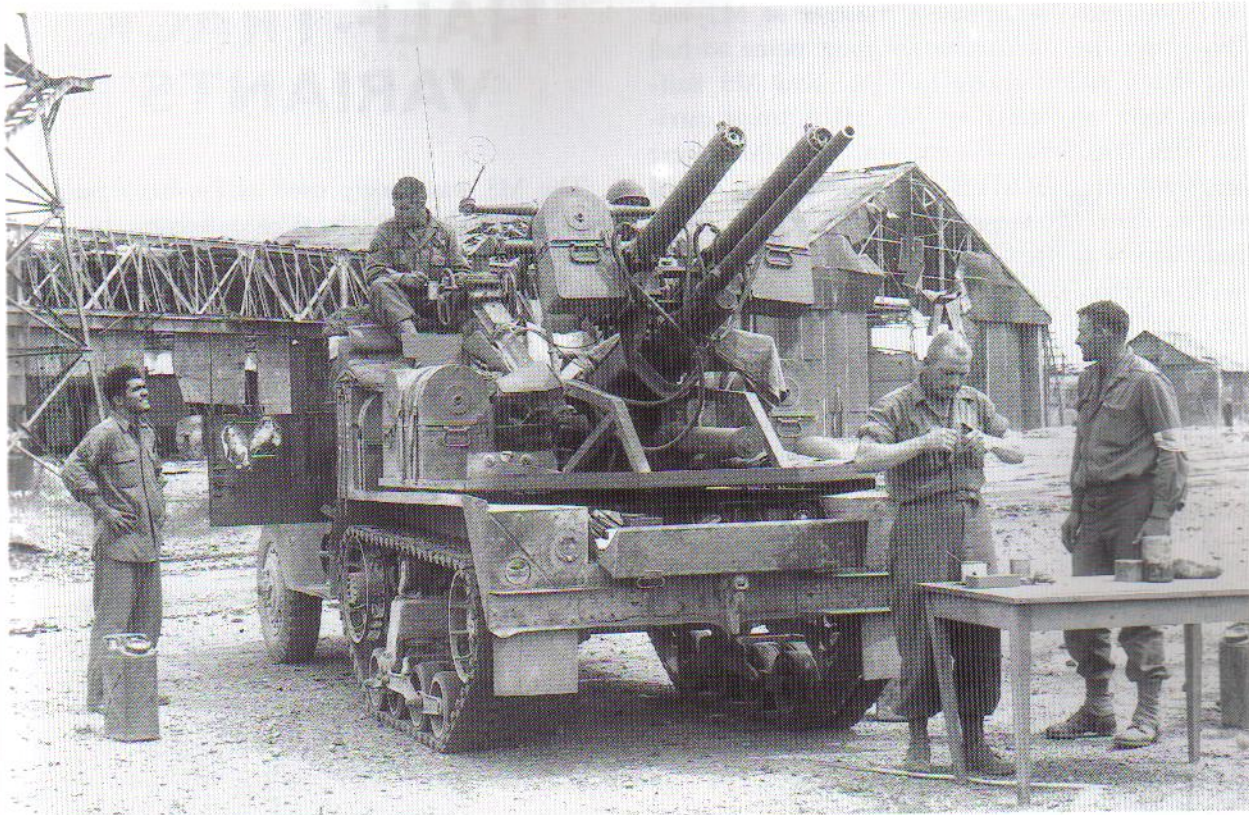
the war. The Brazilian shipments included eight M2/M2A1s, three M3/M3A1s, and 20 M5/M5A1s. China also received a small number of half-tracks which served with their Tank Group in Burma. Small numbers of half-tracks were also provided to Latin and South American countries during the war including ten M5s to Chile and three M2 and two M5s to Mexico.

After the Second World War, most personnel carrier half-tracks were declared obsolete by the US Army; some specialised types such as the M16 air defence vehicle remained in service into the 1950s. A significant fraction of the remaining half-tracks were sold for scrap or sold to American industry. The M3's durability resulted in many of the vehicles having their armour removed and they were widely used in the United States during the 1950s and 1960s by the construction and logging industry.

Half-tracks were widely distributed by the US after the Second World War under the Military Aid Program (MAP). Nearly all NATO countries received some half-tracks in the 1950s, as well as many other US allies including Pakistan and Japan. Half-tracks also became widely available on the secondary arms market from countries such as



M16 MGMC of the 447th AAA Battalion near Neufchateau, Belgium, on 1 January 1945 during the Battle of the Bulge. These anti-aircraft units actually saw some combat in their intended role during the Ardennes fighting, as it was one of the last occasions where German fighter-bombers appeared in force. This vehicle has had an improvised rack for jerry cans added to the front winch bumper. (US Army Signal Corps)



France once they were declared obsolete. One post-war user in particular took advantage of this.

Israeli half-tracks

The largest single post-war combat user of half-tracks was Israel. Jewish agents began to secretly buy up surplus half-tracks in Europe immediately after the Second World War and surreptitiously shipped them to Israel. They were some of the first armoured vehicles available to the Jewish militias during the 1948 fighting that resulted in the state of Israel. The first batch were M5 and M9s acquired in Europe, painted red to disguise them as agricultural equipment. Desperately short of tanks, Israel uparmoured and upgunned many half-tracks instead. This included turreted versions with 20mm cannon, and others with improvised 6-pdr. anti-tank gun mountings. About 20 were in service in the initial 1948 fighting. After the official establishment of Israel, Italy sold about 150 demilitarised half-tracks including M4 mortar carriers, M14 MGMC and M15 CGMCs. Helpfully, most of these had large chunks of their

The T28E1 CGMC was an expedient air defence vehicle rushed into action in time for the November 1943 invasion of French North Africa. Here, a T28E1 soldiers on with the 443rd AAA Battalion in St.

Raphael, southern France, on 17 August 1944. The T28E1 was easily distinguishable by the absence of an armoured shield, and the use of water-cooled .50cal. heavy machine guns. (US Army Signal Corps)

side armour removed. Additional vehicles were also acquired from Europe, so that a force of about 200 half-tracks existed by 1949.

After the 1948-49 war, Israel began acquiring surplus half-tracks directly from the US as well as from European sources, especially France, Belgium and the Netherlands. They were indiscriminately described as M3 half-tracks; M5s and M9s were simply called M3 IHC. In 1955, the Zahal began efforts to standardise the half-tracks as part of an effort to equip its two new armoured brigades with seven infantry half-track companies each. One of the standard modifications was to cut the driver's armoured visor in half, permanently leaving the right side half-folded down with an added ball-mount for a defensive machine

gun. Although Israel had a number of M2 and M4s under the standardisation programme all had rear doors added. Long hull M3 and M5 half-tracks were configured as M3 Mk.A troop carriers, with IHC RED 450 engines. Some M5s were converted into M3 Mk.B command carriers, fitted with a .50cal. Browning heavy machine gun, additional radios and a front winch bumper. The M3 Mk.C usually carried 81mm M1 mortars, and used White 160 AX engines. This particular M3 variant served and saw action in the 1956 war with Egypt.

After 1956, additional vehicles were obtained from France and European scrap dealers. Additional special-purpose types were built including radio command vehicles, ambulances and recovery vehicles. Two special anti-tank types were developed in 1965, one armed with the Belgian Mecar 90mm anti-tank gun, and the other a closed-top type fitted with Nord-Aviation SS.11 wire-guided anti-tank missiles. A second mortar carrier (the M3 Mk.D) was developed in 1965 and armed with the 120mm Soltam mortar. The M3 Mk.D and semi-standardised Mk. A, B and C were all used extensively in the 1967 Mid-East War, forming the backbone of Israel's mechanised infantry capability.

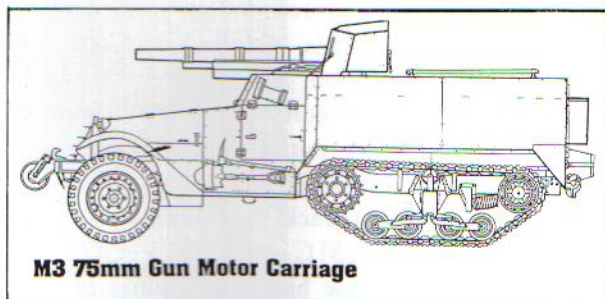
In the late 1960s, Gen. Avraham Adan attempted to replace the half-tracks with American M113 APCs, but the programme was resisted by Gen. Israel Tal, head of the armoured forces, who felt that the half-tracks were quite adequate given Israel's limited budget. Adan prevailed, and in the 1973 war, first-line Israeli mechanised infantry units were equipped with the M113 APC. However, many reserve units still used the half-track. After 1973, most mechanised infantry units gave up their half-tracks for M113s. Nevertheless, they were still retained in service for specialised roles, especially in command, air defence, engineer and maintenance units. In 1974, a modernisation programme was undertaken which saw the original engine replaced by the 6V53 powerplant from the M113. In addition, the new Allison TX-100N engine was also retrofitted. This version is externally identifiable since the radiator was plated over, and external fuel tanks were added at the rear of the vehicle.

HALF-TRACK VARIANTS

The M3 was widely used as the basis for specialised vehicles. Of the 53,813 half-tracks built, 39,436 were half-track cars or carriers (73 per cent). This section deals with variants that actually entered production. There were four basic categories of half-track variants: tank destroyers (also called gun motor carriages, or GMC); howitzer motor carriages (HMC); combination/multi-gun motor carriages (CGMC/MGMC) for air defence, and mortar motor carriages (MMC). Of these types, by far the most important numerically were the air defence types which totalled 9107, or about 17% of total half-track production.

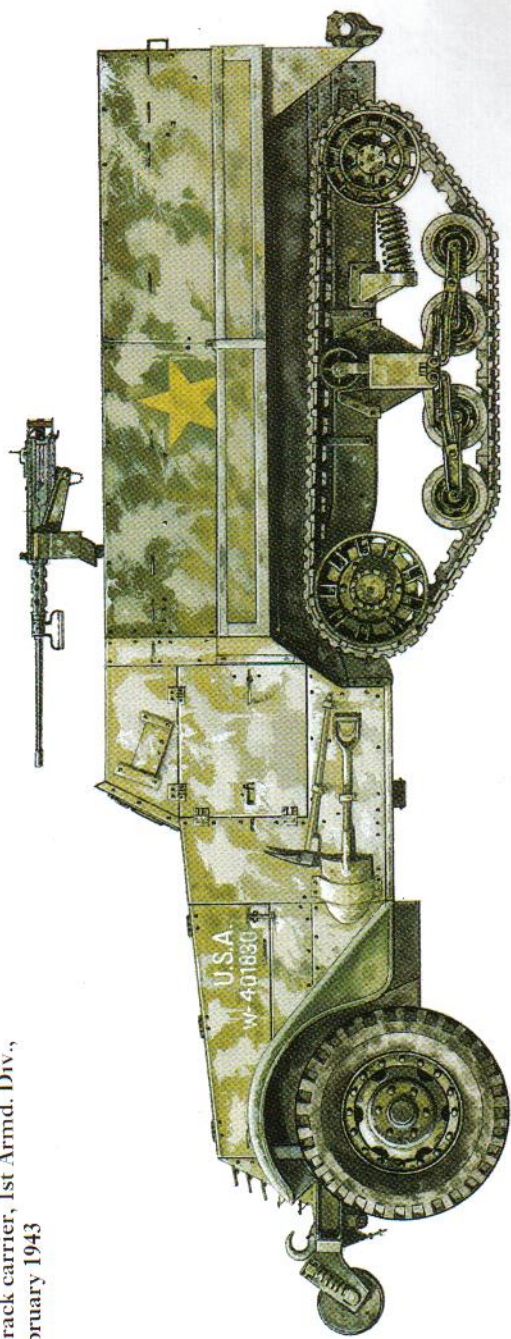
M3 75mm Gun Motor Carriage

The first significant half-track variant was the M3 GMC which entered development in 1941 as an interim tank destroyer until the M5 76mm GMC became available. The pilot T12 consisted of a M3 adapted to carry a M1897A5 75mm field gun, an American version of the legendary French *soixante quinze* of WW1. The adaptation was quite simple, the gun being mounted on a welded box structure attached to the chassis frame behind the driving compartment. A trials batch of 36 T12s was ordered in July 1941. After trials, the T12 was accepted for US Army use as the 75mm Gun Motor Carriage M3 on 31 October 1941. The initial production batches of this vehicle used the same shrapnel shield as the normal M2A3 gun carriage. This gave the crew scant protection, and in 1942 a more effective shield was introduced. Production ended in April 1943 due to the arrival

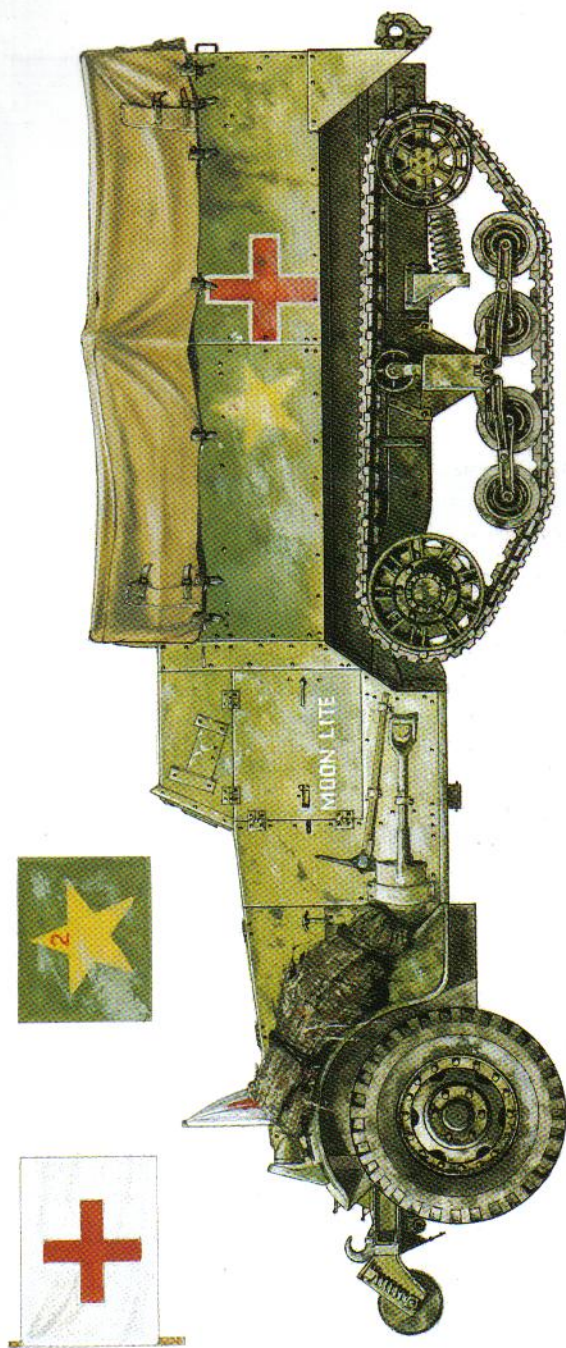


M3 75mm Gun Motor Carriage

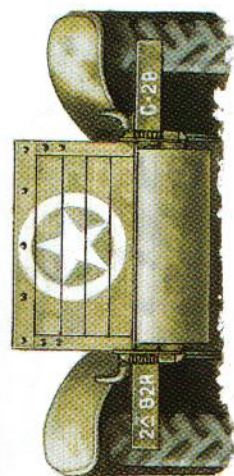
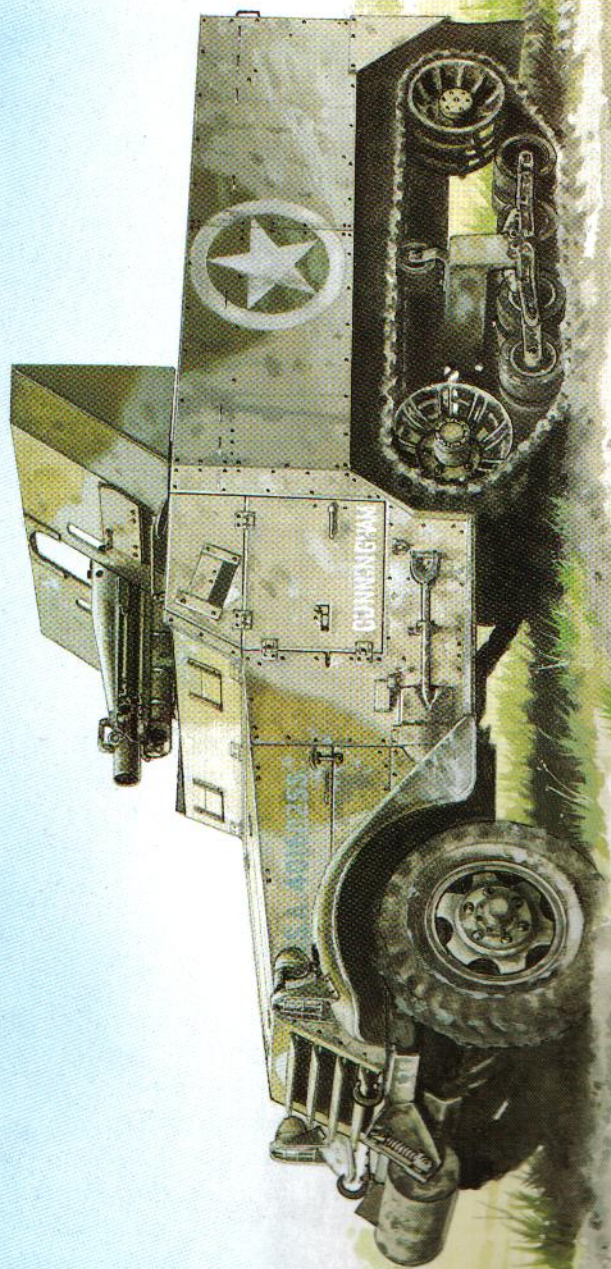
1: M3 Half-track carrier, 1st Armd. Div., Tunisia, February 1943



2: M3 Half-track carrier, Deutsches Afrika Korps, Tunisia, March 1943



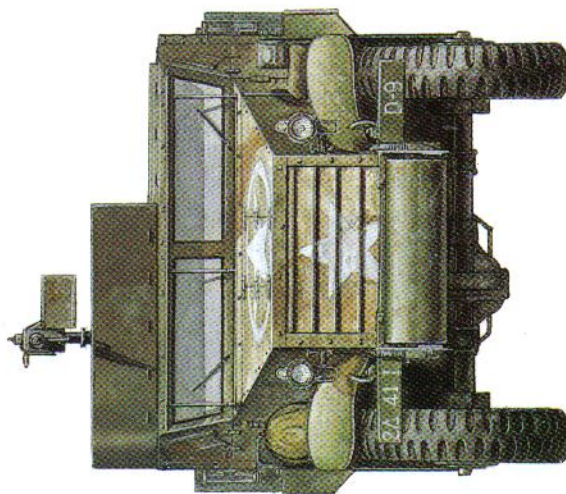
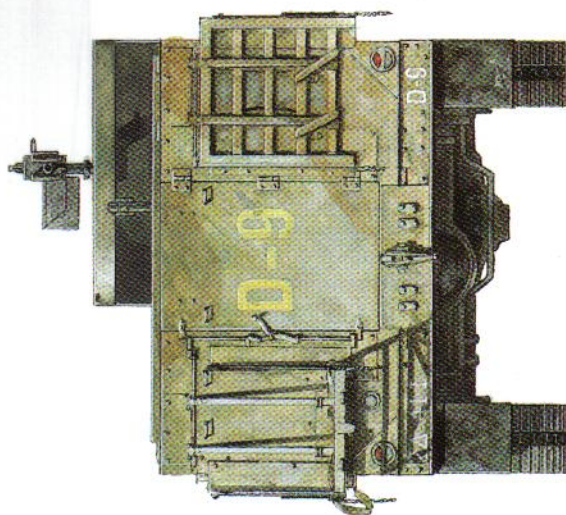
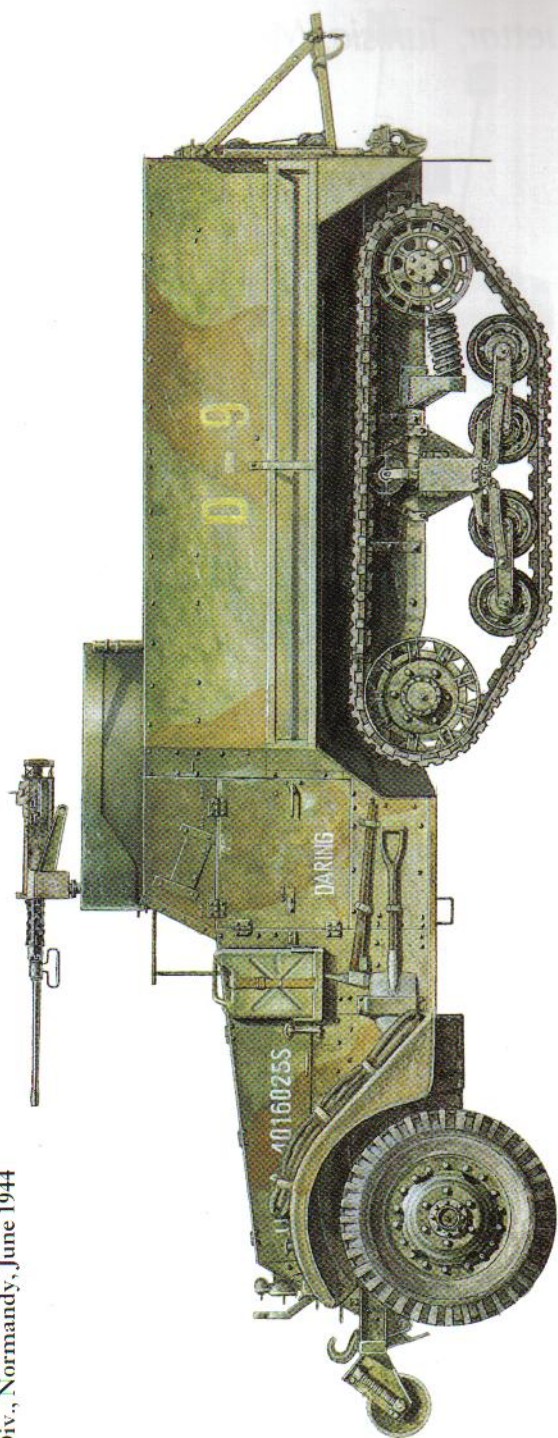
T30 75mm HMC, 82nd Reconnaissance,
2nd Armd. Div., Sicily, June 1943



U.S.A. 40160255

CUNNINGHAM

M3A1 Half-track carrier, 41st Armd. Inf.,
2nd Armd. Div., Normandy, June 1944



M3 75mm GMC

601st Tank Destroyer Battalion, El Guettar, Tunisia, March 1943

SPECIFICATIONS

Crew: five

Combat weight: 10 tons

Power to weight ratio: 14.2 hp/t

Hull length: 20 ft. 5 1/2 in.

Width: 7 ft. 1 in.

Height: 8 ft. 2 5/8 in.

Armour: 6 mm-16 mm (1/4 in. to 5/8 in.)

Engine: White 160 AX In-line 'L' six-cylinder, 4-cycle, 386 cu. in. engine developing 142.5 hp at 3000 rpm

Transmission: Automotive manual transmission, single dry-plate clutch, four gears forward, one reverse

Fuel capacity: 60 gal.

Max. speed (cross-country): 20 mph

Max. speed (road): 45 mph

Max. range: 200 miles

Fuel consumption: 3.3 miles/gal

Fording depth: 32 in.

Slope: 60% grade

Obstacle: 12 in.

Main gun: 75mm M1897A4 on M3 mount

Muzzle velocity: 2000 fps (M61 APC)

Armour penetration: 3 in. (75mm) at 1000 yds (M61 APC)

Stowed main gun rounds: 59

Fire controls: M33 telescope, M36 telescope mount

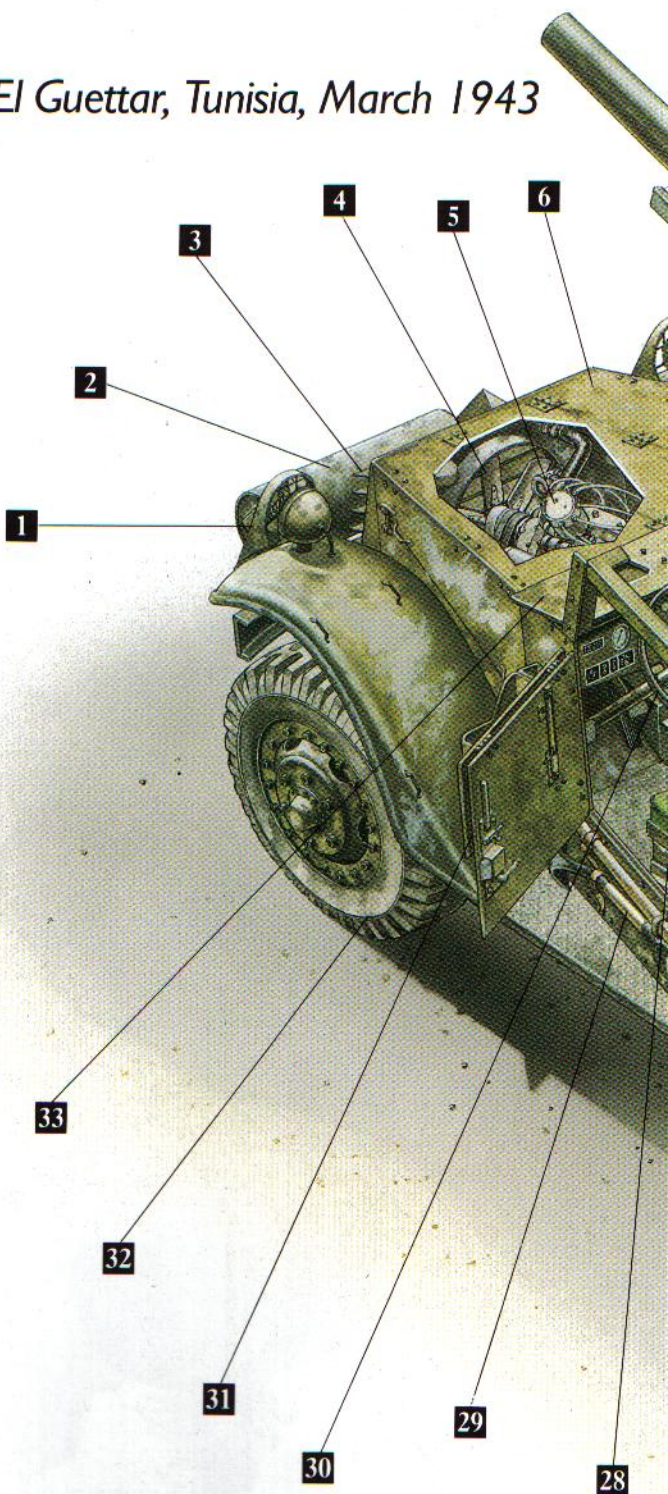
Gun stabilisation: none

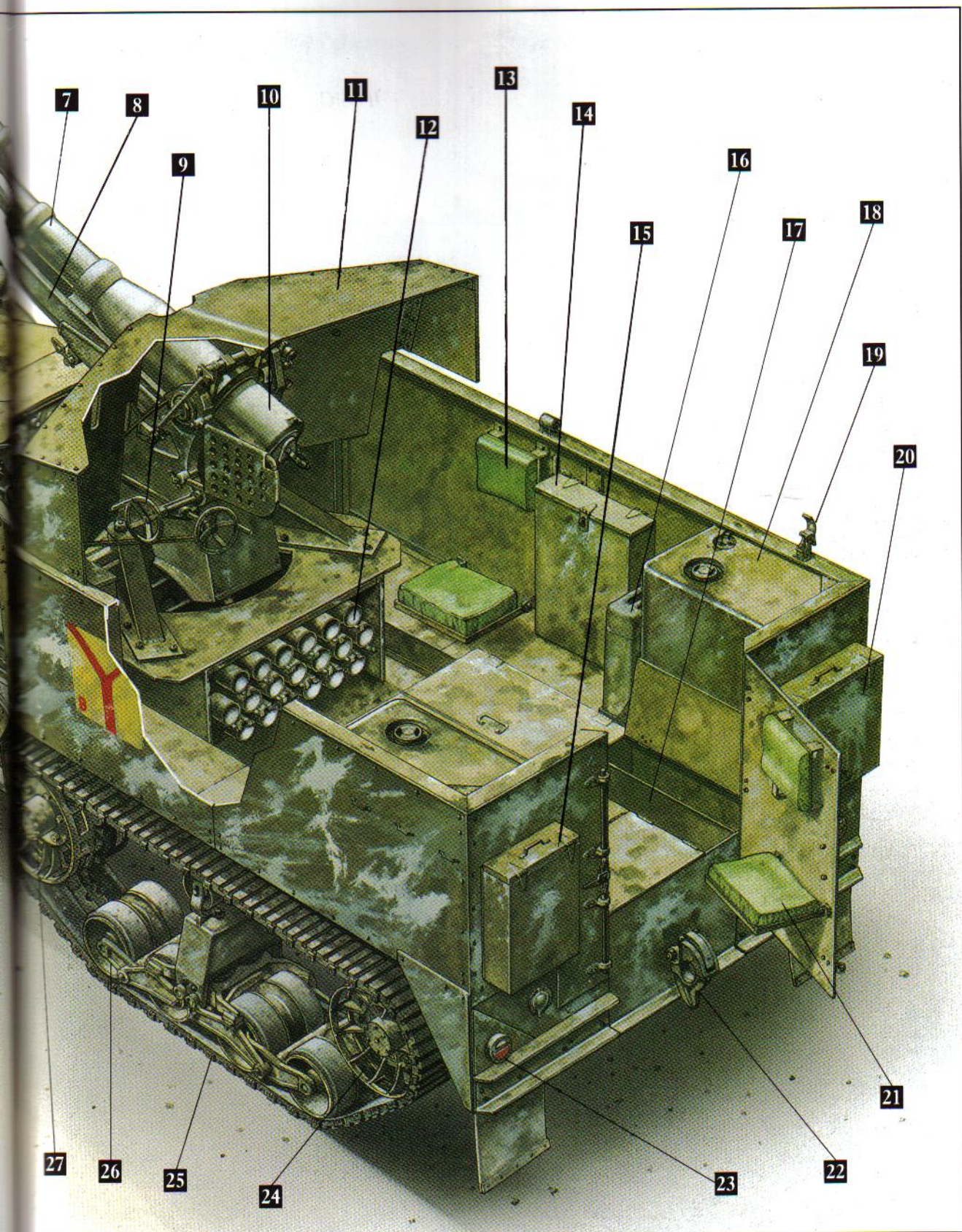
Gun depression/elevation: -10° to +29°

Secondary armament: crew weapons - 1 x M1. 30cal. carbine; 4 x M1903. 30cal. rifles

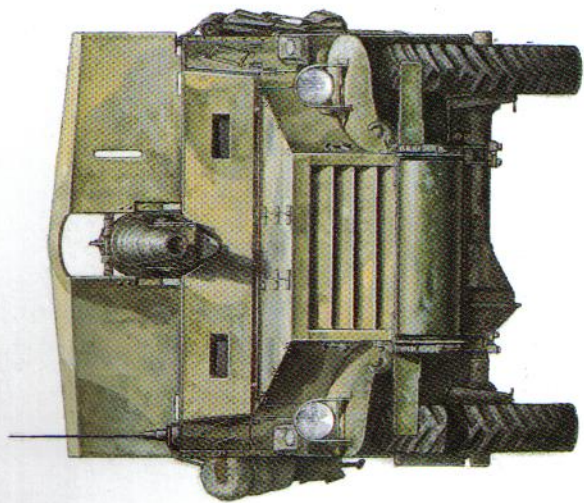
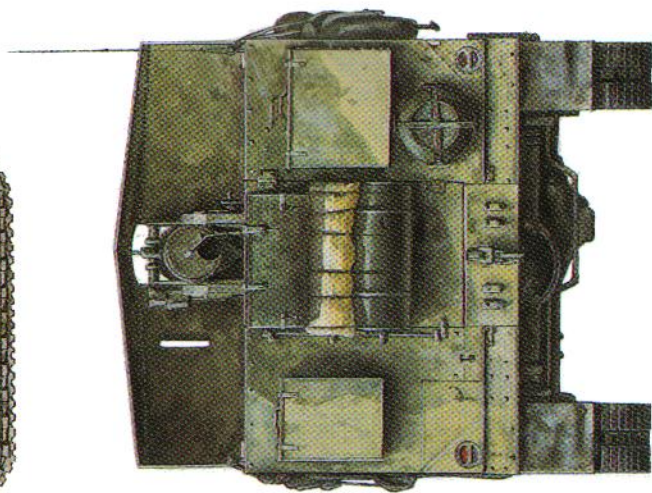
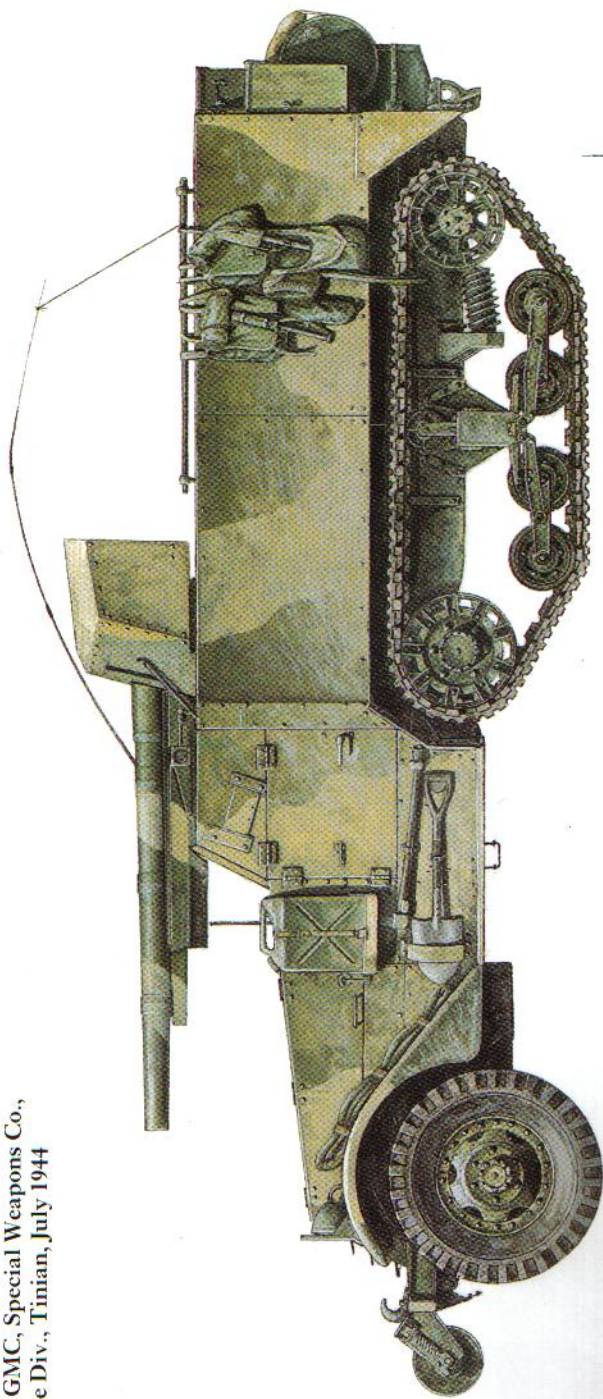
KEY

- | | |
|---|--|
| 1. Early pattern driver's headlight | 17. Floor ammunition stowage box |
| 2. Roller assembly | 18. 30 gallon gasoline tank |
| 3. Armoured grill (open position) | 19. Attachment for gun cleaning rod |
| 4. Engine fan | 20. Large blanket stowage box |
| 5. White 160 AX engine | 21. Folding crew travel seat |
| 6. Armoured engine cover | 22. Towing hitch |
| 7. 75mm M1897 A4 gun | 23. Rear tail/blackout light |
| 8. Gun recuperator assembly | 24. Idler wheel |
| 9. 75mm Gun elevation and traverse wheels | 25. Endless band track |
| 10. 75mm gun breech | 26. Main bogie assembly |
| 11. Armoured gun shield | 27. Drive sprocket |
| 12. Ammunition ready rack | 28. Driver's seat |
| 13. Gun crew seat | 29. Outer vehicular equipment |
| 14. Stowage box | 30. Steering wheel |
| 15. Small blanket stowage container | 31. Armoured door (folded upper panel) |
| 16. Water jerrican | 32. Tyre with anti-scuffing rim |
| | 33. Folding armoured windshield cover |

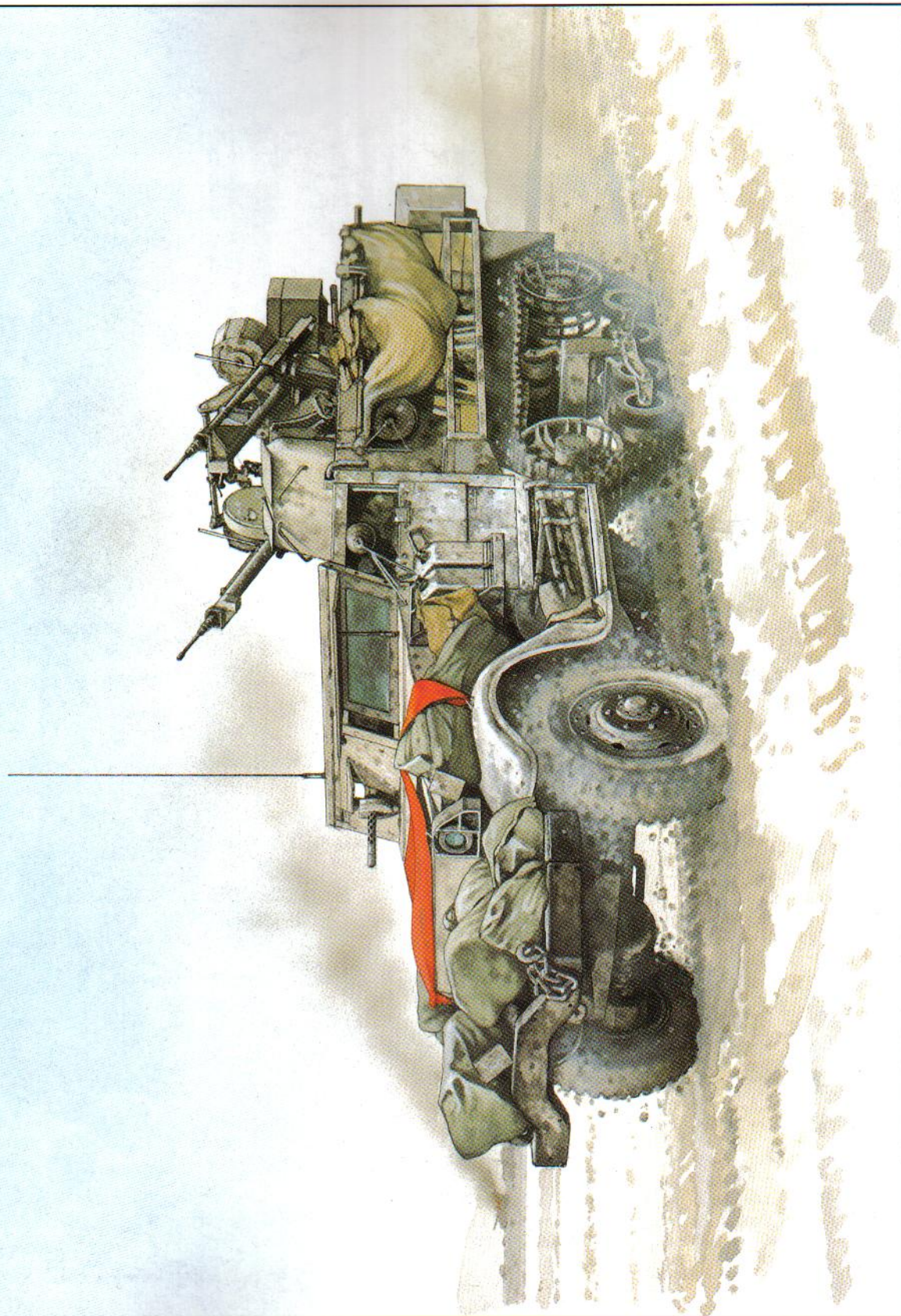




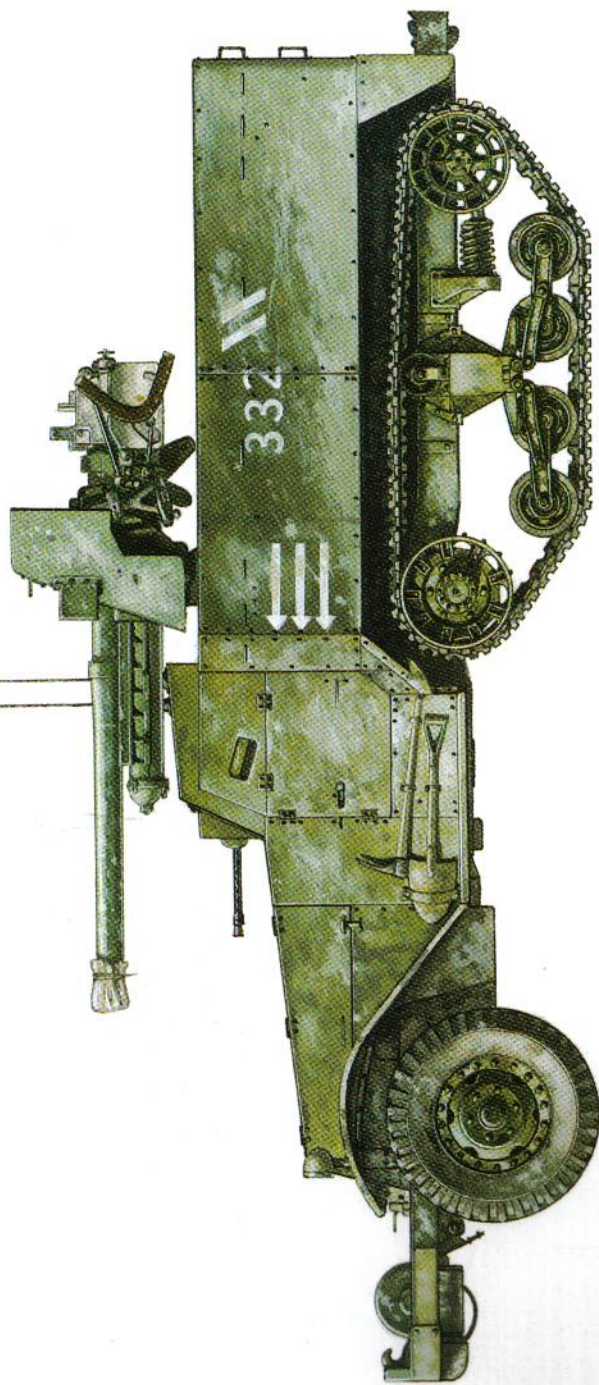
M3 75mm GMC, Special Weapons Co.,
2nd Marine Div., Tinian, July 1944



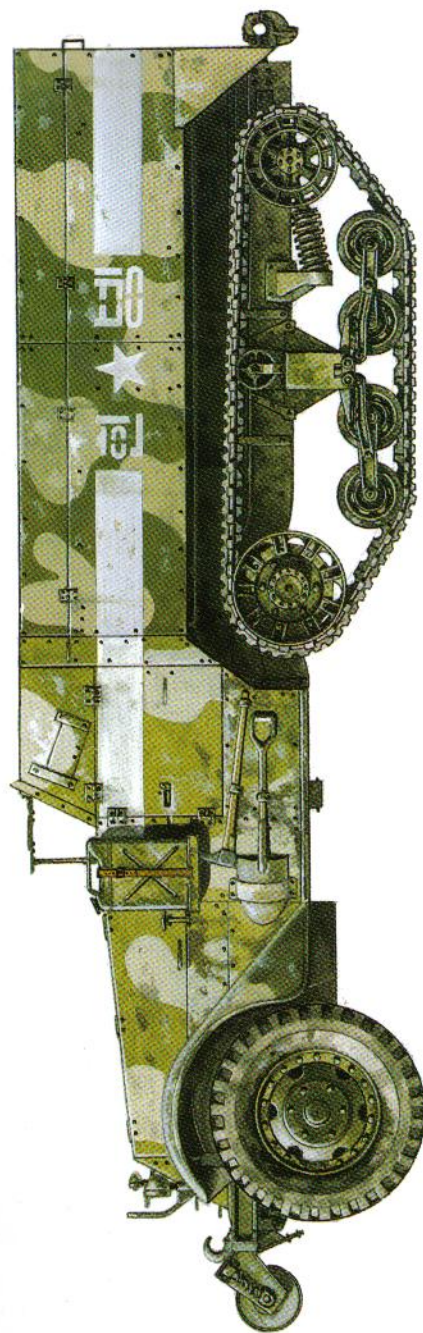
TCM-20 Anti-aircraft Vehicle,
Israeli Zahal Anti-Aircraft Co., Lebanon 1982



1: M5 Half-track carrier, 82nd Tk. Bn., Negev Bde., Israeli Army, December 1948



2: M3 (M13) Half-track carrier, ROK Military Police, Seoul, Korea, 1985



The M15 CGMC was a refined version of the T28E1 CGMC. Several changes were made, most noticeably the addition of a simple armoured turret around the gun mount. This vehicle is serving with the 434th AAA Battalion near Capua, Italy, on 20 November 1943. (US Army Signal Corps)



of the much superior 76mm GMC M10, which was based on the M4 medium tank chassis. The final production batch of the M3 employed the older M2A2 gun carriage, since stocks of the M2A3 variety had been exhausted. These were designated as 75mm GMC M3A1; but it should be borne in mind that this vehicle was in no way related to the M3A1 half-track personnel carrier.

The M3 75mm GMC first saw combat use in the Philippines in December 1941. Fifty of these vehicles, including some of the original T12s, were rushed into action in November-December 1941 to form three battalions of the Provisional Field Artillery Brigade. They were extensively used following the Japanese invasion of the Philippines, both for direct gunfire support and as an anti-tank weapon. They fought during the Bataan campaign, and Capt. Gordon Peck's battery was especially well known for its exemplary performance in support of the Provisional Tank Group. The Japanese later refurbished several captured M3 GMCs, and these were encountered again by US forces when the Philippines were retaken in 1944-45.

The M3 GMCs formed the heart of the new tank destroyer battalions created in the US in



The M15A1 CGMC introduced the new M3A1 gun mounting to the series, identifiable by the location of the 37mm gun barrel above the two .50cal. machine guns; on the earlier T28E1 and M15 the positions had

been reversed. Another distinctive feature was the folding panels on the front of the turret. This M15A1 is serving with a US Army AAA battalion on Okinawa on 12 June 1945. (US Army Signal Corps)



US Army field depots in Australia created their own half-track variant by mating a 40mm Bofor gun to the M3. Although sometimes called M15 Specials, these vehicles were often

based on normal M3, not converted M15s. This example is in action with the 208th AAA Battalion in the south-west Pacific in May 1945.

1942. The original battalion organisation called for eight 75mm GMC M3s, six 75mm GMC M5s and four 37mm GMC M6s. The M5 GMC consisted of a 75mm gun mounted on a Cletrac air-field towing tractor. It was an outlandish design, mockingly called the 'cleek-track'. The Tank Destroyer Command refused to accept it for service, so the M3 GMC had to take its place. The January 1943 TO&E called for 36 M3 GMC per battalion. Prior to 'Operation Torch', the invasion

of North Africa in November 1942, only one tank destroyer battalion had received the new M10 76mm GMC, so the other five tank destroyer battalions committed to the fighting there used the M3 75mm GMC.

The M3 75mm GMC saw extensive combat during the disastrous battles near Sidi bou Zid and Kasserine Pass. The US Army judged it unsuccessful, mainly due to improper employment in roles for which it was not intended. An Army Ground Force's report concluded that: 'The (601st and 701st Tank Destroyer Battalions) were generally used in roles for which they were not designed such as infantry accompanying guns, assault guns, assault artillery operating with tanks, and in cordon defence instead of depth.' The intended role of the M3 75mm GMC was the

ambush of enemy tanks from concealed positions where its weak armour would be less of a detriment. The M6 37mm GMC was even less successful. This vehicle consisted of a 3/4 ton truck with a 37mm anti-tank gun firing over the rear; they were so poorly regarded that some battalions unbolted the gun and mounted it on an M3 half-track instead. The M3 75mm GMC's one redeeming moment came in March 1943 when the 601st Tank Destroyer Battalion repulsed an attack on the 1st Infantry Division by about 100 German tanks of the 10th Panzer Division near El Guettar. The battalion claimed to have destroyed 30 German tanks including two Tiger Is for the loss of 21 M3 75mm GMCs.

Some tank destroyer battalions retained the M3 75mm GMC at the time of 'Operation Husky' in Sicily in 1943, but they were generally used for artillery fire support as the M10 76mm GMC had proven superior as a tank destroyer. After the Sicily campaign, the M3 75mm GMC was no longer employed by front-line tank-destroyer battalions and it was completely replaced by the M10 GMC. In late 1943, the Army ordered 1360 of these vehicles converted back to M3A1 half-track carriers, ensuring that no more than 842 75mm GMC M3 were ever issued to the troops in their intended configuration.

Although this ended its service career with the US Army, the M3 75mm GMC was still employed extensively by the US Marine Corps,

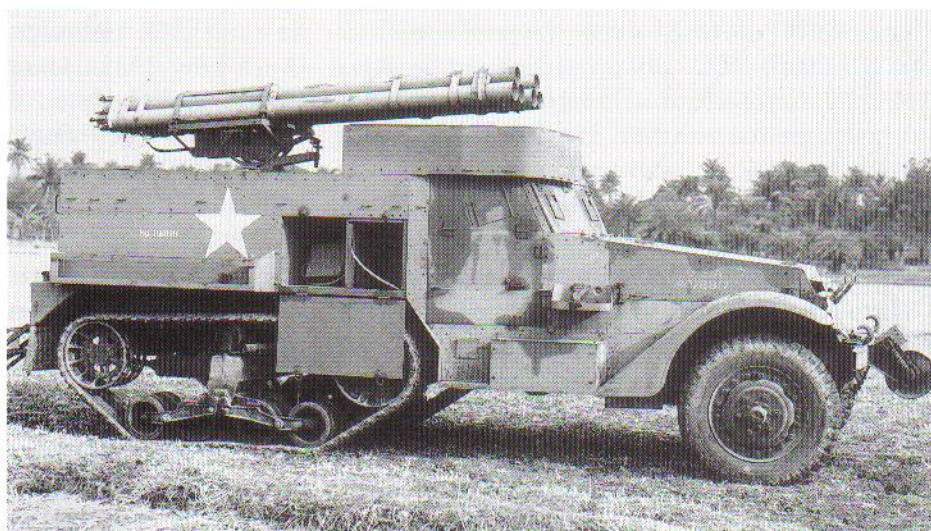
beginning with the Saipan campaign in the summer of 1944. Each Marine division had twelve M3 75mm GMCs; in USMC service they were called SPM (self-propelled mounts) and were used for direct fire support. During the initial fighting on Saipan, they were used in their original tank destroyer role, helping to repulse an attack by the Japanese 9th Tank Regiment on the night of 16-17 June 1944. While obsolete in Europe, the 75mm gun on the M3 GMC could devastate the thinly armoured Japanese Type 95 Ha-go light tanks and Type 97 Chi-ha medium tanks. The M3 GMCs later served in the Peleliu and Okinawa battles, and saw service in many smaller actions as well.

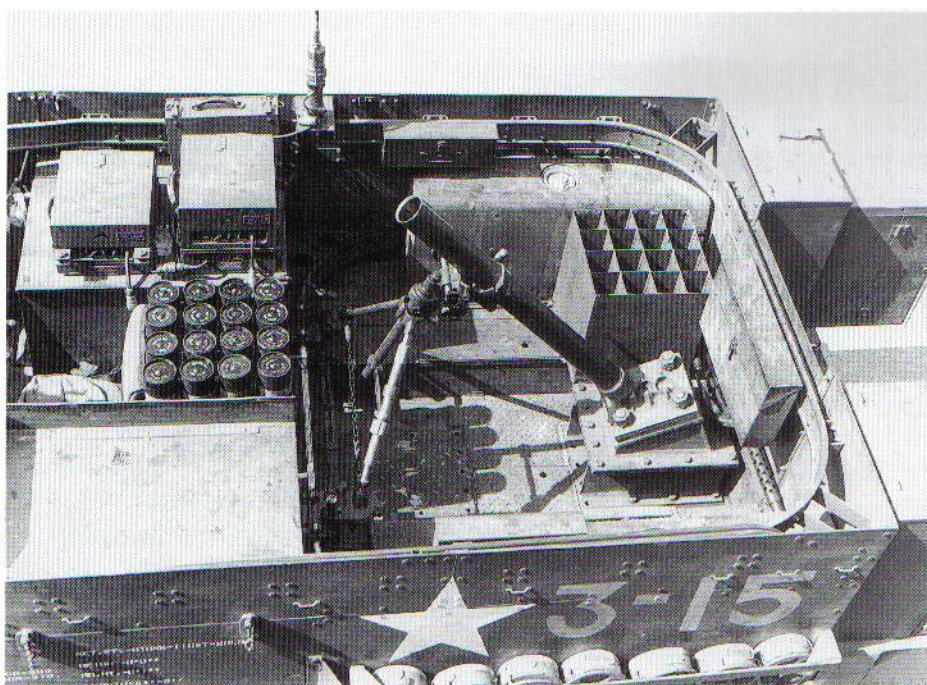
The M3 GMC was not extensively supplied through Lend-Lease. About 170 were provided to the British Army, in which they were mainly assigned to the heavy troops of armoured car regiments. The M3's debut in British service occurred with the Royal Dragoons in Tunisia in 1943; they were also widely used in the Italian campaign. A small number of M3s remained in service in France in 1944, but they were gradually retired through attrition. The Free French Army trained on the M3 75mm GMC in North Africa before receiving M10 GMCs.

T48 57mm Gun Motor Carriage

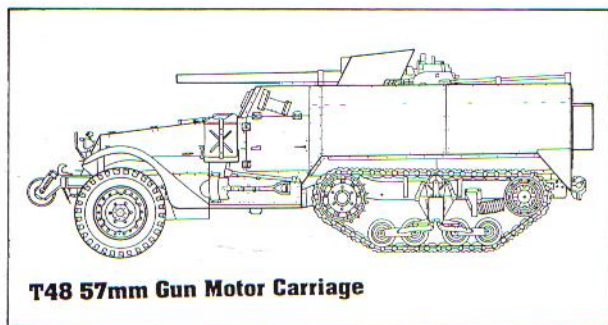
The T48 57mm GMC was based on a British Army requirement for a half-track tank destroyer

There were innumerable local improvisations on wartime half-tracks, such as this M2A1 sporting a set of Air Force rocket launchers at the Bengal Air Depot in India in 1944. (US Army Signal Corps)





The M4 mated the 81mm mortar to the M2 half-track car. The rearward firing configuration was not popular with its crews, so some units reversed the baseplates so that it could fire forward, as seen here on a vehicle of the 41st Armored Infantry, 2nd Armored Division, in April 1944. (US Army Signal Corps)



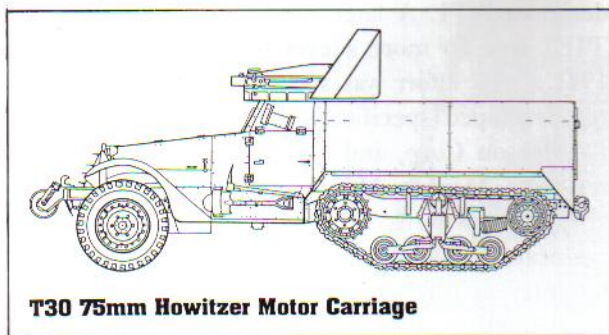
T48 57mm Gun Motor Carriage

armed with the 6-pdr. anti-tank gun. As the US Army was already planning to adopt the M10 76mm GMC, no production was anticipated for the US Army. The pilot was ordered in April 1942 and consisted of a locally manufactured 6-pdr., designated the M1 57mm anti-tank gun, mounted on an M3 half-track chassis. After the experience with the T12, the pilot T48 57mm GMC was equipped with a gun-shield from the outset. The first production batch was accepted in December 1942 and was never type classified since it was intended exclusively for Lend-Lease. By the time they were available, Britain no longer felt they were necessary. Only 30 were provided to Britain under Lend-Lease, and they were mostly converted back into M3 half-track carriers. The majority of the production run, 650 vehicles, was

supplied to the Soviet Union under Lend-Lease; the remaining 281 were converted back to M3A1 half-track carriers for the US Army. The Red Army redesignated them as SU-57 and formed them into special independent tank destroyer brigades with three battalions and 60 SU-57s each. The first of these to see combat was the 16th Separate Tank Destroyer Brigade which went into action during the Dnepr river offensive in Ukraine in August 1943. The 19th Brigade fought during the Baranow bridgehead battles in Poland in August 1944, and some of these units took part in the Berlin campaign and Prague campaign in April-May 1945. The Soviet Union later transferred 15 SU-57s to the Polish People's Army, where they were employed by the 7th Self-propelled Artillery Battery during the fighting in Poland and Germany in 1944-45.

T30 75mm Howitzer Motor Carriage

In 1941, the US Army Armored Force had a standing requirement for an assault gun to equip tank and armoured reconnaissance units. As a satisfactory design was at least a year away, the Ordnance Dept. agreed to design an expedient alternative based on the M3. The pilot was authorised in October 1941 and consisted of a M1A1



T30 75mm Howitzer Motor Carriage

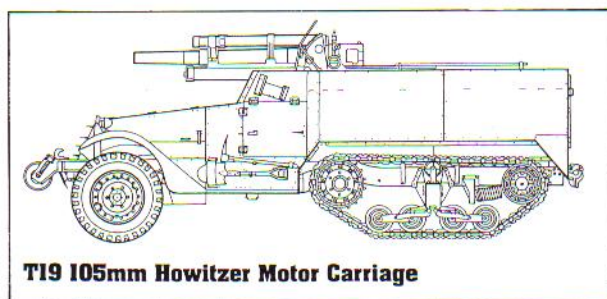
75mm howitzer and its mounting adapted to fit on a simple box attachment in a M3, much like the type designed for the M3 75mm GMC. It was authorised for production in January 1942 and the first deliveries came in February. It was never type classified as it was viewed from the outset as a temporary solution. As on the M3 75mm GMC, the fuel tanks were moved to the rear corners of the hull. The initial production vehicles lacked a protective shield, but this was quickly developed in the light of experiences with the M3 75mm GMC in the Philippines in early 1942. There was considerable debate about the size of the shield, leading to several prototype configurations. Finally, a relatively high shield was selected to permit the use of the howitzer in the indirect fire mode.

The combat debut of the T30 75mm HMC was in North Africa in November 1942. Armoured regiments of the 1st Armored Division received 12; three were used in each tank battalion headquarters platoon and three were used in the regimental reconnaissance battalions. The 6th and 41st Armored Infantry Regiments were also issued nine T30s apiece, with three in the HQ platoon of each battalion. Infantry divisions in North Africa deployed a cannon company with six T30 75mm HMCs and two T19 105mm HMC. The T30 75mm HMC later fought in 'Operation Husky' on Sicily in 1943, and in Italy in 1944. It was removed from infantry division use following the March 1943 reorganisation, being replaced by towed 105mm howitzers. It was gradually replaced by the M8 75mm HMC, based on the M5 light tank, which began to be delivered in November 1942. Only 312 T30 HMCs were delivered in their original configuration as the final batch of

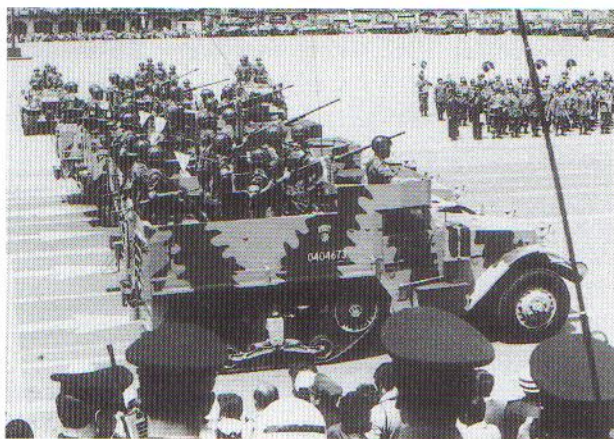
188 were converted back to M3 half-track carriers in November 1942 before they were delivered. A small number of T30s were provided to the Free French Army, and surprisingly, they were used in combat in Indo-china in the early 1950s.

T19 105mm Howitzer Motor Carriage

The T19 105mm HMC stemmed from the same October 1941 Armored Force requirement as the T30. There was some concern that the standard M2A1 105mm howitzer would be excessive for the half-track chassis, so a T38 pilot with the T7 105mm pack howitzer was also designed. Trials of the T19 with the M2A1 105mm howitzer were successful, service authorisation following on 25 March 1942. Only 324 were produced through April 1942, as the much superior M7 105mm HMC on the M4 medium tank chassis was entering production. The T19 was mainly used in cannon companies of US Army infantry divisions, and in artillery battalions in armoured divisions. It was used in the 1942-43 North Africa campaign, but had been replaced by M7 105mm HMC in most armoured units by the time of the Sicily invasion in 1943. Although intended to provide direct fire, its mobility led many cannon companies to use these vehicles in a more aggressive fashion. A good example was provided in an account by Col. Bryce Denno, of the 16th Infantry Regiment's company, which described an engagement against Vichy French troops near Oran in November 1942: 'When the 2nd Battalion's assault rifle companies attacked, our Cannon Company guns fanned out like tanks before them, concentrating artillery fire on enemy strongpoints. Charging into enemy positions, cannoneers fired carbines, tommy guns and machine-guns while some threw hand grenades. In the



T19 105mm Howitzer Motor Carriage



Surplus M3A1s were provided to several Latin American armies in the 1950s, and remained in ser-

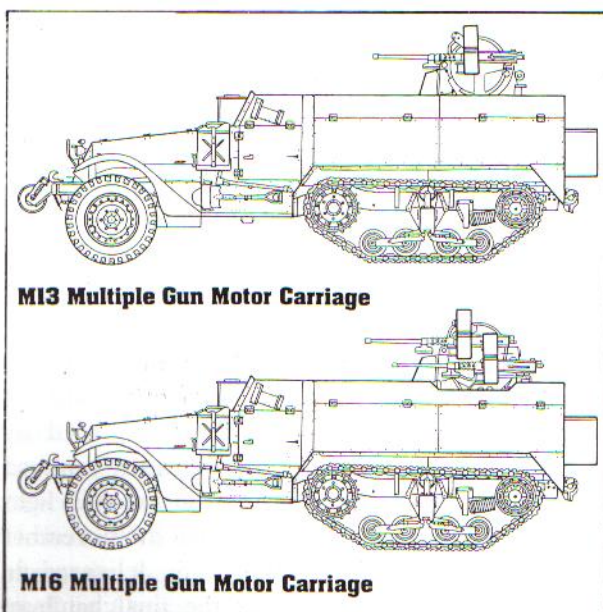
vice until the 1980s; these are Bolivian Army M3A1s. (Defense Intelligence Agency)

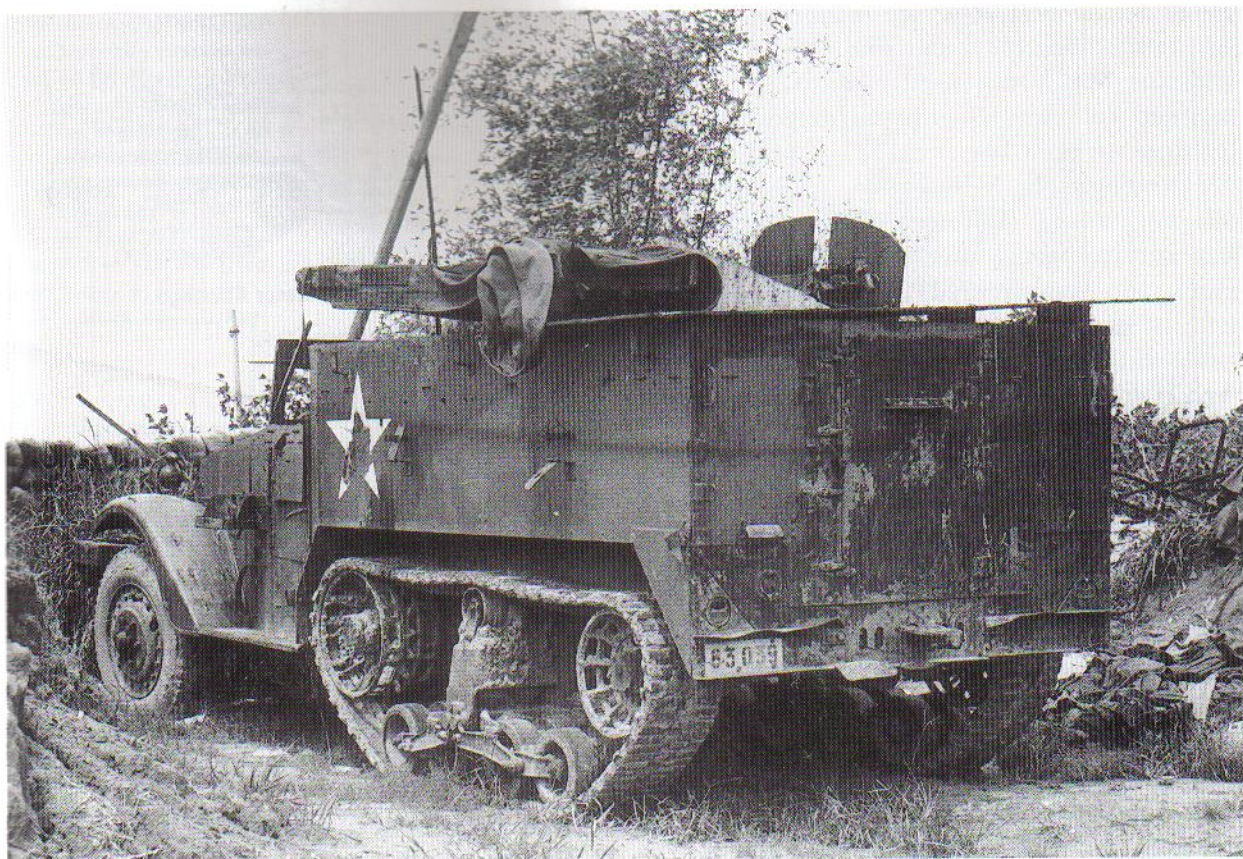
close and confused fighting, the crew chief and another cannoneer of a full-track were hit and their vehicle caught fire. The remaining crewmen stayed with their gun, extinguishing the fire even as they exchanged shots with the enemy.' Two cannon companies of the 1st Infantry Division, from the 16th and 18th Infantry, were heavily involved in the fighting against the 10th Panzer Division at El Guettar along with the M3 75mm GMCs of the 601st Tank Destroyer Battalion mentioned earlier. The Cannon Company of the 16th Infantry was awarded the Presidential Unit Citation for their repulse of a thrust by the Hermann Göring Panzer Division near Gela, Sicily in June 1943. They were credited with destroying six tanks and halting the attack. These weapons were not intended for direct confrontation with enemy tanks, and at least one T19 was knocked out in a duel with a Tiger I near Gela. Small numbers of T19s remained in service in Italy as late as 1944. So far as is known, none were ever exported through Lend-Lease.

M13-M16 Multiple Gun Motor Carriages

There was a long-standing requirement for an anti-aircraft vehicle to protect US mechanised columns, and work began in October 1940. The first attempt was based on a Bendix twin .50cal. aircraft machine gun turret mounted on an unarmoured jeep as well as a M2 half-track prototype,

designated T1. A later redesign of the T1 as the T1E1 was no more successful, and in November 1941 a new effort was started using the M33 turret developed specifically for vehicles by the W. L. Maxson Corp, and a new Martin Aircraft turret. The Maxson M33 turret was operated by a single crewman, sitting in an open-topped, armoured shell. A separate power generator was mounted at the rear of the turret so that its electrical traverse and elevation could take place without operating the half-track engine. The initial prototypes, designated T1E2 (Maxson turret) and T1E3 (Martin turret), were mounted on the M2 half-track. But it was quickly realised that the M3 half-track was a more practical solution since it would provide more room for ammunition. The Maxson turret looked the more promising of the two types, and was mounted on the M3 as the T1E4. This type was accepted for production on 27 July 1942 and they were standardised as the M13 MGMC (on the M3 chassis), and M14 MGMC (on the M5 chassis). A total of 1103 M13 and 1600 M14 MGMCs were manufactured through May 1943. All of the M14 MGMCs were earmarked for the British Army, but they apparently did not suit its air defence requirements; most were rebuilt as half-track carriers. A small number of M13 MGMCs saw service with US Army units during the Italian campaign.





Although both the M13 and M14 MGMC were judged acceptable, the T61 mount was developed which placed four .50cal. machine guns on a slightly modified Maxson turret. This proved so successful that in November 1942 it was adopted as the M45 mount. The M3 half-track with the M45 mount was designated M16 MGMC and on the M5 half-track as the M17 MGMC. Production of the M16 began in May 1943, and of the M17 in December 1943. All 1000 M17s were supplied to the Soviet Union. A total of 568 M13 MGMCs were remanufactured as M16s before being issued. The US Army also decided to examine whether the 20mm Oerlikon gun used by the Navy could be mounted in the Maxson turret. This was tested in two configurations on the M2 and M3. Production was authorised in March 1944 as the T10, and 110 were built. But later trials showed that under dusty field conditions the guns had a tendency to jam. As a result, 109 of the T10s were rebuilt as M16s in December 1944, and the T10 was never issued. Besides factory

The French Army used several models of the M3 during the war in Indo-china in the early 1950s. This vehicle is one of the sur-

vivors serving with the South Vietnamese ARVN in Vietnam in the late 1960s. (James Loop)

built M16s, a number of Army units created improvised versions by mounting Maxson turrets from towed M45 trailer mounts onto normal M2 and M3s.

By 1944, each armoured division deployed an anti-aircraft artillery (AAA) weapons company consisting of eight M16 MGMCs and eight M15 MGMCs. Infantry divisions used a towed version of the M45 Maxson turret (M51). These were supplemented at corps and army level by AAA weapons battalions which had 32 M16 MGMCs and 32 M15 MGMCs for the defence of high-value installations such as bridges, HQs and rail junctions. Due to the heavy losses inflicted on the Luftwaffe by British and American fighter aircraft, the M16s frequently lacked targets. As a result, they were often used in an improvised fashion for

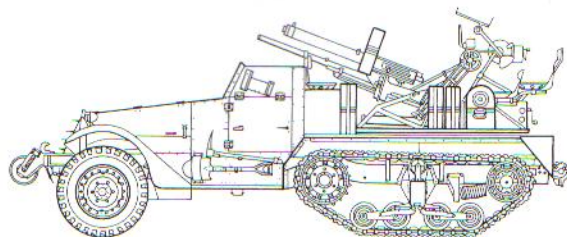
ground fire support. They earned the grim sobriquet 'meat-choppers' in this role. One of the few times the M16s were used extensively in their intended role was during the defence of the Remagen bridge in 1945.

Interestingly, the M16 was one of the M3 versions not declared obsolete in 1947. In fact, many M3s were converted after the war into M16A1s rather than being retired. The M16A1 differed from the standard production versions since it did not have the folding rear sides. As a result, the M45 turret had to be mounted on a higher pedestal to clear the armoured sides of the M3. Another post-war modification on M16s and M16A1s was the addition of 'bat-wing' armoured shields on either side of the Maxson turret to protect the ammunition loaders. The M16 was extensively used by the US Army during the Korean War, mainly in the ground support role to stop Chinese massed infantry attacks. Although later replaced by the M42 Duster twin 40mm gun vehicle, the M16 remained in service with some Army National Guard units into the 1960s. A small number were used as late as 1967 being deployed by National Guard units during the Newark riots.

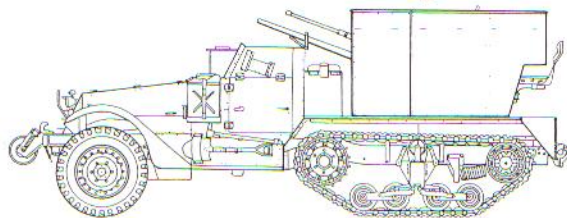
The M16 was not widely exported during the Second World War, only two trials examples being provided to Britain (with 10 M13s) and 70 to the Free French Army. However, after the conflict many were declared surplus and were gradually provided to US allies in NATO and elsewhere. Israel created its own version of the T10 by mounting a pair of Hispano-Suiza HS 404 20mm cannon on a modified Maxson turret designated the TCM-20. This vehicle was credited with shooting down 26 aircraft, some 60% of the kills credited to Israeli ground defences in the 1973 war. Although Israel acquired the M163 VADS, the TCM-20 remained in service through the 1980s in reserve units.

M15 Combination Gun Motor Carriage

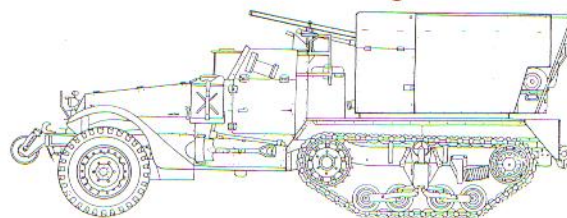
The relative merits of machine guns versus light cannon for air defence was the subject of hot debate in the US Army in 1941. In September 1941, the Ordnance Dept. began development of the T28 Combination Gun Motor Carriage which



T28E1 Combination Gun Motor Carriage



M15 Combination Gun Motor Carriage



M15A1 Combination Gun Motor Carriage

consisted of a M1A2 37mm autocannon flanked by two .50cal. Browning heavy machine guns mounted on the rear of a M2 half-track with its side armour removed. The idea was to use tracer from the .50cal. machine guns to aim the weapon and, once the tracer began to impact, to fire the 37mm gun. The Coast Artillery Board, which governed anti-aircraft development at the time, favoured a multiple machine gun system, the T37, which consisted of four .50cal. machine guns on the same mounting. This led to the cancellation of the T28 CGMC programme in April 1942. In the middle of June, the Armored Force requested that a crash programme be initiated to provide a mobile air defence system for the forthcoming North African campaign. As a result, the T28 programme was dusted off, but the gun system was mounted on the longer M3 half-track chassis. A total of 80 T28E1s were manufactured by the end of August as expedient standard and most were deployed with US forces in Tunisia in 1942-43. The system proved to be one of the few effec-

The shortage of tanks led the Israelis to convert several of their half-tracks into turreted armoured vehicles during the 1948 war. This is a converted International Harvester M5 acquired on the surplus market in Europe after the Second World War and smuggled into Palestine. (Israeli Government Press Office)



tive army anti-aircraft weapons, and was credited with 78 kills in a three month period. At Kasserine Pass, they were credited with 39 German aircraft destroyed, mostly Ju-87 Stuka dive-bombers. The initial tracer fire sometimes misled German pilots into thinking that they were being engaged only by short-range machine guns, only to be struck moments later by the longer-ranged 37mm cannon.

The success of the T28E1 in North Africa led the US Army to resume production in February 1943, with the vehicle being reclassified as substitute standard M15 MGMC. One of the main complaints about the T28E1 was the lack of armour protection for the crew, so a simple box shield was developed before production reopened. A total of 680 M15 CGMCs were built in February-April 1943. The new turret and added stowage overburdened the M3 half-track chassis and degraded reliability. Improvements were incorporated into the M15, including the new M3A1 gun carriage. This vehicle was designated the M15A1 Combination Gun Motor Carriage and was authorised for production in September 1943. This was the most common version of the family, with 1652 built from October 1943 to February 1944. During the middle of the production run, units reported that the new gun carriage permitted



To provide additional fire-power to Israel's new armoured units, some M5 half-tracks were upgunned by removing the wheels from 6-pdr. anti-tank guns, and simply bolting the mounting down inside the rear of the half-track. They were simple, but effective

fire support vehicles in the 1948 war. This vehicle fought with the 82nd Tank Battalion in the Negev in December 1948. Note the ball mounted machine gun on the right side of the driver's cab. (Israeli Government Press Office)

Table 2: US Half-track Production

Type	1941	1942	1943	1944	Total
M2 Half-track Car	3565	4735	3115	0	11415
M2A1	0	0	987	656	1643
M3 Half-track Carrier	1859	4959	5681	0	12499
M3A1	0	0	2037	825	2862
M5	0	152	4473	0	4625
M5A1	0	0	1859	1100	2959
M9	0	0	2026	0	2026
M9A1	0	0	1407	0	1407
T48 57mm GMC	0	50	912	0	962
M3, M3A1 75mm GMC	86	1350	766	0	2202
T30 75mm HMC	0	500	0	0	500
T19 105mm HMC	0	324	0	0	324
M13 MGMC	0	0	1103	0	1103
M14 MGMC	0	5	1600	0	1605
M16 MGMC	0	0	2323	554	2877
M17 MGMC	0	0	400	600	1000
T10 MGMC	0	0	0	110	110
T28E1 CGMC	0	80	0	0	80
M15 CGMC	0	0	680	0	680
M15A1 CGMC	0	0	1052	600	1652
M4 81mm MMC	0	572	0	0	572
M4A1 81mm MMC	0	0	600	0	600
M21 81mm MMC	0	0	0	110	110
Total	5510	12727	31021	4555	53813

accidental firing of the weapon into the driving compartment. As a result, intermediate production vehicles had a guard rail added to prevent this from happening, this was added retrospectively at field depots on vehicles already in service.

As mentioned earlier, the M15 and M15A1 served alongside the M16 in AAA weapons companies and battalions. As with the M16, the lack of Luftwaffe targets for much of the fighting in France and Germany in 1944-45 led to its frequent use in the ground fire support role. Only 100 M15s were exported via Lend-Lease, all being shipped to the Soviet Union. Like the M16, the M15A1 remained in US Army use after World War 2, and saw combat service in Korea. Many M15A1s were later provided to Japan under the MAP programme, as well as to other US allies.

There were repeated attempts to mount the renowned 40mm Bofors gun on a half-track chassis. The first attempt was conducted on the Mack

T3 in June 1941 which predated nearly all other half-track anti-aircraft vehicles. This vehicle proved unsatisfactory and the effort shifted to the M3 chassis. The first of these was the T54 which entered development in 1942. A variety of mountings were tested including the T54E1, T58, T59E1, T60, T60E1 and T68. In nearly all cases, the gun and its mounting proved too heavy, the recoil too severe. On 22 July 1943, all these projects were cancelled due to the decision to proceed with the T65 based on the M24 light tank chassis; this emerged late in the war as the M19 40mm MGMC.

Although the Ordnance Dept. failed to field a 40mm half-track motor carriage, troops in the field were more successful. The Coopers Plains 99th Ordnance Depot near Brisbane, Australia, built several of their own conversions, originally on the basis of an M15 CGMC. These were issued to the 209th AAA Battalion which used them in combat on Luzon in the Philippines in 1944-45. The recoil problems encountered by the Ordnance Dept. prototypes were largely irrelevant on these field expedient mounts, since they were used for ground fire support, not precise anti-aircraft fire. Surprisingly, several escaped the post-war draw-down and later saw action in Korea.



By the time of the 1967 Mid-East war, the Israeli Defence Forces had acquired a large number of surplus M3 and M5s. Many

had local modifications, but this M3A1 half-track carrier appears to be virtually standard. (Israeli Government Press Office)

One of the most successful Israeli conversions was the TMC-20, which mounted a pair of 20mm cannon on the old Maxson turrets. These were usually based on the M3 half-track chassis, not the M16 MGMC chassis, evident by the lack of folding sides. (US Army)



M4 Mortar Motor Carriage

The M4 81mm mortar motor carriage (M4 MMC) was the earliest of the half-track derivatives, being standardised in October 1940. It was a very simple conversion as it was intended only to carry the M1 81mm mortar along with 126 rounds of ammunition. Although the mortar was supposed to be dismounted from the vehicle before engaging a target, a base fixture was provided so that, in an emergency, the crew could fire the mortar over the rear of the vehicle. A total of 572 were manufactured through October 1942.

They were deployed in the HQ company of each armoured infantry and tank battalion, with four per battalion. The armoured troops were not happy about the limitations on firing the mortar from a mounted position, and often disregarded them. The Ordnance Dept. had already begun a programme in October 1942 to mount the mortar on the M3 chassis as the T19, but this was not ready for production. As a result, a programme was begun to permit firing the mortar safely from onboard the vehicle on a regular basis. The chassis had reinforcement added to prevent metal fatigue from the mortar's recoil and the base fixture was improved to accommodate additional traverse. Production of this improved type, the

M4A1, ran from May to October 1943 and totalled 600 vehicles. The large production run dramatically reduced the need for mortar vehicles. The new T19 mortar carrier on the M3 chassis completed its developmental trials in July 1943 and was standardised as the M21 81mm MMC. One of the main improvements of this version over the earlier mortar carriers was that the mortar could be fired through the forward arc. The production of the interim M4A1 mortar carrier had largely satisfied US Army requirements, and consequently only 110 were built from January to March 1944. Of these, 54 were provided to the Free French Army. No other mortar carriers were exported through Lend-Lease. In the 1970s, the Israeli Army converted some of their M3 half-tracks to mortar carriers by adding a 120mm Soltam mortar.

THE PLATES

Plate A1: M3 Half-track carrier, 1st Armored Division, Tunisia, February 1943

Vehicles serving with the US Army's Armored Force in 1942 frequently wore yellow stars rather



One of the most heavily armed Israeli half-track variants mounted the Belgian 90mm Mecar smooth-bore anti-tank gun.

These served in anti-tank units in the 1967 war. (Israeli Government Press Office)

Plate A2: M3 Half-track carrier, Deutsches Afrika Korps, Tunisia, March 1943

During the fighting around Sidi-bou-Zid and Kasserine Pass in February 1943, the Afrikakorps captured many intact half-tracks from US Army units, especially the 1st Armored Division. Due to the Germans' severe shortage of motor transport, these were immediately pressed into Afrikakorps service. This M3 is serving as an improvised ambulance. It still retains the yellow US Armored Force star on the hull side (with the tactical number '2' inside), but the Germans have added a simple Red Cross insignia as well as a Red Cross flag on the front. Usually, the Germans marked captured US vehicles with prominent white crosses to indicate their nationality; in this case they must have felt that the Red Cross was sufficient. The vehicle is finished in standard US Army olive drab. The name of this vehicle is *Moon Lite*. US vehicles normally used a name starting with the company letter; it is possible that this M3 was originally deployed with a medical platoon of a US Army unit, which may explain its otherwise unusual name.

than the normal US Army white stars. Besides the star seen here, there would also be a star on the rear door, and one on the top centre of the engine hood. Serial numbers were officially to be painted in blue-drab, but in fact many units overpainted the blue drab serials in white, since they were easier to read when recording data in daily maintenance logs. During the Tunisian campaign of February and March 1943, the ANA 613 olive drab (FS #34087) finish of the US Army vehicles was ill-suited to local conditions. Accordingly, in the 1st Armored Division, the units would often mix up an improvised camouflage by combining water with local clay, and smearing it over the vehicles with a mop or brush. The camouflage scheme created as a result was effective if somewhat messy. On this vehicle, the name, carried on the lower edge of the door, has been painted out with the mud camouflage.



Plate B: *T30 75mm HMC, 82nd Reconnaissance, 2nd Armored Division, Sicily, June 1943*

Prior to 'Operation Husky', the invasion of Sicily, several changes were made to US markings. A set of instructions were issued covering pattern-painted camouflage. The instructions suggested large patterns of ANA 612 earth red (FS #30117) or ANA 305 earth yellow (FS #30257) camouflage over the usual olive drab. In the case of the 2nd Armored Division, sand yellow was the choice, and it was spray-painted on in large swathes. During the Tunisian fighting, it was found that the white US star could be mistaken for a German cross at long distances, so US Army units were instructed to paint a large white circle around the star to minimise possible confusion. The star was carried on the side, on the armoured radiator cover, on the engine hood, and centrally on the rear. This particular vehicle had the bumper codes: 2^ 82R (left front bumper) and C-28 (right front bumper). This was repeated on the rear as well. As a vehicle from C company it has been given a suitably appropriate name.

The Israeli Defense Forces used the French SS.11 wire-guided anti-tank missile, mounted on jeeps or half-tracks, as seen here on parade in Tel Aviv in 1963. The SS.11 was a first gen-

eration ATGW and was retired when the American BGM-71 TOW became available in the early 1970s. (Israeli Government Press Office)

Plate C: *M3A1 Half-track Carrier, 41st Armored Infantry, 2nd Armored Division, Normandy, June 1944*

During the preparations for 'Operation Cobra', the break-out from the Normandy beachhead near St. Lo, 2nd Armored Division camouflaged most of its combat vehicles in a spray-painted pattern of earth brown (FS# 30099) over the normal olive drab. This unit painted over most of the white stars; the exceptions were the circled-star carried on the engine hood roof and the star on the radiator armour grill. The company letter and vehicle number were painted in large block numbers on the hull side and rear to make recognition on the battlefield easier. *Daring* is yet another example of a vehicle being given a name starting with the company letter.



One of the last armed adaptations of the half-track in Israeli service was the mounting of the 120mm Soltam mortar, seen here during field exercises in July 1966. These were called M3

Mk.D in Israeli service, but they were often based on International Harvester M5s and M9s, as seen here. (Israeli Government Press Office)

Plate D: M3 75mm GMC, 601st Tank Destroyer Battalion, El Guettar, Tunisia, March 1943

The M3 75mm Gun Motor Carriage was finished, like most US armoured vehicles of the Tunisian campaign, in an overall camouflage of olive drab together with an irregular pattern of mud. The 601st Tank Destroyer Battalion had its own tactical insignia, namely a yellow box divided by a 'Y', with the company letter painted in one of the spaces.

This cutaway displays the essential features of the M3 75mm GMC. The forward section of the half-track is essentially the same as the basic M3 personnel carrier, but with several small exceptions. The armoured panel in front of the driving compartment folded downward to provide the gun with additional depression (rather than upward as on the normal half-track). In the driving compart-

ment, there are only two seats for the driver and battery commander; the central seat was removed as it would interfere with the gun carriage. The two main fuel tanks were moved from their usual position behind the driving compartment to the rear corners of the vehicle.

The 75mm M1897A4 gun is mounted in the centre of the vehicle on a special steel box which is bolted to the chassis frame. The box contains a ready ammunition supply of 19 rounds. The M3 gun mount has been modified by the addition of a large armoured shield of 5/8 inch steel (1/4 inch on sides and top) which traversed with the gun. The gun could be traversed 19° to the left and 21° to the right, and elevated from -10° to +29°. The floor of the M3 75mm GMC was raised, compared to the M3 personnel carrier, to accommodate ammunition storage. Up to 40 additional rounds could be carried in two main ammunition bins immediately behind and below the gun. The ammunition was usually left in its normal cardboard packing tubes, as the elementary stowage arrangement did not protect the ammunition from moisture or dirt. Stations for the other three men

in the vehicle were provided in the rear; two seats on either side, and a seat with the back cushion attached to the rear door. A pedestal mount for a .50cal. Browning HB heavy machine gun was provided on later production vehicles for anti-aircraft defence.

When in combat, the crew remained in the rear compartment; the muzzle blast from the gun was too severe to allow the driver to remain in the forward section of the vehicle. Crew self-defence was provided by a M1 .30cal. carbine (driver) and four M1903 Springfield rifles. In addition, stowage was provided for 22 hand grenades.

Plate E: M3 75mm GMC, Special Weapons Company, 2nd Marine Division, Tinian, July 1944

US Marine SPMs were frequently camouflaged. This was a local initiative and did not follow any known regulations. This vehicle is finished in a pattern of Earth Yellow over the usual olive drab. Marine vehicles seldom carried US national insignia, and tactical markings on the SPMs were limited as well.

Plate F: TCM-20 Anti-aircraft Vehicle, Israeli Zahal Anti-Aircraft Company, Lebanon 1982

By the time of the 1982 Lebanon invasion, Israeli Army vehicles in the northern theatre of operations were shifting from sand drab to a darker grey drab better suited to the terrain in the Levant. The Israel Zahal had a comprehensive set of markings in the 1973 war, but by 1982 many of these were ignored to no small degree due to the extensive external vehicle stowage which covered the markings. The only marking on this vehicle is the American-style orange air identification panel. As with the US Army, the 'colours-of-the-day' would be changed periodically so as to prevent enemy formations from using the same insignia.

Plate G1: M5 Half-track Carrier, 82nd Tank Battalion, Negev Brigade, Israeli Army, December 1948

This vehicle is a surplus International Harvester M5 converted into an improvised tank destroyer due to the shortage of armour in the embryonic Israeli Army of 1948. The depot has simply mounted a 6-pdr. anti-tank gun in the rear bed of the half-track, minus its carriage. The cab has been modified by the addition of an armoured roof, and a ball mount for a German MG-34 machine gun has been added to the front-right armoured visor. The tactical markings consist of the brigade insignia, three forward pointing arrows, the battalion insignia, and two angled slashes behind the tactical number. The vehicle serial is 3282, probably an abbreviation for 32nd vehicle, 82nd Tank Battalion. The vehicle scheme is the original olive drab, and all markings are in white.

Plate G2: M3 (M13) Half-track Carrier, Republic of Korea Military Police, Seoul, Korea, 1985

The Republic of Korea Army has employed M3 half-tracks since 1949, as well as variants such as the M13 MGMC and M16 MGMC. In recent years, it has been replaced in regular army units by the KIFV armoured vehicle. Some surviving half-tracks are still in use with support units, including the military police as seen here. This particular vehicle is a M13 rebuilt as a M3 personnel carrier by removing the Maxson turret and associated stowage. That it is a rebuild rather than a purpose-built carrier is evident from the hinged side panel. The police vehicles have a large white band painted down the hull side (but not rear), with a white star and the police identification in Korean on either side. It is finished in a pattern of light sand over olive drab.

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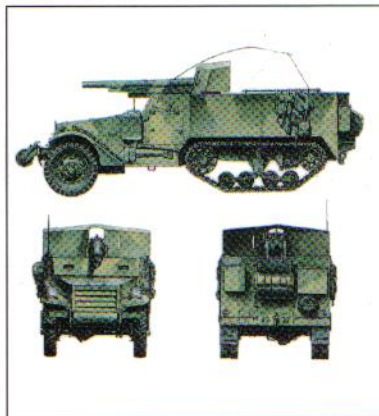
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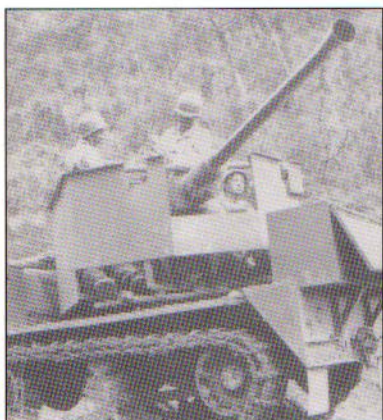
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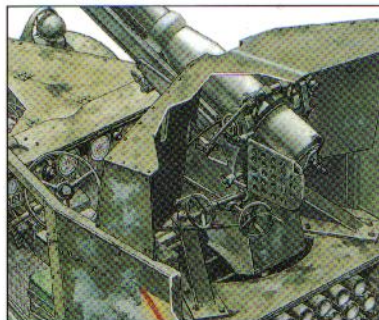
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