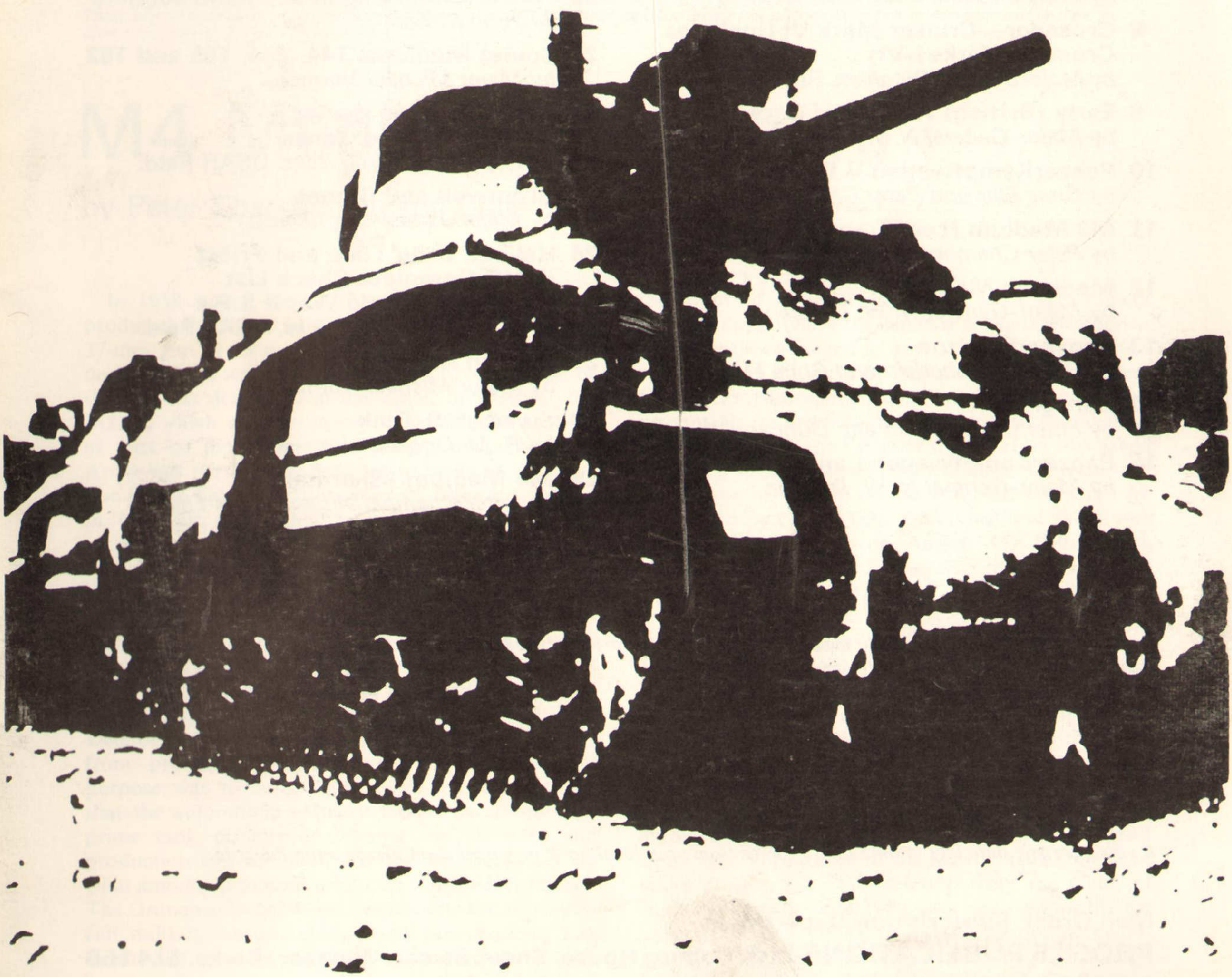
PROFILE

AFV WEAPONS

29

M4 Medium (Sherman)

by Peter Chamberlain and Chris Ellis



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"Hell on Wheels": M4s of the U.S. 2nd Armored Division in the Break-Out between St. Lo and Lessay, Normandy, July 26, 1944. These are re-worked and re-manufactured M4s with applique armor and displaying full olive drab/brown camouflage rarely seen on later replacement vehicles in 1944-45.

M4 Medium (Sherman)

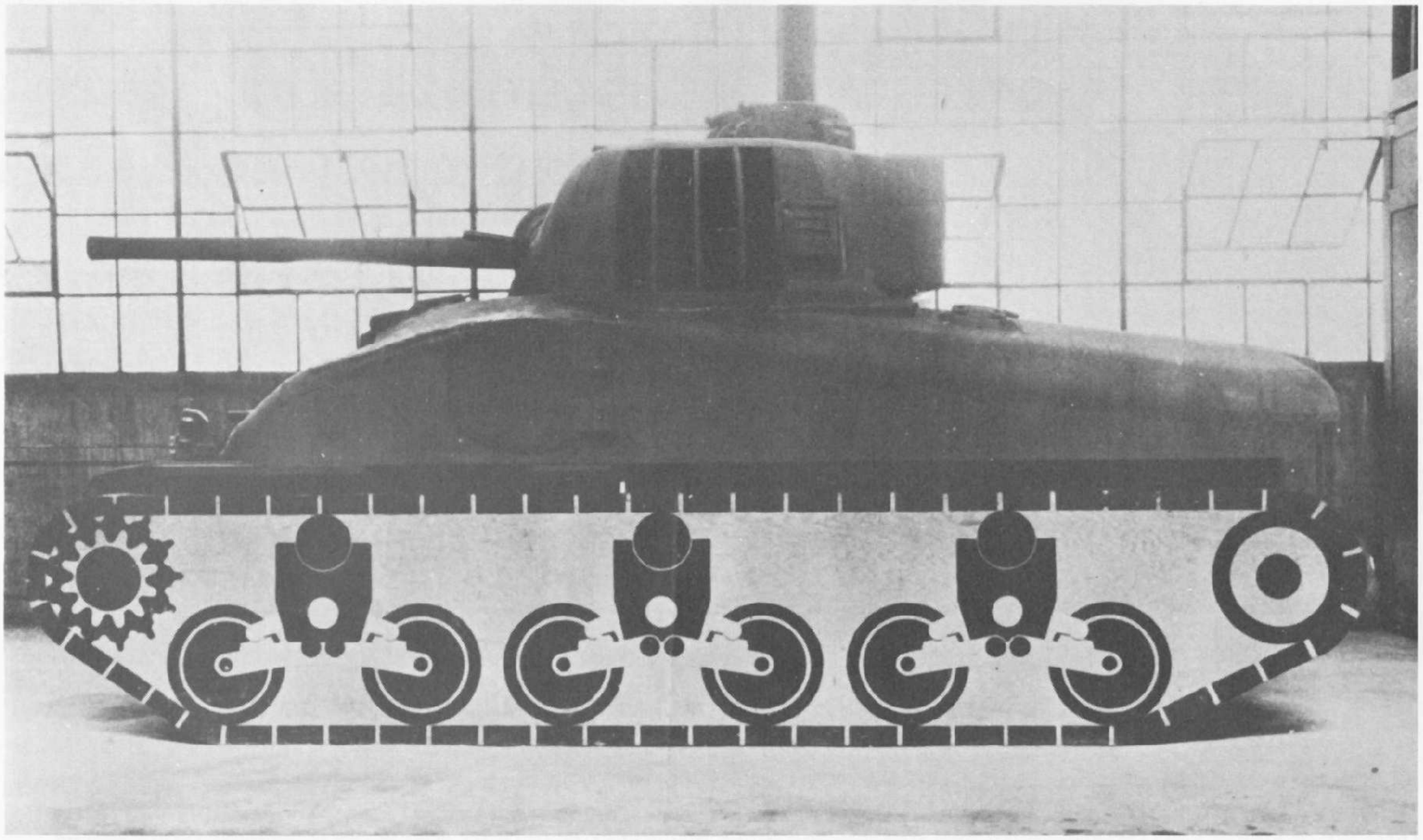
by Peter Chamberlain and Chris Ellis

In 1938 a new design of medium tank had been produced for the U.S. Army, the M2, which had a 37-mm gun as its main armament. Prompted by the declaration of war in Europe, an improved version of the M2 was developed in the winter of 1939–40, the M2A1, which was envisaged for production in 1940 as part of the rearmament programme. The U.S. Army was particularly deficient in tanks at this time due to the financial stringencies of defence spending in the 1930s, and in the interests of economy the M2 series of medium tanks utilised many components, such as suspension units and engines, derived from or based on the contemporary M1 and M2 light tanks.

Late in June 1940 a new National Munitions Program was announced which called for medium tanks on a scale of about 1,000 a month for the next 18 months. To produce tanks in these hitherto unprecedented quantities the newly-established National Defense Advisory Commission, which was made up from prominent industrialists and whose special purpose was to co-ordinate rearmament, suggested that the automobile industry should be co-opted as prime tank producers, utilising the planning and production experience of the car makers to set up what amounted to mass production facilities for tanks. The Ordnance Department, responsible for all American military weapon design and procurement, had meanwhile planned to place orders for tanks with heavy engineering plants and locomotive producers in the event of national emergency since government arsenals did not have the capacity for tank production on the scale envisaged in any sort of wartime conditions. On the initiative of William S. Knudsen, member of the National Defense Advisory Commission responsible for mechanised weapons (and President of General Motors) the Chrysler Corporation was asked to erect a special arsenal for medium tank production at Detroit on behalf of the U.S. Government. An initial contract for 1,000 M2A1 medium tanks was placed with Chrysler on August 15, 1940, which included erection of the factory later to become known as the Detroit Tank Arsenal.

SHERMAN PREDECESSORS

Development of better armed American medium tanks stemmed directly from the German use of PzKpfw IV tanks armed with low velocity 75-mm guns in their lightning invasion of France and Flanders in May 1940. At this time the United States was a neutral country, though an interested observer of events and sympathetic to the British and French cause. The appearance of the heavily armed German tanks produced a swift reaction from the Chief of Infantry who, in June 1940, was still responsible for tanks in the U.S. Army. In a staff memorandum submitted to the Ordnance Department by the Chief of Infantry on June 5, 1940, it was pointed out that the

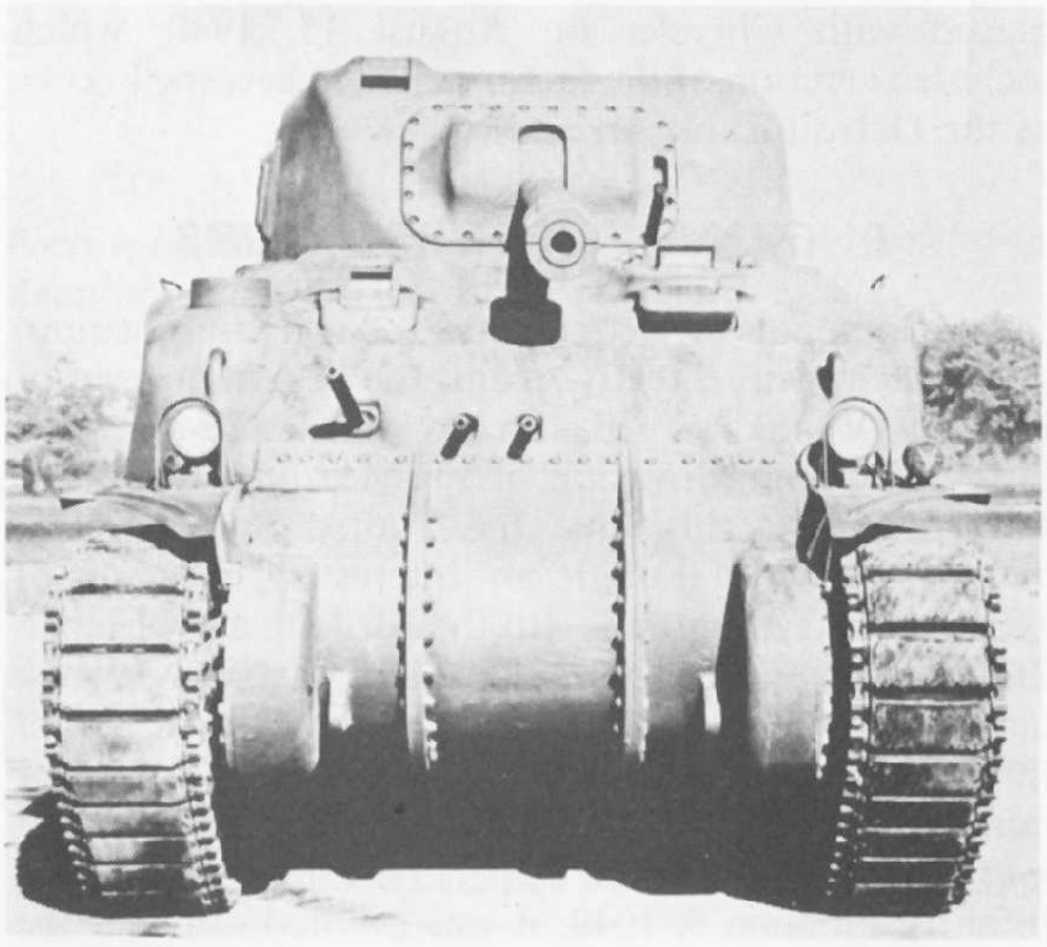


Wooden mock-up for the T6, built April/May 1941 for Ordnance Board approval before the actual T6 was built.

M2 and M2A1 medium tanks had been rendered obsolete virtually overnight by the heavier calibre guns, both 50-mm and 75-mm, now fitted to the German tanks. It was recommended that a 75-mm gun be fitted to American tanks as swiftly as possible.

Soon after this, on July 10, 1940, responsibility for tank forces in the U.S. Army was taken over by a newly-established Armored Force, commanded by General Adna R. Chaffee, who inherited the initial ideas for a tank with a 75-mm gun at the same time. In mid-August 1940 Chaffee and his staff met Ordnance Department representatives at Aberdeen Proving Ground to discuss future requirements with special emphasis on the need for the 75-mm gun.

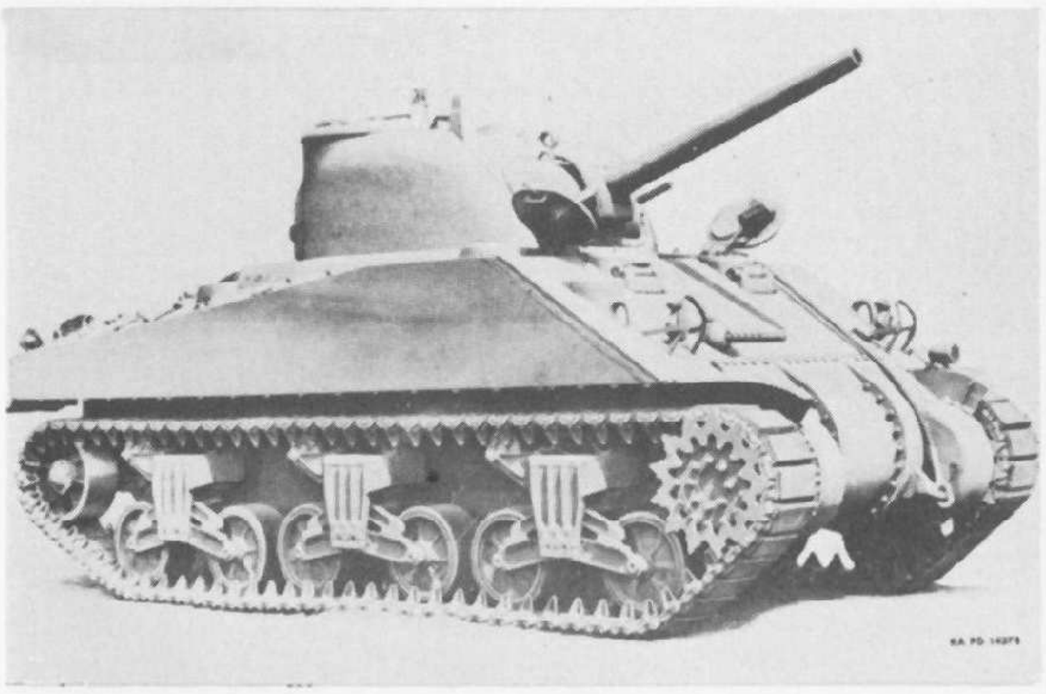
The Medium Tank T6 prototype showing rotor sight in turret (upper left) and twin fixed Browning machine-guns in nose.



The characteristics agreed upon were the need for a vehicle with thicker armour than the existing M2 and M2A1, but utilising the same chassis and mechanical layout. The 75-mm gun was to be turret-mounted with an all-round traverse. However, in the existing M2A1 turret it was not possible to fit a 75-mm gun due to the small ring diameter and it would be necessary to design a new turret from scratch. This in itself involved lengthy design and development work, for the turret would need bigger castings in armour plate than any previously attempted in America at that time.

Because of the urgency of the matter, therefore, a compromise design was decided upon in which the 75-mm gun would be mounted in the right hull sponson with the 37-mm gun of the M2A1 retained in a turret. This was not a satisfactory arrangement in tactical terms because the traverse of the all-important 75-mm gun was severely limited. It was accepted as an expedient for immediate production, however, while design of a vehicle with a turret-mounted 75-mm gun was undertaken.

The interim design, with hull-mounted gun, became the M3 medium tank and superseded the M2A1 in the original 1,000 tank order placed with Chrysler for production at the Detroit Tank Arsenal. In the meantime the Ordnance Department also placed orders for the M3 – later famous as the Lee – with Baldwin and American Locomotive Co., two heavy engineering companies, which had been in their original contingency plans for emergency tank production. M3 pilot models were ready by April 1941 and full production was under way the following July, continuing until December 1942 by which time the M3 had been fully supplanted on production lines by its planned successor, the M4 with 75-mm gun in the turret.



Early production M4 with M34 Combination Gun Mount, "second type" suspension (trailing return rollers), three-piece nose, and vision slots in hull front.

Early production M4A2 with M34 Combination Gun Mount, "first type" suspension (vertical return rollers), vision slots in hull front and fixed nose machine-guns.

THE T6

The M3 design had been completed in March 1941 and the Ordnance Department instantly began work on its replacement. In April five provisional schemes were shown to the Armored Force who selected the simplest for development. Designated Medium Tank T6, this was to have the same chassis and mechanical layout as the M2A1 and M3, a turtle-shaped cast hull, access doors at the side, and a centrally mounted cast turret carrying a 75-mm gun with simple rotary gun-sight and co-axial ·30 cal. machine-gun. A cupola was to be mounted on the turret as in the M3 and another feature derived from the M3 was to be twin ·30 cal. machine-guns in a fixed mount in the hull front. There was a single hatch for the driver in the hull top above his station. A wooden mock-up with all these characteristics was completed and inspected by the Armored Force Board in May 1941. Approval was given to proceed with a prototype vehicle, subject to detail changes.

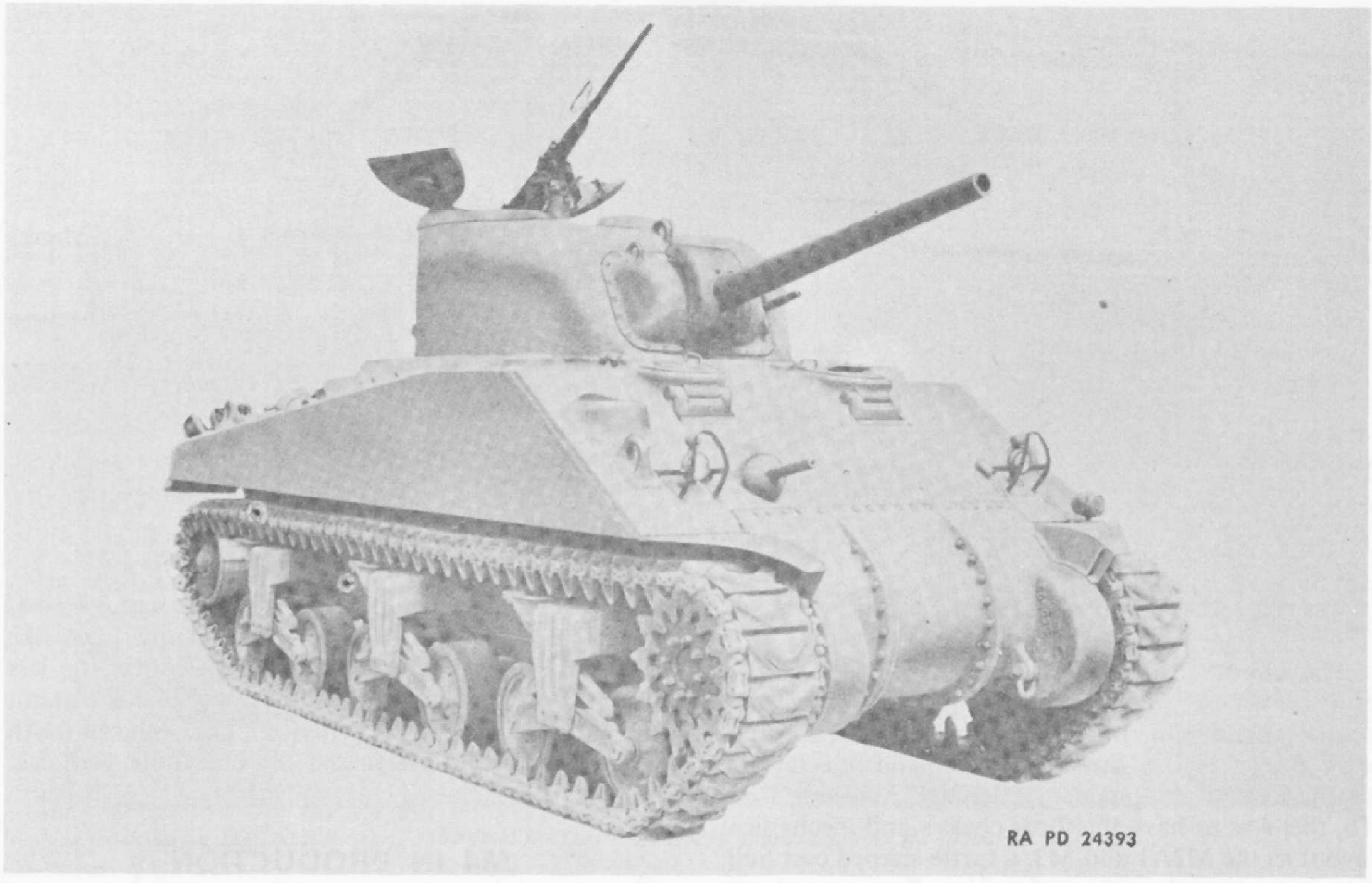
The T6 proper was completed in September 1941 with minor changes which included removal of the cupola. It was thought that this, and the then novel idea – by U.S. standards – of mounting the radio equipment at the back of the turret instead of inside the hull, stemmed from British influence, via the British Tank Mission which was then in America to purchase tanks for British service. Another British device later incorporated in the design (after standardisation) was a 2-inch smoke mortar mounted in the turret roof.

The T6 was standardised as the Medium Tank M4 in October 1941 after satisfactory conclusion of running trials at Aberdeen Proving Ground, Maryland. Plans were made to put the M4 into production in early 1942 with a phased replacement of the M3 series vehicles on the various assembly lines then in operation. A major design change before production began was the elimination of the side doors which gave a stronger structure and simplified casting. As a substitute a second hatch was fitted in the hull top above the assistant driver's station and a belly escape hatch was added. The cast turtle-shaped hull presented further production problems since casting facilities at the heavy engineering plants would not be able to meet the demand which at one stage in 1942 was set at a target of 2,000 vehicles a month (though this was later scaled down). Accordingly a simpler box-like welded hull was designed which was within the less sophisticated production capabilities of plants without casting facilities or experience. The vehicles with welded hulls were designated M4 and those with cast hulls M4A1.

M4 IN PRODUCTION

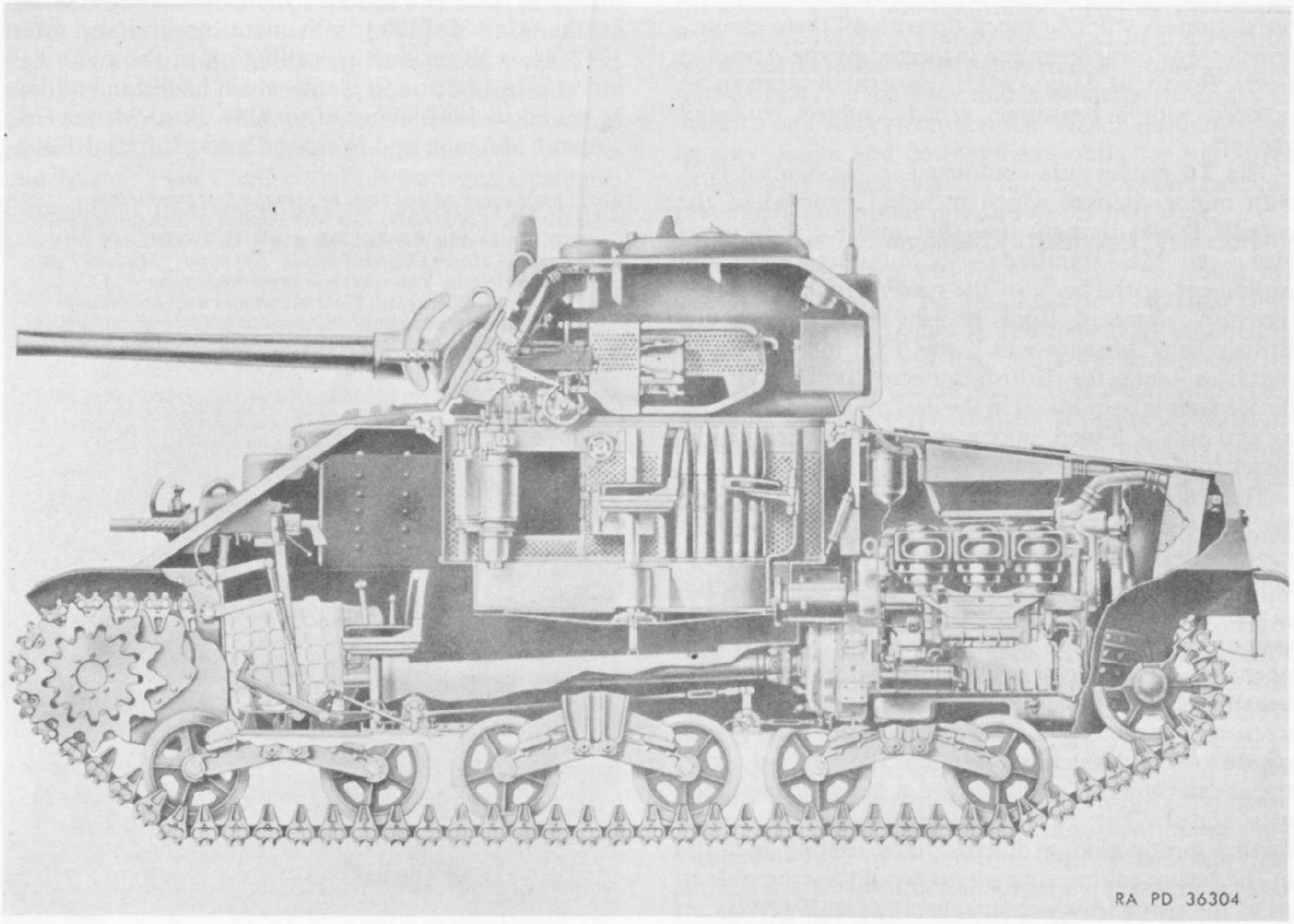
The M4 series vehicles were built in eleven different plants, and hundreds of outside sub-contractors were involved in the supply of components. The M4, or Sherman as it was known to the British, was produced in greater numbers than any American tank before or since and became the standard medium tank produced in the United States armament programme from 1942–44, with production tailing off at the war's end in 1945. In addition to plants which had been building M3s and in 1942 switched to M4s, Ford Motor Co., Federal Machine and Welder, Pacific Car and Foun-

Early production M4A1 (and in fact the first production vehicle of the M4 series). This was shipped to Britain in 1942 where it is seen at a demonstration of U.S. Lease-Lend equipment on Horse Guards Parade. The name "Michael" was acquired in Britain. The vehicle is preserved at the R.A.C. Tank Museum, Bovington. Note the usual early production features. A counter-weighted M2 gun (to balance the stabiliser) was fitted in early vehicles pending availability of the M3 75mm gun. Cast hull is distinctive for the M4A1.



Early production M4A4 with M34 Gun Mount, vision slots, and threepiece nose. This had a longer hull than other models.

Cutaway view of an early production M4A2 showing GMC diesel engines, drive shaft, and gearbox forward. Note ready-use ammunition in turret cage. Gyro-stabiliser is seen immediately below the trunnions and mantlet.



Later production M4A1 (typical of 1943 vehicles) with shielded M34A1 Combination Gun Mount, cast one-piece nose, vision slots eliminated, and sandshields.

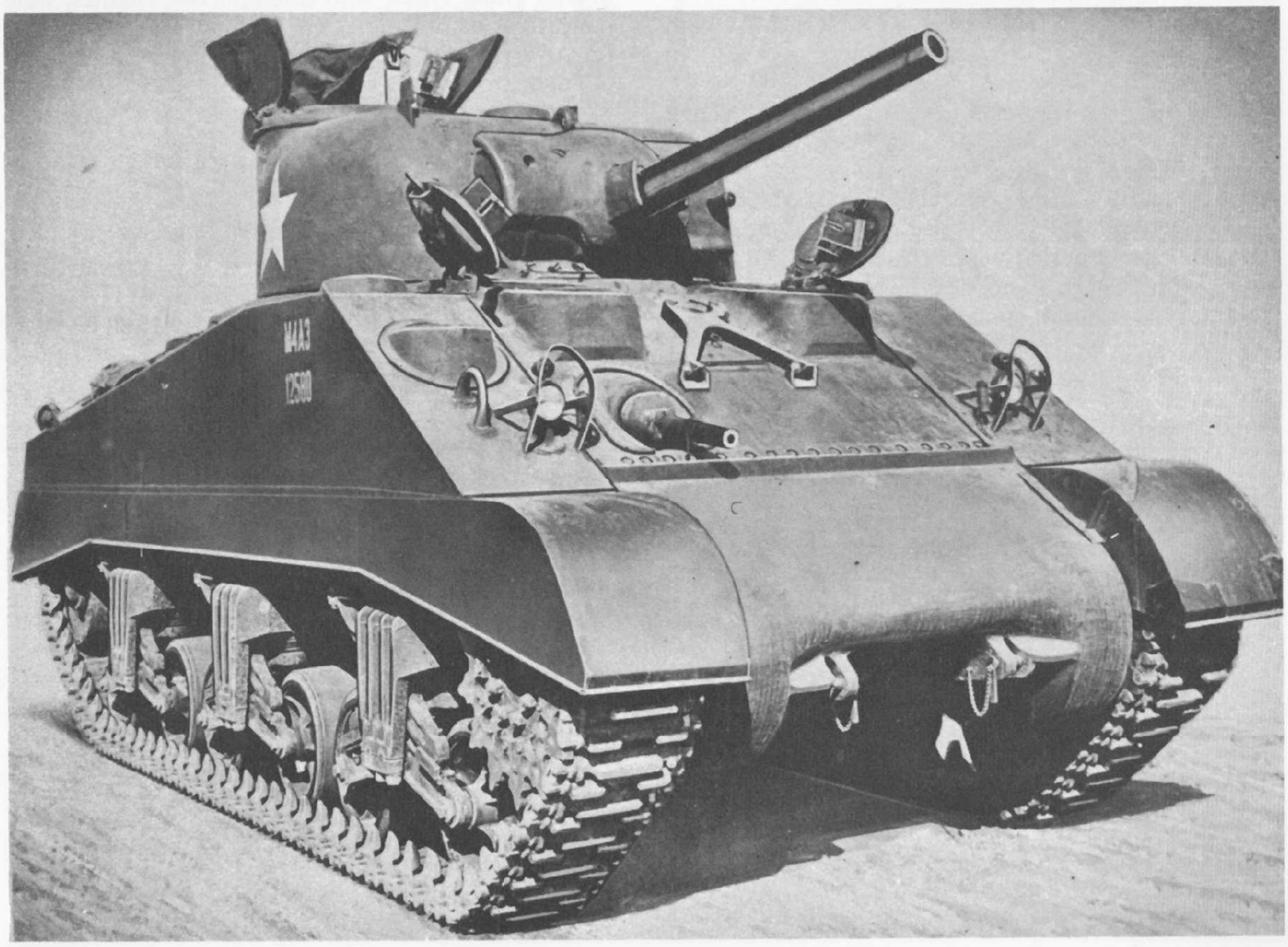
1943 production M4A2 with cast nose, M34A1 Combination Gun Mount, sandshields, and no vision slots.

dry, and Fisher Body, were all involved in building various models of the M4. A second purpose-built plant to turn out tanks was built (from January 1942) and operated at Grand Blanc, Michigan, by Fisher Body on similar terms to the Chrysler-operated Detroit Tank Arsenal.

As originally designed the M4 had the same engine and chassis as its predecessors, the M2A1 and M3. The Wright-built Continental R-975 engine was basically a de-rated and adapted aero engine, with nine cylinder radial layout and air-cooled.

This was a very efficient unit, original adaptation of which stemmed from the 1930s when it was cheaper to use an existing aero engine than work out a new design specifically for tanks. However, the massive U.S. rearmament scheme of 1940–42 made it quickly apparent that this source of engines would be insufficient to meet demand, particularly as aircraft production had also been greatly expanded with consequent demand for the same engine. Alternative power units were needed by the time the M3 Medium (Lee) went into production. A few Guiberson T-1400 diesel

The Ford-engined M4A3 became the favoured U.S. Army production model. This shows a typical 1943 production vehicle with M34A1 Gun Mount, cast nose, gun clamp, and steel tracks.



Very few M4A6s were built; they had a combination of cast nose and welded hull and were lengthened like the M4A4 to accommodate a Caterpillar diesel engine.

motors were the first used to alleviate the supply problem, but these were not entirely satisfactory and were never used in the M4. Other types of engine were used, however, and these gave rise to the different production models in the M4 series.

M4 SERIES MODELS (WITH ENGINES AND MAIN ARMAMENT)

M4: This was the original design with Continental engine but with the simplified all-welded hull instead of the cast hull initially devised. It was actually the third type to go into production.

Total production was 8,389, of which 6,748 with 75-mm gun and 1,641 with 105-mm howitzer (see section below on Design Improvement).

British designation for the M4 was Sherman I. For those with the 105-mm the suffix B was added, i.e. Sherman IB. A late production M4 built at Detroit with combination cast/rolled hull front was designated Sherman Hybrid I.

M4A1: Original design based closely on the T6 prototype with cast hull and Continental engine, it was the first type in production.

Total production was 9,677, of which 6,281 with 75-mm gun and 3,396 with 76-mm gun (see section below on Design Improvement).

British designation for the M4A1 was Sherman II. For those with the 76-mm gun the suffix A was added, i.e. Sherman IIA.

M4A2: This was a vehicle with a welded hull but utilising the General Motors 6046 diesel engine. This power unit had been produced from January 1941 for the M3A3 medium tank and was adapted for the M4 immediately production was authorised. The unit consisted of two G.M. truck engines, one each side of the engine compartment, each geared to a common prop shaft. The M4A2 was the second type actually in production, early models following closely after the first M4A1s. The M4A2 was the major type supplied under Lend-Lease to the Russians. Other major users were the British and the U.S. Marines. Few, if any, M4A2s were used by the U.S. Army.

Total production was 11,283, of which 8,053 with 75-mm gun and 3,230 with 76-mm gun (see section below on Design Improvement).

British designation for the M4A2 was Sherman III. For those with the 76-mm gun the suffix A was added, i.e. Sherman IIIA.

M4A3: A model with welded hull but utilising the Ford GAA engine, a V-8 unit which was specially developed as a tank engine to replace the Continental. It was authorised for production in January 1942, being developed by Ford on behalf of the Ordnance Department. It subsequently became the new standard tank engine and the M4A3 became the most important model in U.S. service together with the M4 and M4A1. Other types, with extemporised engines, were thereafter mainly allocated to Lend-Lease supplies. Relatively few M4A3s were supplied to other nations.

Total production was 11,424, of which 5,015 with 75-mm gun, 3,370 with 76-mm gun, and 3,039 with 105-mm howitzer (see section below on Design Improvement).

British designation for the M4A3 was Sherman IV. For those with the 76-mm gun the suffix A was added, i.e. Sherman IVA, and for the few, if any, received with the 105-mm the suffix B, i.e. Sherman IVB.

M4A3E2: The 5,015 M4A3s with 75-mm gun included

M4A3E2 "Jumbo" was a special assault tank built for the invasion of N.W. Europe to make good the American deficiency in heavy tanks. A new cast turret was made, plus a new heavy cast nose. Rest of hull was thickened with additional armor sheets, clearly visible in the front view. Grousers were a permanent fitting because of the extra weight.

Versions of both the M4 and the M4A3 were built with the 105mm howitzer, the M4A3 (105mm) being shown here.

A late production M4 (105mm) with the 47 degree hull front and HVSS. Some of these served with the British Army, 1945-47, under the designation Sherman IB Y (B = 105mm howitzer, Y = wide tracks).

254 M4A3E2s. The M4A3E2 was an assault tank (nicknamed "Jumbo") built for the close support of infantry in the Normandy campaign. Additional armour was welded to the frontal surfaces to increase the thickness to 4 inches and a new turret was designed with 6 inches of frontal armour; additional rolled plate was also added to the hull top. Weight of the tank was 42 tons compared with an ordinary M4A3's 31–34 tons. Some M4A3E2s were re-armed with a 76-mm gun in the field. The 254 M4A3E2s were produced at the Grand Blanc Tank Arsenal in May and June 1944.

M4A4: Another extemporised engine was used in this model, this time developed by Chrysler. It featured five 6-cylinder engines on a common shaft. It was first used in the M3A4 built at Detroit Arsenal, and was continued in use in the M4A4. Due to the size of this engine it was necessary to lengthen the rear of the hull and re-space the bogies accordingly. This was the most distinctive distinguishing feature of this model. The Chrysler Multibank engine was considered complicated by the Ordance Department and the M4A4 was the first model to be phased out of production in September, 1943. The M4A4 was a major type supplied to the British.

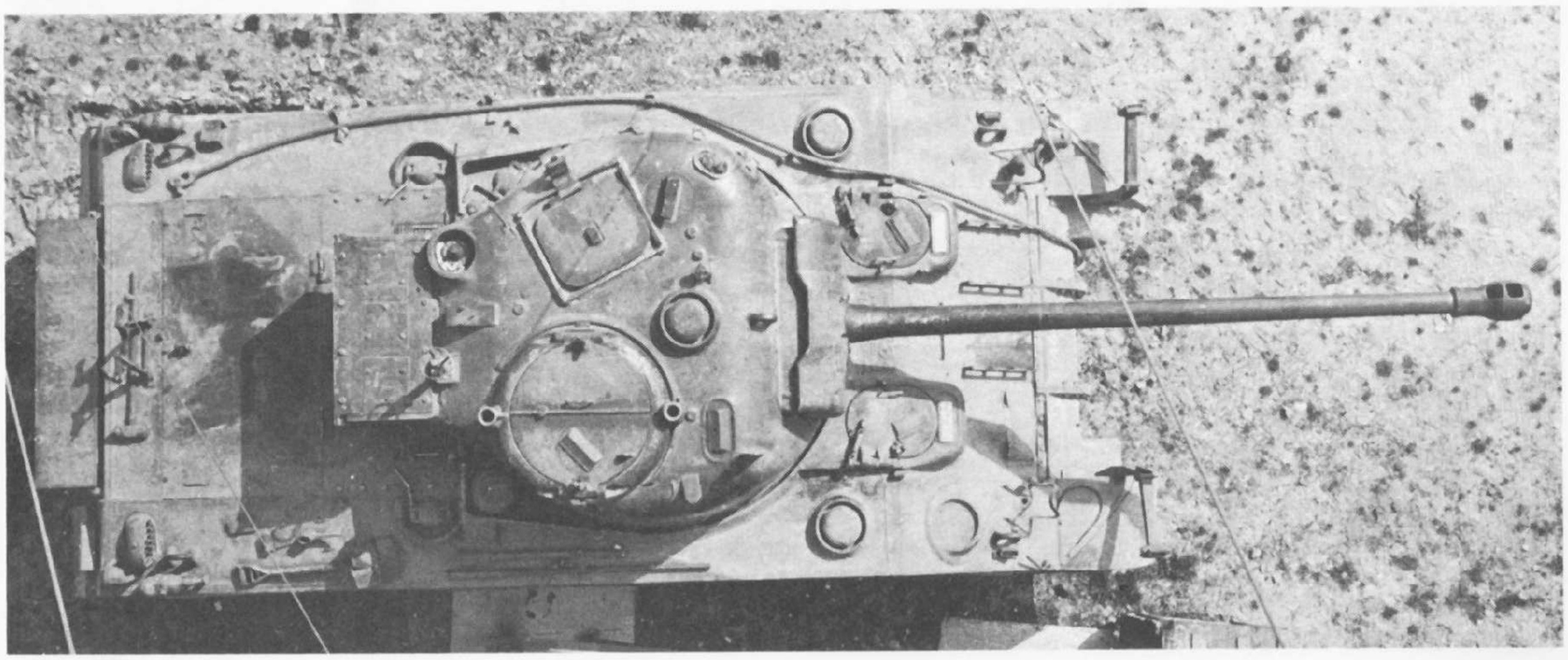
Total production was 7,499, all with 75-mm guns.

British designation for the M4A4 was Sherman V.

M4A5: There was no M4A5 as such; this designation was used by the U.S. Ordnance Department as a "paper" designation for the Ram, built and developed in Canada (see *Profile* of Ram and Sexton).

M4A6: As a proposed replacement for the earlier interim engines the Ordnance Department selected the Caterpillar D-200A diesel motor after a series of competitive trials. Under the Ordnance designation RD-1820, this was used to replace the Chrysler engine in the M4A4, the resulting new model becoming the M4A6. However, at the end of 1943 it was decided to standardise on the Ford and Continental engined

Sherman "Firefly". The British re-armed many Shermans, mainly Mark I (M4), Mark II (M4A1), Mark III (M4A2), and Mark V (M4A4), with the 17-pdr. gun to produce the most effective tank in Allied use when France was invaded in 1944. Shown here is a Mark IC (C = 17-pdr. gun). Popular name for the conversion was "Firefly".



Loader's hatch and counterweight on turret rear were major additions to the "Firefly", shown clearly on this Mark VC. Note barrel clamp on rear decking.

Late production M4s had the hull fronts originally produced for the cancelled M4A6 i.e. combination cast/rolled. They were known to the British as Sherman Hybrids. This one seen in Holland in 1945 has been converted to "Firefly" standards as a Sherman IC.

models only, and M4A6 production came to a premature end. Like the M4A4, the M4A6 had a lengthened rear hull to accommodate the engine, and wider spaced bogies.

Total production was 75, all with 75-mm guns.

British designation for the M4A6 was Sherman VII.

Sherman Firefly: About 600 British Shermans were adapted to take the British high velocity 17-pdr. gun as the main armament. These were ready in time for the Normandy campaign and played a vital part against the Panthers and Tigers. Initially, until the supply of 17-pdrs. improved, there was one of these up-gunned tanks per troop. When armed with the 17-pdr. the tank was called the Sherman Firefly. Nearly all marks of Sherman were used as Fireflies, but the most numerous was the Sherman V. When fitted with a 17-pdr. the suffix C was added, i.e. Sherman IC, IIC, IIIC, IVC, VC.

OTHER PRODUCTION FEATURES

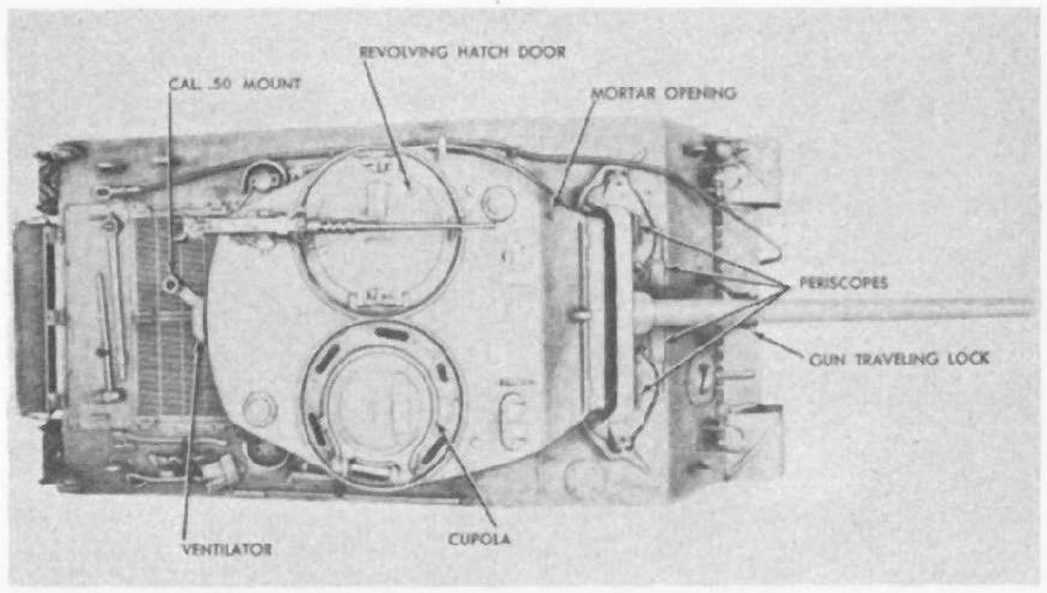
The earliest M4 vehicles in production had vertical volute spring bogies with return rollers mounted immediately above; this was known as "first type" suspension. Subsequently a modified suspension, "second type", was used which had trailing return rollers. The initial design had twin fixed machine-guns in the hull front as in the M3 series, and early vehicles appeared so fitted. The value of these weapons was limited, however, and they were soon removed to simplify production. Similarly vision ports initially provided for the driver and assistant driver were soon eliminated in favour of periscopes.

The main (75-mm) gun and co-axial (·30 cal.) machine-gun were in a mantlet designated Combination Gun Mount M34 on early production vehicles. This offered armoured protection for the 75-mm gun only, and in later vehicles an improved mount, M34A1, was introduced (approved in October 1942) which had a full width armour shield. A final basic change was the use of a cast one-piece nose transmission cover in place of the three-piece bolted assembly initially used. Most later vehicles were also fitted with sand-shields.

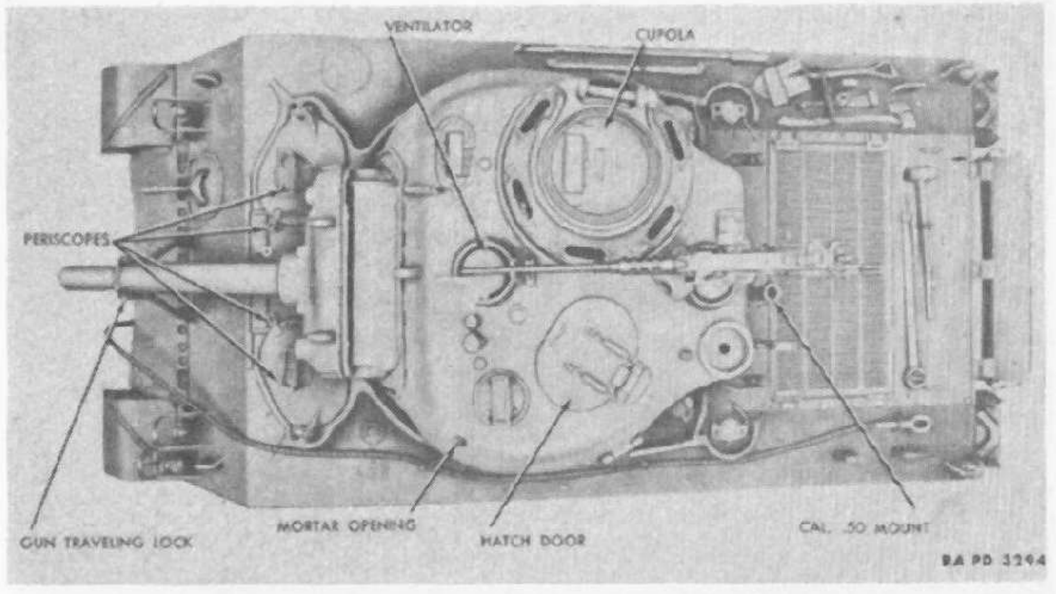
DESIGN IMPROVEMENTS

The quest for more powerful gun armament was met by the introduction of the 76-mm (3-inch) high velocity weapon, based on an earlier A.A. gun. The Ordnance Department carried out design work in

The later M4 series changes are well illustrated in these views of an early (1944) and late (1945) M4A1 (76mm). Vehicle on left has the M1A1 76mm gun.



Top view of a M4A3 (76mm) shows well the larger T23 type turret, the commander's vision cupola, loader's revolving hatch, and the stowage pintle for the Browning .50 cal. machine-gun which is here mounted in its usual combat position on the revolving hatch. 76mm gun is the M1A1 version.



The late production M4A3 (105mm) had the original M4 series turret but featured an extra ventilator aft (seen under the MG), a vision cupola, and a loader's hatch. Other features are marked.

July-August 1942 and the weapon was tested in September 1942 fitted in a standard turret. This proved too small to hold the gun comfortably and in 1943 the large cylindrical turret of the T23 medium tank, which had a 90-mm gun and which would fit in the turret ring of the M4 without alteration, was successfully adapted to hold the 76-mm gun and was subsequently used in all models in the M4 series produced with this gun. The T23 (progenitor of the M26) was a medium tank design planned to succeed the M4 but was never standardised and was produced only in small numbers.

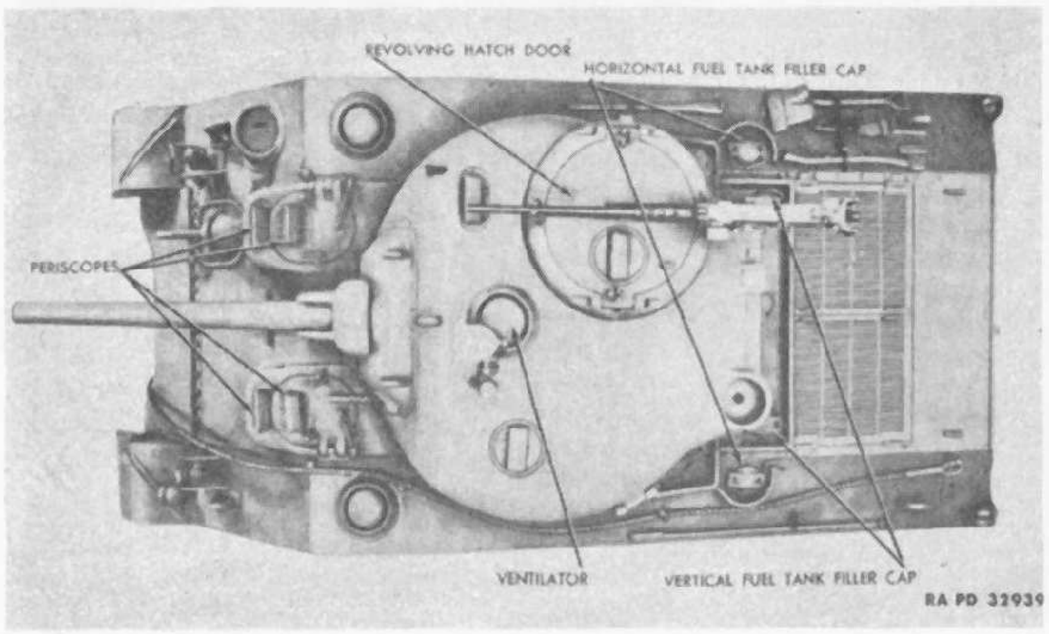
Production of the up-gunned M4 was authorised by Ordnance in February 1944, and the first M4A3s with new turret and armament were leaving the line at Detroit Arsenal in the following month. Detroit built 2,845 M4A3 76-mm vehicles that year and the type played an important part in the fighting in France and Germany with Patton's Third Army. Fisher commenced making the M4A3 76-mm in September 1944 after completing 2,845 M4A3 wet stowage tanks (see below) with the 75-mm gun. Other Sherman variants fitted with the new gun and turret were the M4, M4A1, and M4A2. The 76-mm M1A1 gun fired 3-inch ammunition with muzzle velocity, range, and penetrating power much superior to the 75-mm M3 gun. The 3-inch APC shell M62 had a muzzle velocity of 2,600 ft. per second, a maximum range of 16,100 yds. and would penetrate 4 inches of face-hardened armour at 1,000 yds. range. An azimuth indicator and elevation quadrant was provided for indirect fire control up to maximum range, and provision was made for direct fire control up to 3,000 yds. A full-width cast mantlet held the gun and there was a co-axial ·30 cal. machine-gun. Small improvements resulted in the M1A1C and M1A2 guns which were virtually identical to the original M1A1 except for the fitting of a muzzle-brake.

A major change in models with welded hulls introduced with the T23 turret and 76-mm gun was the 47 degree hull front. This steeper front eliminated the raised driver's hatchways and so greatly simplified production – it also offered a marginal improvement in protection. At the same time the steeper hull front also allowed larger access hatches for the driver and assistant driver. A gun barrel travelling clamp was incorporated on the new front plate.

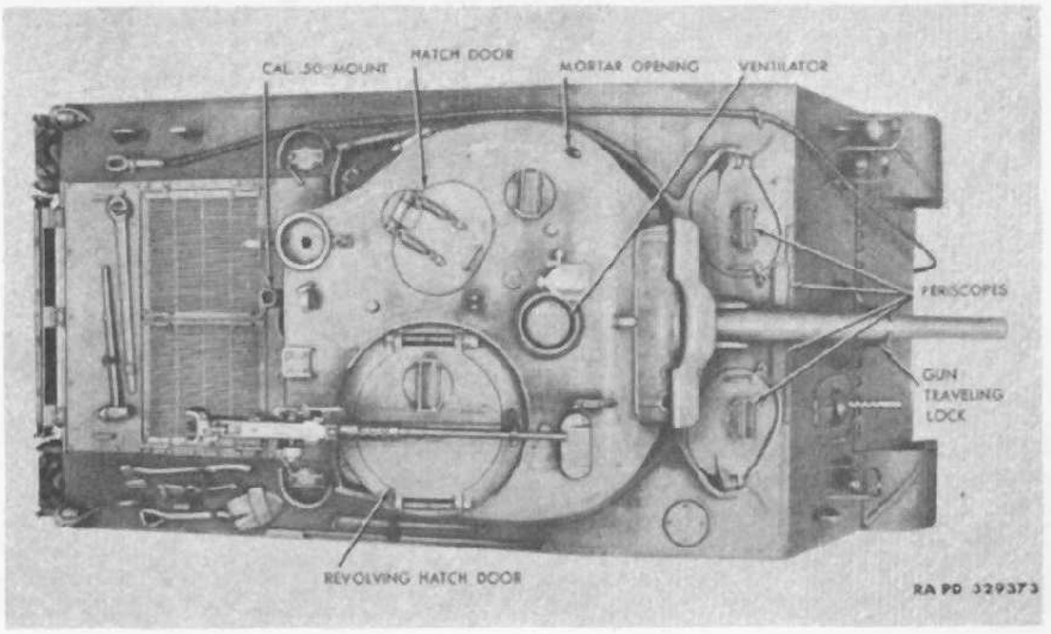
Coincidentally with the revised hull came the so-called "wet stowage" for the ammunition which was sited inside the vertical superstructure faces. Originally conventional "dry" racks had been used, but the frequency of fires led to new racks being designed which had an outer "hollow" casing containing a mixture of water and glycerine to reduce hazards from combustion. Wet stowage involved an extensive rearrangement of the vehicle's interior, with no less than 2,500 design changes.

Very late M4A3s with 75-mm guns also had wet stowage and the 47 degree hull front. All these late vehicles also had improved vision devices including an armoured cupola with six vision blocks for the

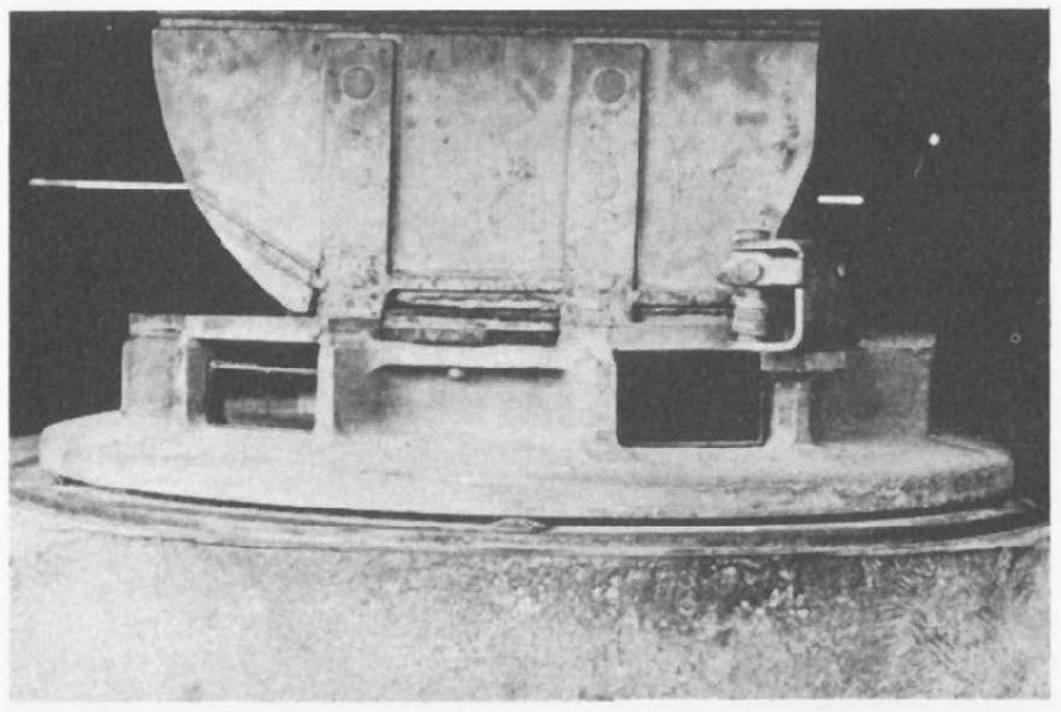
By contrast with the M4A3 (76mm) the earlier M4A3 with 75mm gun is shown here, having the original M4 series turret and the M34 Gun Mount.



The last production version of the M4A3 with 75mm gun had wet stowage and the later hull with 47 degree front. Note loader's hatch and the wide shield of the M34A1 Gun Mount.



A close view of the all-round view vision cupola fitted to later variants of the M4 series. In the foreground is the "mushroom" ventilator in the turret top. (Picture sources for this Profile are U.S. Official, Canadian Official, and Imperial War Museum.)



To improve the commander's vision the British developed their own design of vision cupola which could be fitted in the ring of the original M4 series rotating hatch. It had eight periscopes and a two-piece flap. Some British vehicles (notably "Fireflies") were fitted with this although it was developed too late in the war to see extensive production for Shermans. It was based on the cupola used in contemporary British tanks (e.g. Churchill VII).

commander giving all-round view and a rotating periscope or, alternatively, a small oval hatch for the loader.

One further armament variation was the fitting of the 105-mm howitzer to the M4 and M4A3 to provide a close-support tank to equip the HQ Companies of medium-tank battalions in place of the small M8 self-propelled 75-mm gun. The mount was standardised as the M52. Detroit Arsenal built all 105-mm Shermans and the first models of the M4 105-mm left the line in February 1944, production ceasing in March 1945 with 1,641 vehicles built. Production of M4A3 105-mm – differing only in engine installation – commenced in May 1944 and ceased in June 1945 with a total of 3,039 vehicles built. The new cupola and the new hull front were incorporated in these vehicles but turret traverse was by hand only. A further detail was the provision of a towing hook for an ammunition trailer.

Finally, in the list of design improvements, there was the introduction of horizontal volute spring suspension in place of the vertical volute type. HVSS was designed to give improved flotation and simpler maintenance. Track width with HVSS was increased from the original 16½ inch to 23 inch and each bogie had four wheels with the return rollers attached directly to the chassis sides. Any wheel could be removed and replaced without disturbing any adjacent wheels. With the old vertical volute suspension minor damage sometimes necessitated removing the complete bogie to carry out repairs. HVSS and its associated wide track T66, was developed late in 1943 and was fitted to the M4 series vehicles in production from late 1944 onwards.

Shermans so fitted were nicknamed "Easy Eights" from the E8 designation applied to the vehicles which carried the trial installation. Some vehicles were later fitted with HVSS retrospectively.

British Shermans with HVSS had the extra suffix Y added, as well as any suffix added for the armament, i.e. Sherman IBY, IIAY, and IIIAY.

Apart from the T66 track for HVSS vehicles, which was of rubber chevron type, the earlier vehicles could be fitted with any of four different types of track, all of which were interchangeable. These were rubber bloc, steel, rubber chevron, or steel chevron. The steel tracks were introduced to conserve rubber and in practice they were found almost as good and durable as the rubber type. In certain theatres (e.g. Italy) steel tracks

A small number of Shermans with HVSS were delivered to the British in 1945. This is a late production M4A2 (76mm) HVSS, designated Sherman IIIAY by the British (A = 76mm gun; Y = wide tracks). Note the stowage rack at rear and the grilles over the rear exhaust outlets, a feature of late M4 series vehicles.

The penultimate production version of the Sherman was the M4A3 (76mm) with vertical volute suspension. The gun is the M1A1C version with muzzle brake.

were mainly used, but whatever the theories, the different types were usually well mixed at any given time. A steel and rubber composite chevron 23-inch track for HVSS was also introduced. The 16½-inch tracks had side guides while the 23-inch tracks had centre guides. To increase the effective width of the 16½-inch tracks, extended end connectors (or "grousers") were supplied which extended overall shoe width by a quarter for use in muddy or icy conditions. A special grouser compartment was furnished in the rear superstructure to carry these. Grousers were also developed for use on the 23-inch tracks but these were not actually produced until after the war and they were rarely used.

REWORKED VEHICLES

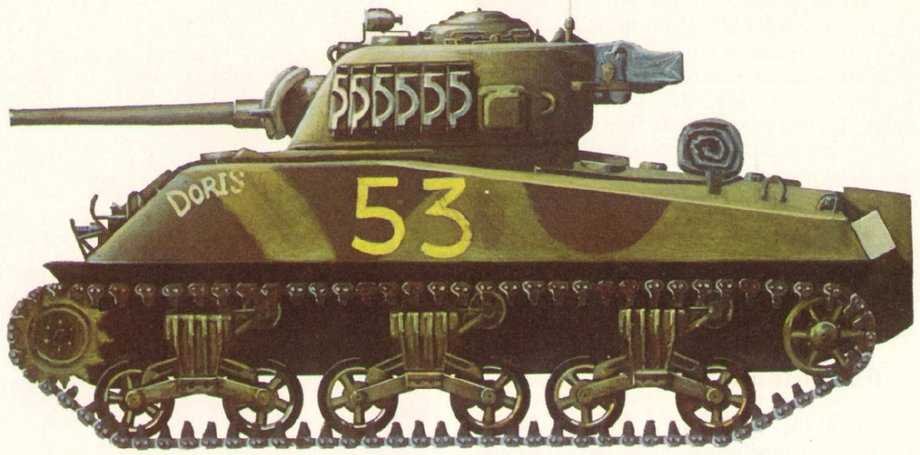
In addition to the modified production vehicles which were being turned out in 1944, the same year saw a massive "rework" programme involving 5,880 early production vehicles which were completely re-manufactured in the main tank arsenals and by other medium tank producers. All models except the M4A6 were involved in this scheme and most were vehicles which had already seen extensive service with armoured divisions in the U.S.A. or Canada. Apart from a complete overhaul, new tracks, new wiring, etc., some had new engines, guns, mantlets, etc. A common fitting was appliqué armour on the sides of the hull and on the front quarters of the turret. Some had extra armour plates on the driver's hatchways as well. These reworked vehicles were widely seen in U.S. armoured divisions in Europe in 1944–45 where they were used as replacements or to supplement new vehicles. The M4s supplied to the French armoured

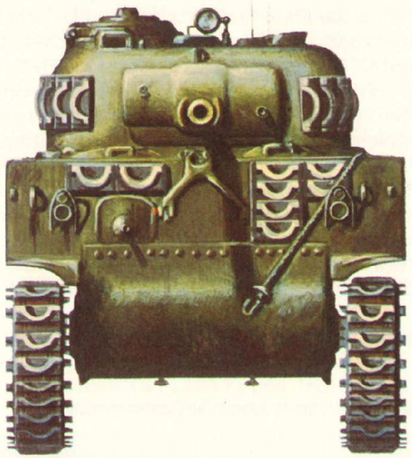
"Jumbo" heavy assault tanks (M4A3E2) in Aachen, October 18, 1944.

divisions were also from the rework programme.

The British also reworked many of the vehicles supplied to them (also receiving reworked vehicles direct from the U.S.A.). Most common addition seen on many vehicles was appliqué armour on the hull sides over the ammunition racks and these became a standard "in service" modification as well. Two plates were added on the right side and one on the left, all spot-welded in place corresponding to the ammunition rack positions. Spare track shoes, sand-bags and even metal sheets were used in other "in service" attempts to improve the M4s armour protection which was thin by the standards of 1944–45.

M4A1s and infantry moving in to mop up Japanese snipers after the U.S. landing at Hollandia, northern New Guinea, on April 22, 1944.





Four views of late production M4A3, 75-mm, wet stowage, of U.S. Marine Corps, Iwo Jima landings, March 1945.

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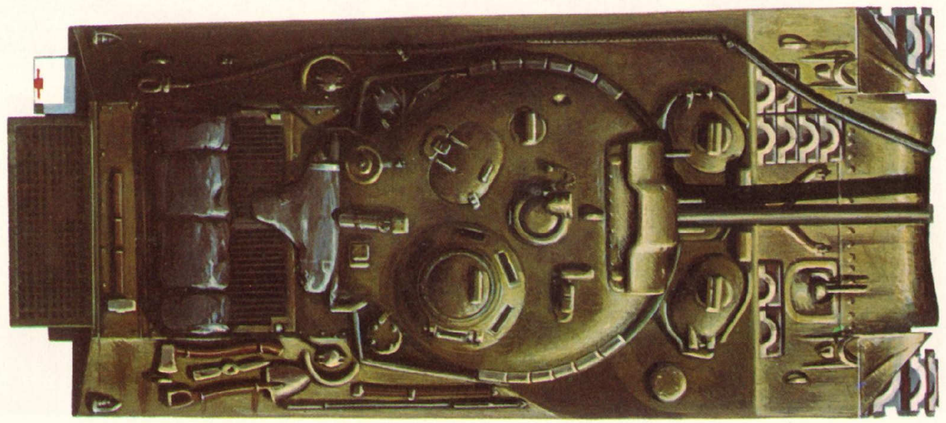
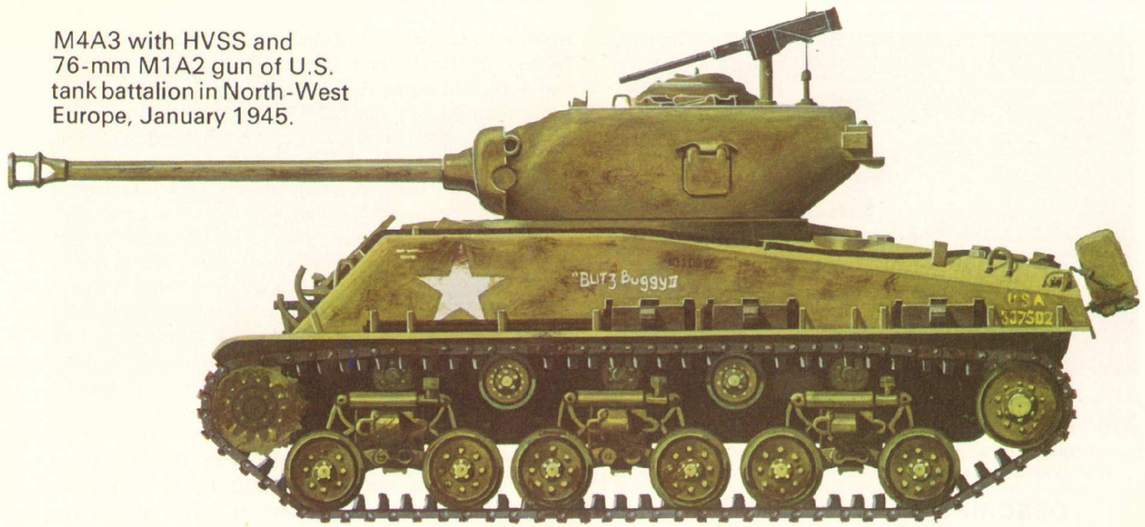
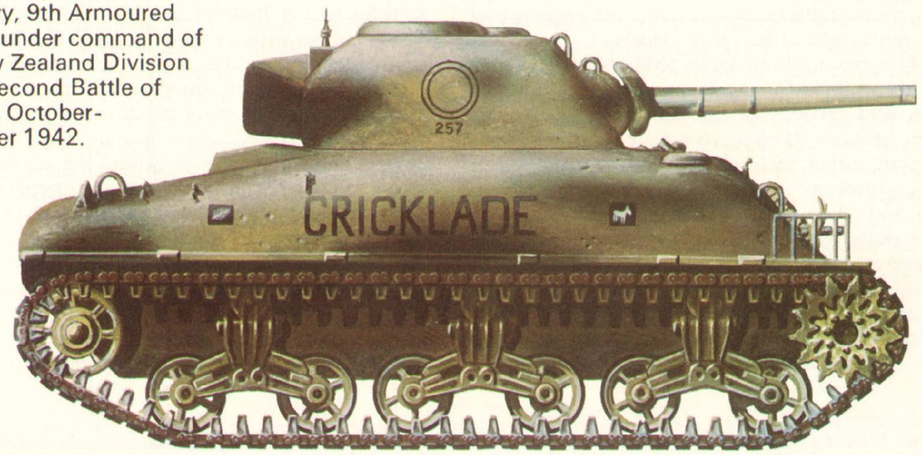


M4A3 with HVSS and 76-mm M1A2 gun of U.S. tank battalion in North-West Europe, January 1945.

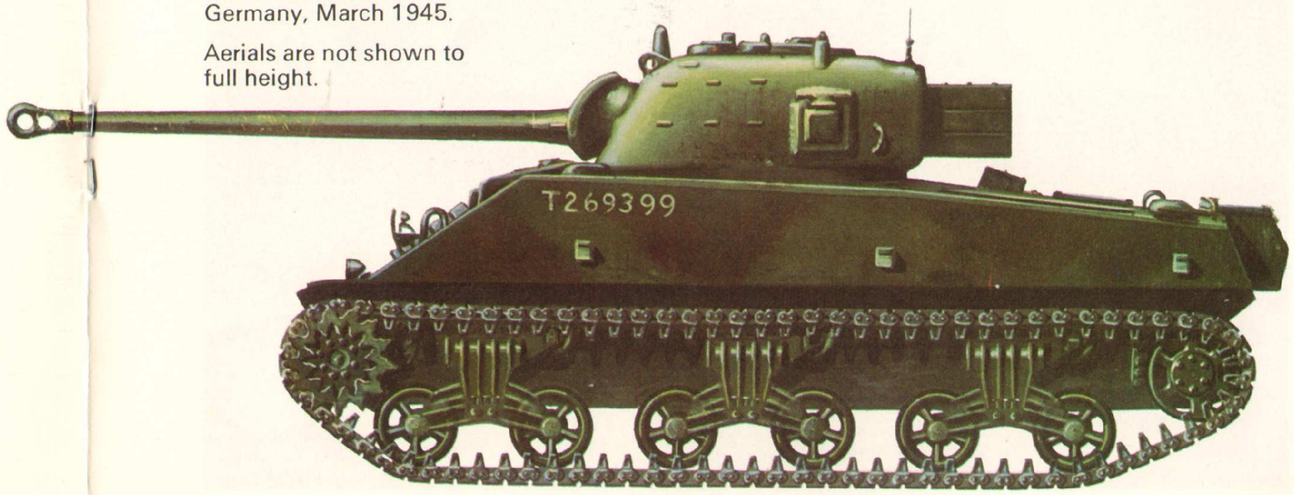


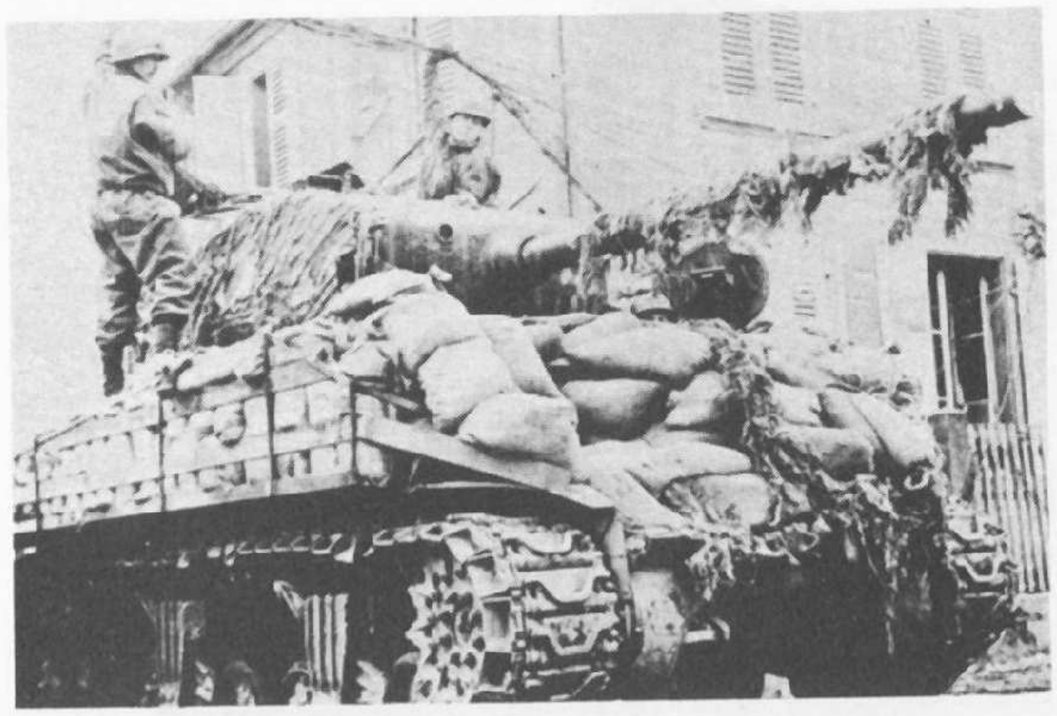
M4A1 of Royal Wiltshire Yeomanry, 9th Armoured Brigade, under command of 2nd New Zealand Division for the Second Battle of Alamein, October-November 1942.



Sherman VC Firefly (M4A4) of 4th Canadian Armoured Division, Sonsbeck, Germany, March 1945.

Aerials are not shown to full height.





Extensive use was made of extemporised protection to overcome the Sherman's main weakness—thin armor. This M4A3 (76mm) has wooden frames and sandbags added in typical style.

DESCRIPTION OF SHERMAN

It will be apparent from the production story that though there were numerous different models of the Sherman, the basic vehicle was essentially the same whoever the manufacturer was. Only the engines and minor details differed between models.

All M4 series medium tanks (M4, M4A1, M4A2, M4A3, M4A4, M4A6) were of the same general design and size, and carried the same armament (with the variation between 75-mm, 76-mm, and 105-mm detailed in an earlier section). All had identical transmissions, volute spring suspensions (vertical or horizontal), and shoe tracks (steel or rubber). Other identical units were the turret and turret platform, gyro-stabilizer, combination turret gun mount and bow gun (·30 cal.) mount.

The tank crew consisted of five men. The driver sat at the left bow of the tank, to the left of the transmission. The assistant driver's position was in the right bow, to the right of the transmission and directly behind the bow machine-gun. The tank commander was stationed at the rear of the turret, just to the right of the main gun guard. The gunner's station was almost directly in front of the commander. The loader's station was to the left of the main gun.

For each of the five crew stations there was a periscope; all except the gunner's mounted so that they could be rotated for observation in any direction and tilted to raise or lower the line of vision. The gunner's periscope was connected to the gun mount by linkage that kept the line of vision in constant alignment with the gun as the gun was elevated or depressed. This periscope was fitted with a telescope sight so mounted that it could be moved independently of the periscope and the gun for gun-laying.

For the driver and assistant driver, direct vision was provided by horizontal slots in the hull front plate. The slots were fitted with heavy protective covers. In later vehicles, however, these slots were deleted.

A periscope in a revolving mount in the turret hatch was provided for the use of the tank commander when the hatch was closed. All late production vehicles of the 1944–45 period, however, had a new vision cupola with six episcopes which offered a great improvement over the original arrangement.

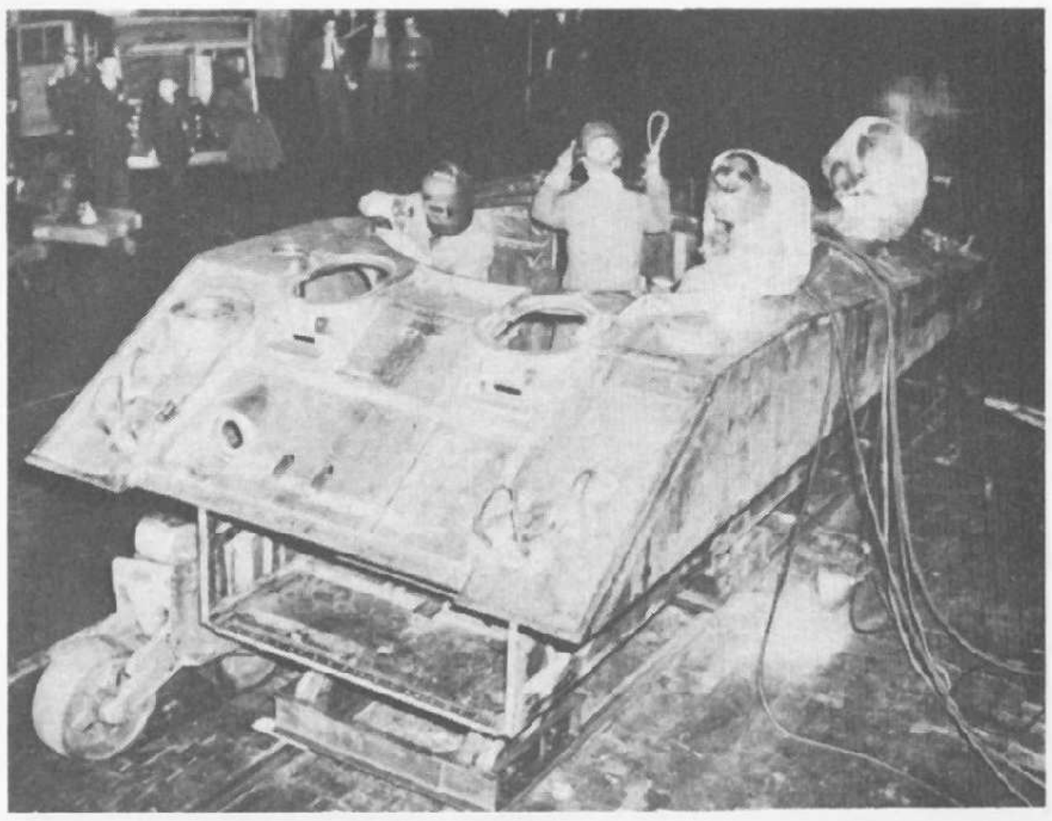
Access to the tank was provided by two hatches in the bow and a revolving hatch in the turret. For use in an emergency, a quick-opening escape hatch was provided in the tank floor behind the assistant driver.

All models had a radio and an interphone system for crew communication. The radio and interphone were shock-mounted on a common base located on a shelf in the turret bulge.

The turret carried a combination mount for a 75-mm gun and a ·30 cal. machine-gun. The turret platform, or basket, rotated with the turret, which could be traversed through 360 degrees either by hand

The original M4 had a Wright radial engine developed from the Continental aero engine. The rapid engine change in the field shown in this picture demonstrates a major advantage of the design—ease and speed of maintenance—compared with more sophisticated and complicated British and German tanks.

Extensive application of spare track shoes was another way of improving the Sherman's protection. This vehicle is crossing the Orne near Caen in August 1944.



Early production M4A2 at the Fisher Body factory shows the inherent simplicity of the Sherman design. Note vision slots in hull front and ports for fixed twin MGs. Both these features were soon eliminated.

cranks or by electric-hydraulic drive.

The combination gun mount allowed the gun to be elevated 25 degrees above the horizontal and depressed 10 degrees.

The turret guns could be manually elevated or depressed by operating the elevating handwheel. When the gyro-stabilizer was in operation, the gun was elevated by hydraulic power controlled by the elevating handwheel, and the gyro-stabilizer automatically held the gun steady at any quadrant angle of elevation at which it had been laid, while the tank was in motion.

The two turret guns were fired electrically by means of the firing buttons (foot-operated switches) to the left of the gunner.

The vehicle was steered by means of levers, which operated steering brakes in the differential housing. Braking was effected by pulling back both steering brakes at once.

TYPICAL VEHICLE

The M4A3 was typical of production models and was powered by a 500 hp Ford GAA tank engine which was an 8-cylinder, liquid-cooled, V-type engine specially designed for tanks. The engine was located in the rear of the hull which was divided into two sections by a bulkhead. The driver steered by means of two levers, located in the front end of the hull. There were five forward speeds and one reverse, and the vehicle was wired for radio installation and for an interphone system within the tank. The turret could be traversed through 360 degrees. An auxiliary electrical generating system, consisting of a generating set powered by a 1-cylinder 2-cycle gasoline engine, was used to charge the batteries when the main generator was not operating, or when the use of electrical units in the vehicle drew large amounts of current.

Two "Fireflies" of a Canadian regiment replenishing their ammunition, Germany, March 1945. Note the size of the 17-pdr. AP round. Logs are used here for added side protection.

Shermans were frequently used to give supporting fire in what was virtually a self-propelled artillery role. This camouflaged Sherman is seen in the Anzio bridgehead, Italy, May 1944.

THE M4A3 (76-mm)

The M4A3 tank with a 76-mm gun had ammunition racks which had liquid filled wet stowage containers on either side to prevent fire in case the side of the vehicle was pierced. This vehicle had the larger turret with only a partial platform for the gunner and commander. The loader stood on a subfloor, which extended across the lower hull level with the sponson.

THE M4A3 (75-mm, WET STOWAGE)

The M4A3 tank with wet stowage and a 75-mm gun had a full turret floor bracket-mounted to the turret. It had all the characteristics of the M4A3 (76-mm), with or without HVSS, including the 47 degree hull front. It retained the original 75-mm turret, however. It was the final production model with the 75-mm gun.

THE M4A3 (75-mm, DRY STOWAGE)

The M4A3 tank with dry stowage and a 75-mm gun had a basket and a floor attached to the turret. Some dry stowage vehicle turrets, however, were identical to the turret in the M4A3 wet stowage vehicles. Engine compartment door shutters and a gun travelling lock were not fitted on the early M4A3 dry stowage vehicles, but these features became standard on vehicles built from early 1944 on.

THE M4A3 (105-mm HOWITZER)

The M4A3 tank with the 105-mm howitzer was identical to the M4A3 tank with wet stowage and 76-mm gun, with the exception of the gun and turret. The turret was the same type as that fitted to Shermans with 75-mm guns, but could be traversed only by hand. While the M4A3 (105-mm) had the 47 degree hull front, the early M4s with this howitzer had the original hull front, though later vehicles came into line with the M4A3 in this respect. Late production models of both the M4 (105-mm) and the M4A3 (105-mm) had HVSS in addition to the 47 degree hull front. Another addition was the provision of a separate hatch for the loader in the turret roof. The prototype for vehicles with the 105-mm howitzer was a suitably modified M4A4 which was converted at Detroit Arsenal in summer 1942.

ENGINE

The Ford GAA engine, developed for and used in the M4A3, subsequently became the "standard" American gasoline tank engine. Variants were used in later tanks.

The GAA was a 60 degree V-8 cylinder, 4 cycle, valve in head, liquid cooled unit. The cylinder block and crankcase were cast integrally in aluminium, with steel dry type sleeves in cylinder bores. The water jackets extended the full length of the cylinders. Four overhead camshafts were used, one exhaust and one intake, for each bank of cylinders. There were two exhaust and two intake valves in each cylinder. Two four-cylinder magnetos were used, located at the rear of the engine. The engine was mounted within its compartment by four brackets. The two front brackets were mounted on the engine compartment bulkhead, and the rear brackets were on the engine compartment floor. Rubber mounts were fitted between the brackets and the engine.

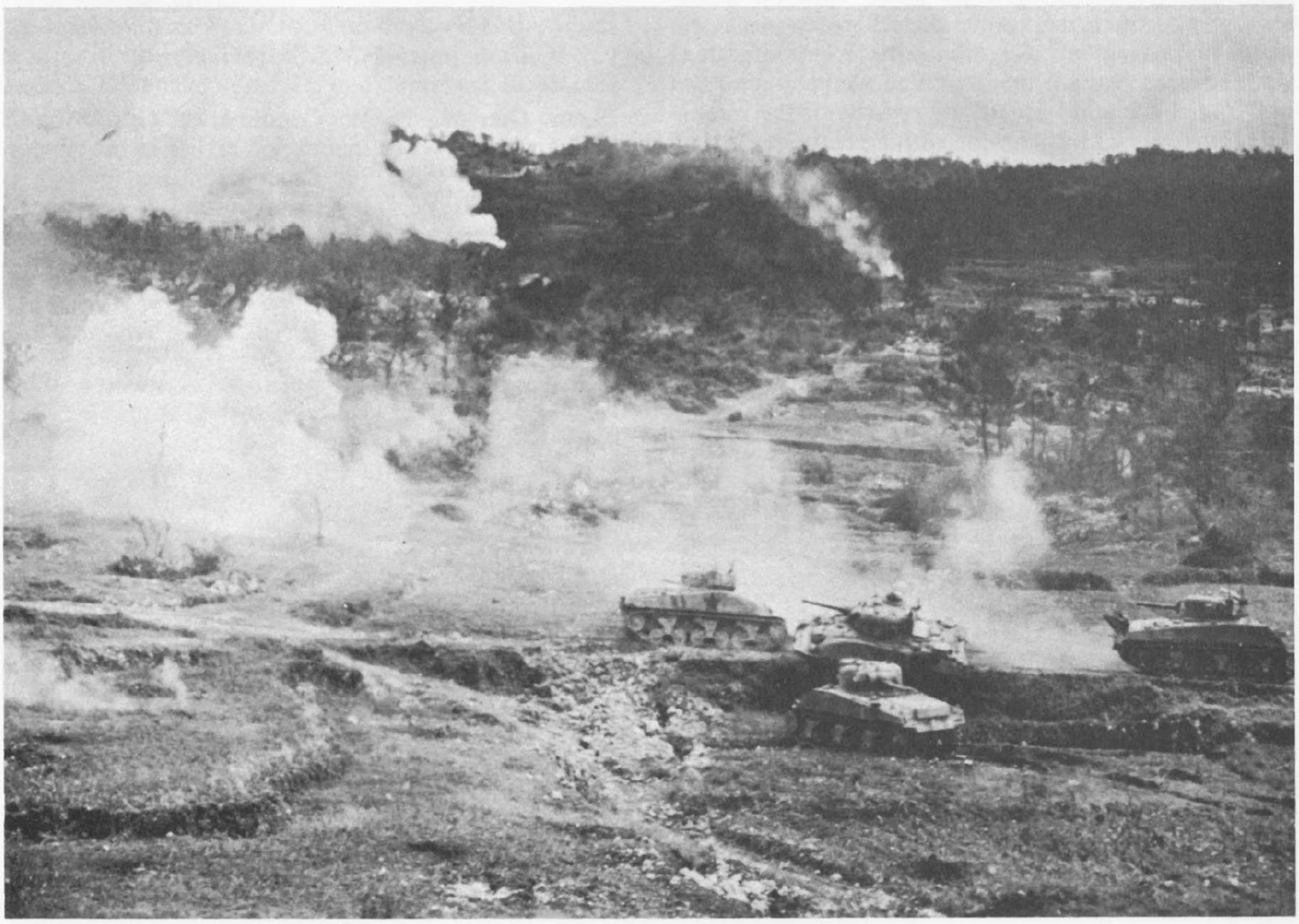
VERTICAL VOLUTE SPRING SUSPENSION AND TRACKS

This was the original simple suspension system used on the M4. Each track was composed of 79 separate shoes, and the tank was supported on six bogie suspension assemblies bolted to the hull. Each suspension unit had two rubber tyred wheels. As the tank passed over uneven ground, the vertical movement of the road wheels was transferred to the supporting arms or levers, and was absorbed by the two volute

Two Sherman squadrons of 4th Canadian Armoured Division being used to give artillery support east of Sonsbeck, Germany, March 1945, a role frequently allotted to Shermans. First and fourth tanks can be distinguished as "Fireflies".

U.S. Marines on Iwo Jima, March 1945. In the foreground late production M4A3s (75mm) wet stowage, and M32 Tank Recovery Vehicle.

Shermans of the U.S. Army cover a knocked-out vehicle (centre) as shells fall on Japanese anti-tank gun position, Okinawa, June 1945.



M4A1s of the U.S. Marines landing at Kwajalein. Full wading equipment is fitted, the trunking coming as a kit of parts for each vehicle.

M4A1s of the U.S. Marine Corps on the New Britain beach during the Cape Gloucester landings, March, 1944.

springs in each suspension assembly. Two drive sprockets at the front end of the vehicle pulled the tracks from the rear and laid them down in front of the advancing road wheels. A track skid and a single steel roller were mounted at the top of each suspension to support and carry the upper portion of the track. An adjustable idler wheel for each track was mounted at the rear of the vehicle for adjusting tension of the tracks.

HORIZONTAL VOLUTE SPRING SUSPENSION AND TRACKS

The HVSS system replaced the old vertical volute suspension in late production. From both the maintenance and the riding points of view it represented a major improvement. An adjustable idler with dual wheels for each track was mounted at the rear of the hull and this could take up the tension of the tracks. The track was 23 inches wide with a centre guide that minimised the possibility of throwing the track. The top run of each track was supported on two dual rubber-tyred rollers fitted with adjustable tapered roller bearings.

The vehicle was supported on six suspension assemblies bolted to the hull. Each suspension had four rubber tyred wheels, one pair mounted on each suspension arm. The wheels had removable rims and could be removed from the hubs and installed without disturbing the adjustable tapered roller bearings or any part of the suspension and tracks. The suspension wheel support arms were connected to the suspension by rubber bushed pins. Two horizontal volute springs in each suspension were held in position by spring seats that rested on spring seat pins and were free to travel on the seat pins, allowing the volute spring to compress in true alignment without distortion.

A telescopic type, hydraulic shock absorber was connected between the support arms on each side of the suspensions. The shock absorbers reduced the pitching action of the vehicle by stabilizing the vertical movement of the suspension wheels when passing over rough terrain.

Sherman captured and used by the Germans during their Ardennes offensive is re-captured by U.S. Army, January 1945.

ARMAMENT

75-mm Gun M3 in the Combination Gun Mounts M34 and M34A1: as mentioned earlier in the general description of the Sherman the turret could be traversed 360 degrees manually or by hydraulic traversing mechanism, while the gun could be elevated 25 degrees and depressed 10 degrees. The ·30 calibre machine-gun in the combination mount was co-axial with the 75-mm gun.

The combination mount M34 was fitted in early vehicles and the M34A1, which incorporated a direct sight telescope, in later Shermans. The modifications in the M34A1 mount consisted of:

The addition of a new front shield which protected the ·30 co-axial MG, the 75-mm gun, and the direct sight telescope.

The addition of a breech counter-weight to balance the new shield.

A slot in the front plate to allow the telescope to protrude through the opening.

A pad on the mount to hold the telescope mounting brackets.

76-mm Gun M1A1, M1A1C, orM1A2 in the Combination Gun Mount M62: there were three models of 76-mm guns used variously in the Combination Gun Mount M62 in the M4 series. They were the M1A1, M1A1C, and the M1A2. The M1A1 was rifled with uniform right-hand twist, one turn in 40 calibres. The M1A1C was modified by threads at the muzzle end to

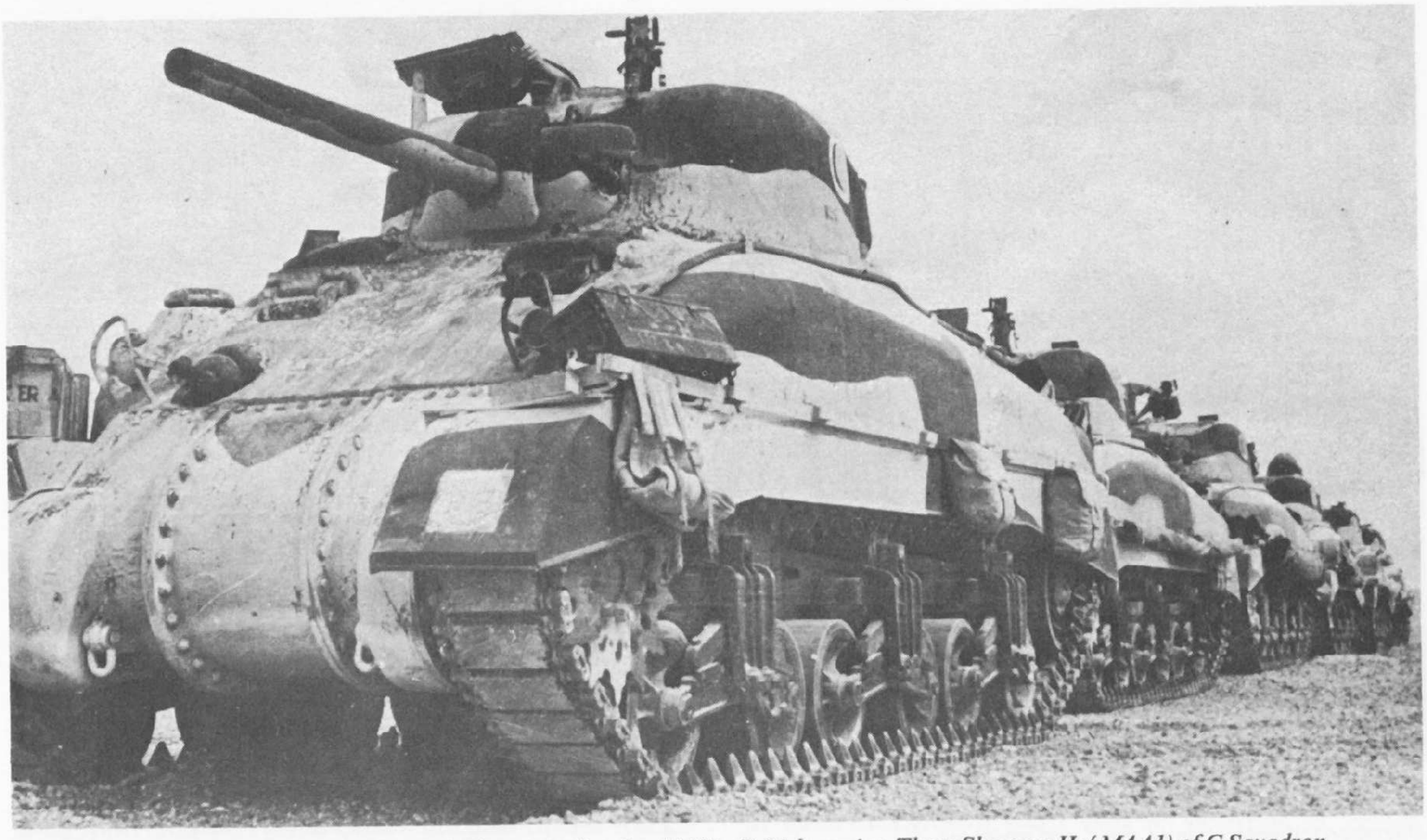
M4A3 (76mm) with a M4A3 and other Shermans behind it line a street in Bergerhausen, Germany. The tanks are of U.S. 8th Armored Division (nicknamed "Thundering Herd") which took part in the battle for Cologne which fell on March 6, 1945. Note extemporised protection of wood and sandbags.

take a muzzle brake. When the muzzle brake was not installed the threads were protected by a ring. The M1A2 model had the rifling changed to a uniform right-hand twist, one turn in 32 calibres with the muzzle end threaded to take a muzzle brake. Once again a ring was used to protect the threads if the brake was not fitted.

105-mm Howitzer M4 in the Combination Gun Mount M52: the howitzer could be traversed through 360 degrees, elevated 35 degrees, and depressed 10 degrees (note the 10 degrees added elevation). An azimuth indicator was mounted to the right of the traversing handle and gave the position of the howitzer in traverse. The elevating mechanism was located to the left of the traversing mechanism. A clockwise rotation of the handwheel elevated the howitzer.

The howitzer could be fired electrically or manually, in case of a failure of the electrical system. Two foot-operated electric switches, convenient to the gunner's foot, were located on the turret floor. One

Though little publicised by the Russians, several thousand Shermans (M4A2) were delivered to the Soviet Army on Lease-Lend in 1942. Here cavalry pass new Russian Shermans near Kharkov. Note typical Soviet features including the log for unditching, and the extra fuel tanks. Front vehicle has all-steel tracks.



The Sherman's combat debut was at Second Alamein in October 1942 in British service. These Sherman IIs (M4A1) of C Squadron, The Queen's Bays, British 1st Armoured Division, are seen prior to the battle. They have the early "first type" suspension.

switch operated the machine-gun in the combination mount, the other operated the howitzer. A foot pedal was also provided for firing the howitzer manually.

Telescope and periscope sights were provided for the howitzer plus an illuminated elevation quadrant. Included in the turret was a fuse-setting machine. No stabiliser was fitted in howitzer-armed vehicles which normally fired only when stationary.

Secondary armament: as well as the ·30 cal. machine-gun co-axially mounted M4 series vehicles had another ·30 machine-gun in the hull front which was elevated and traversed manually and fired by a conventional trigger. There was also a ·50 cal. machine-gun mainly for AA defence. It too was elevated and traversed manually and fired by a conventional trigger. On early vehicles it fitted with its pintle into a socket on the rotating commander's hatch. In later vehicles a separate pintle was fitted on the turret roof adjacent to the hatch.

Tank Recovery Vehicle M32B1 with M4A3 in tow.

A 2-inch mortar for laying smoke had a fixed mount in the turret, traversed with the turret, and was manually fired.

AMMUNITION

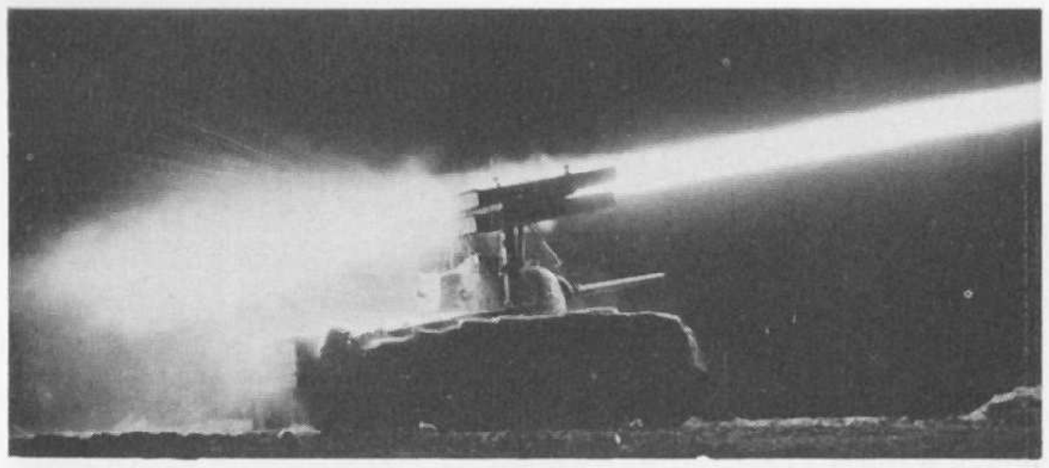
Rounds for the 76-mm gun were made with both brass and steel cases. All 76-mm rounds were ready for firing as removed from their packing, except for setting the point-detonating fuses of the high explosive rounds for the required action.

Service rounds and practice rounds were also manufactured with both brass and steel cases for the 105-mm howitzer. With the exception of the canister round, which was the same for all 105-mm howitzers, rounds for the M2, M2A1 and M4 howitzers differed from those of the M3 (airborne) howitzer only with respect of the propelling charges. The adjustable charges for rounds for the M2, M2A1 and M4 howitzers were made up of seven sections, whereas the M3 howitzer rounds had a five section charge of quick-burning powder. These charges or sections were not interchangeable. However, the M1 high explosive rounds for the M3 howitzer could be fired in the M2, M2A1 and M4 howitzers by applying suitable corrections when aiming.

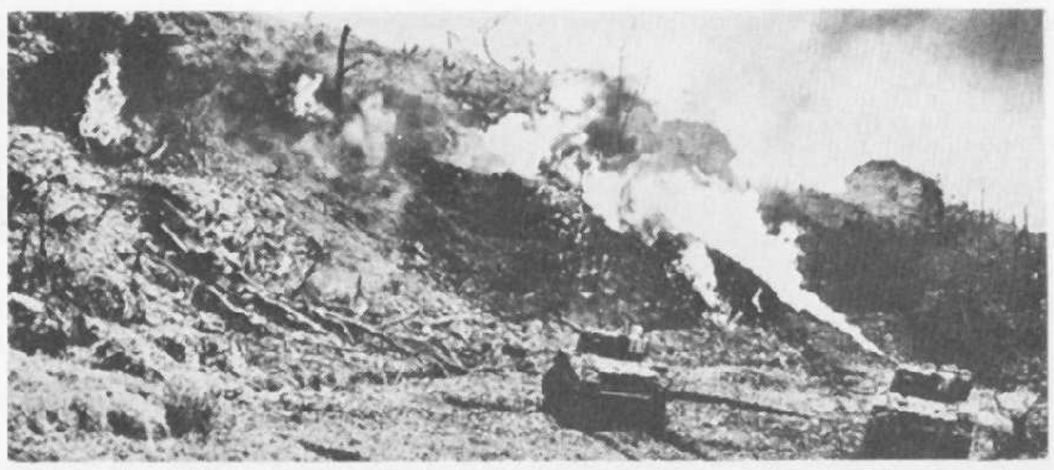
Service rounds were made with both brass and steel cases for the 75-mm gun, too. Fused rounds for this gun were ready for firing as removed from the packing, except for the point-detonating fuse of the M48HE round which required setting.

M4 SPECIAL PURPOSE AND MISCELLANEOUS TYPES

Special purpose types which saw full production and service in the U.S. Army were relatively few. On



T34 Calliope rocket launcher mounted on a Sherman of Seventh U.S. Army firing on German positions across the Moder river in Alsace.



POA-CWS75 H1 Flamethrower on U.S. Marine Corps M4A2 in action against Japanese cave defensive positions on Okinawa, 1945.

the other hand the number of experimental prototypes developed by the U.S. Ordnance Department ran into dozens, many of them of a very sophisticated nature. This reflected the rift between the designers, the Ordnance Department, and the users, Army Ground Forces, who were resistant to the introduction of special service vehicles except where the need was quite obvious. (This same attitude led to the delay in the service introduction of up-gunned models of the Sherman, and indeed of the Sherman's successor, the M26 Pershing).

It was due to this that the special purpose types used by the U.S. Army in North-West Europe in 1944-45 were mainly of British origin: the Sherman Crab (U.S. designation – Mine Exploder T2) and the Sherman DD "swimming" tank, which was subsequently adopted for production in the U.S.A. in 1945 as the Sherman DD III, the DD I and DD II being the original British conversions some of which were used by U.S. battalions in the Normandy landings.

M32 TANK RECOVERY VEHICLE

The major U.S.-developed special type was the Tank Recovery Vehicle M32 which saw widespread service from late 1943. This was a modification based on the standard M4 hull. The turret was removed and replaced by a fixed superstructure and a 60,000 lb. winch in the space formerly taken by the turret cage. An 18-ft. A-frame jib was pivoted at the forward end of the hull and normally lay to the rear. For engine-changing etc. it could be topped up and rigged forward. The vehicle was unarmed, but a 81-mm mortar was fixed to the front end of the superstructure firing forward; this was used solely for smoke bombs to give cover during recovery operations. In practice, however, the mortar was frequently removed, evidently because it obstructed winching operations.

Various models of the M4 were converted to M32s, the differences being restricted only to the basic model changes already described. Specifically these were M32 (M4 chassis), M32B1 (M4A1 chassis – cast hull), M32B2 (M4A2 chassis), M32B3 (M4A3 chassis), M32B4 (M4A4 chassis). The M32 weighed 62,000 lb. Some were delivered to the British (designated Sherman ARV Mk III) and to other M4 series users.

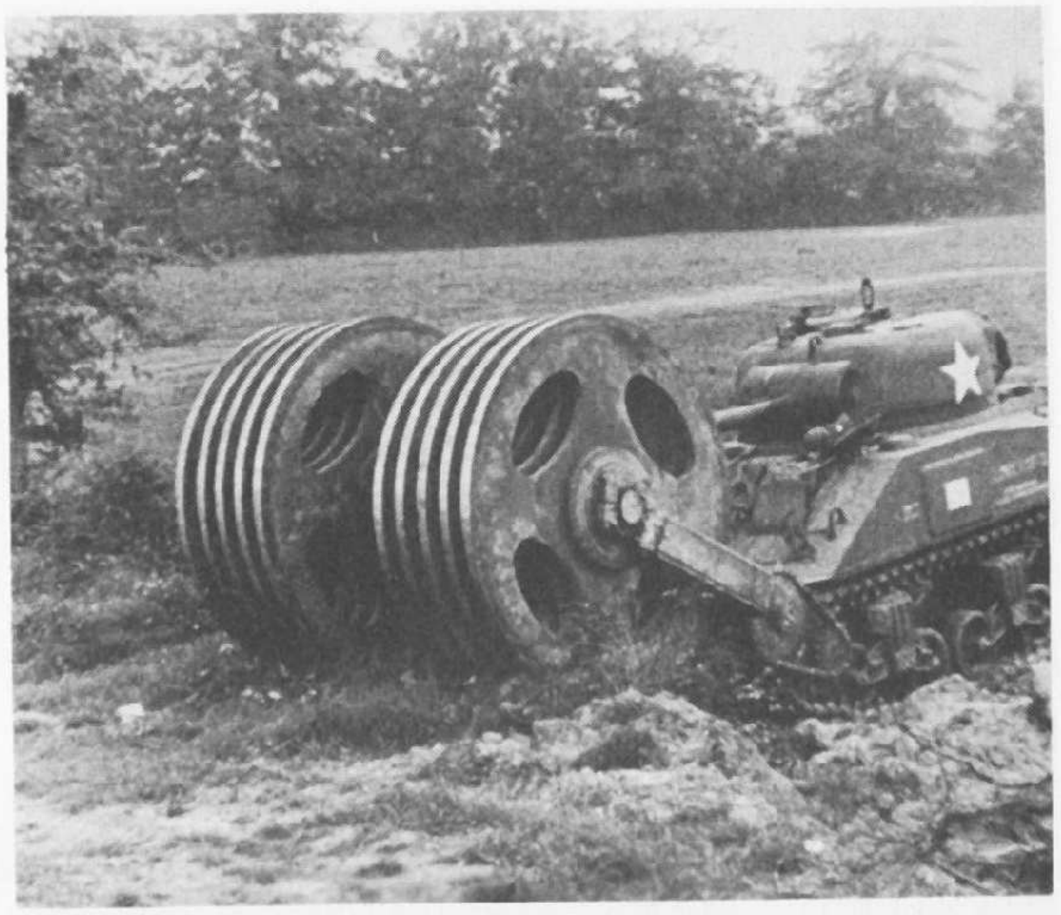
ROCKET LAUNCHERS

A large number of rocket launcher types were developed, most important of which was the T34 Calliope. This simple but effective conversion consisted essentially of a bank of rockets in a carrier frame mounted above the turret. In the T34 there were 60 4·6-inch rocket tubes in four rows. Elevation of the frame was controlled by a linking arm from the gun

M4A1 with "Prongs" or Cullin Hedgerow device on its nose. The device was invented in the field and fabricated from girders for cutting through the hedgerows of the Normandy "bocage" country. Subsequently it became a standard factory-produced item.

M3-4-3 Flamethrower of U.S. V Corps in action in Germany, November 1944. The flame gun fitted in place of the hull machine-gun on the Sherman.

Mine Exploder T1E1, Earthworm.



Mine Exploder T1E3 (M1), Aunt Jemima.

barrel, and traverse was effected by training the turret on the required bearing. When the rockets were expended the mount could be jettisoned if necessary.

The Calliope was a "limited procurement" type first used by the U.S. 2nd Armored Division in August 1944. It was a formidable weapon for putting down a huge blanket barrage in softening-up bombardments. Variations on this theme were the T34E1 and T34E2 which had different arrangements of the launchers.

Of other rocket launcher types, the only ones to see limited service were the T40 (M17) Whiz-bang and the T99. The Whiz-bang was similar to the Calliope in arrangement but had 20 7·2-inch rockets and a box-like frame enclosing the tubes. The T99 had two small box-like launcher frames, one each side of the turret, each with 22 4·5-inch rockets. Some M4A3s with T99 launchers were used in the Pacific in 1945.

FLAMETHROWERS

Flamethrowers in U.S. service mostly took the form of the E4R2, R3, or R4 types (M3–4–3) or the E6 type. These were supplied in kit form for installation in the field. The former fitted in place on the hull MG, and the latter fitted above the assistant driver's hatch in a periscope type mount. Another flamethrower type was the POA, mainly used by the U.S. Marine Corps, in which the flame projector replaced the main gun. In Europe the U.S. 2nd Armored Division used a British-developed flamethrower, the Crocodile, four of which were fitted to Shermans.

M10 GMC Tank Destroyer fitted with a Cullin Hedgerow device, Normandy 1944. The M10 was built on an adapted M4A2 chassis, the M10A1 on the M4A3 chassis. Both had a 3-inch gun.

Standard M36 GMC Tank Destroyer on M4A3 chassis, Battle of the Bulge, Ardennes, January 1945. The M36 had a 90mm gun.

MINE EXPLODERS

Mine exploders were developed by the score for fitting to the M4, and these covered all forms of mine clearing: excavating, flailing, and pressure. Only a few saw service, the rest progressing no further than the trials stage. Of these the Mine Exploder T1E1, Earthworm, was designed for the M32. It took the form of three disc units arranged tricycle fashion and suspended from the jib of the M32 with a heavy girder frame supporting the discs.

A better device was the Mine Exploder T1E3, Aunt Jemima, which reached "limited standard" status as the Mine Exploder M1; 75 vehicles were built and were used in Italy and France in 1944. Two huge 10-ft. diameter disc-type rollers were pushed ahead of the vehicle, drive coming via a chain from the vehicle's sprockets. While effective in exploding mines, the Aunt Jemima was very cumbersome and in muddy weather it usually needed a second tank to push the carrier vehicle.

Subsequently British Sherman Crabs (Mine Exploder T2) were taken over by U.S. troops and became the main type in use. In addition some units notably in the U.S. Marine Corps, improvised mine exploders of their own based on the flail idea and often using the arms of the standard M1 dozer blade which was supplied for field fitting to the M4.

No other U.S. designed mine exploder based on the M4 series saw service other than for troop trials.

SELF-PROPELLED WEAPONS

While all variants of the M4 series were used as a basis for the special purpose and miscellaneous types, the M4A3 chassis was mainly used for the various self-propelled guns that formed part of the equipment of the U.S. armoured divisions. This reflected the U.S. policy of keeping the Ford-engined vehicles for first-line operations.

The Gun and Howitzer Motor Carriages on M4 series chassis were:

M7B1 HMC. The M7 (known to the British as the Priest) with its 105-mm howitzer was originated on the M3 Medium chassis, but when the M4 superseded the M3 in production M7s were built on the M4A3 chassis and designated M7B1.

M10 GMC. The M10 3-inch gun tank destroyer was built on an adapted diesel-engined M4A2 chassis with a new flat-topped hull and open-topped turret. Production was continued on the M4A3 chassis and this Ford-engined version was designated M10A1. M10 production totalled 6,596 of which 2,603 were M10A1 built between June 1942 and December 1943.

M36 GMC. Developed from November 1943 to provide a heavier gun (the 90-mm A.A. gun) on the M10 chassis. By May 1945 M36 production totalled 2,324 of which 187 were M36B1 produced on standard M4A3 hull and 1,268 were converted M10s and M10A1s.

The M36 could take on all German tanks. One unit, the 702nd Tank Destroyer Bn. of the U.S. 2nd Armored Division, chalked up the fantastic score between 16th and 30th November 1944 of one PzKpfw III, eight PzKpfw IVs, fifteen Panthers, one King Tiger, two self-propelled guns, two anti-tank guns, two pillboxes, and two half-tracks, all totally destroyed for the loss of only eight of its own vehicles.

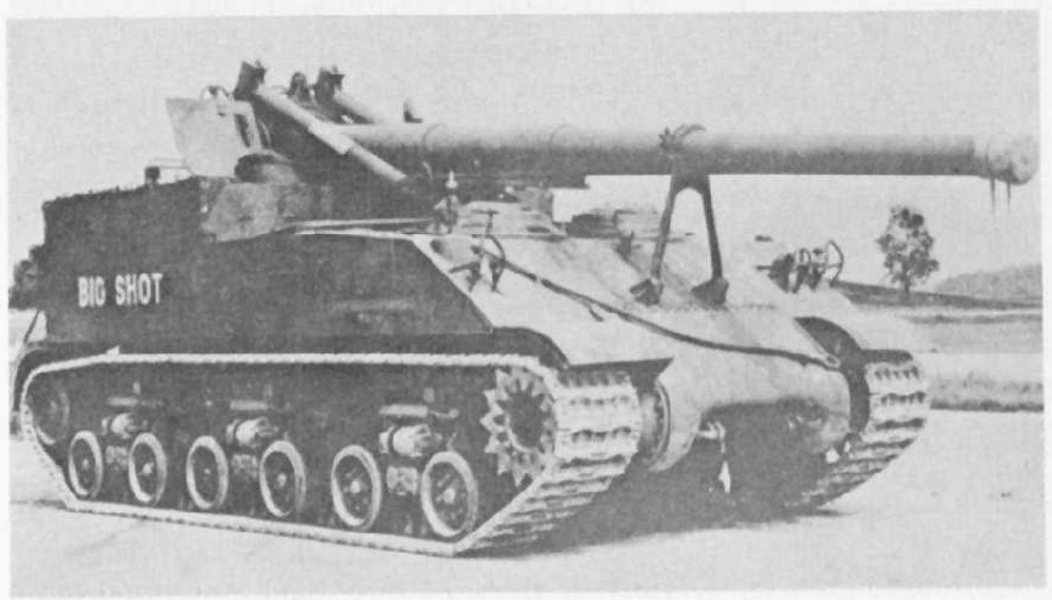
M40 GMC. One of the most successful heavy self-propelled weapons ever to see service, the M40 design started life in December 1943 as a successor to the M12 (1918 pattern 155-mm gun on M3 chassis). It mounted the M2 155-mm gun "Long Tom" on a widened M4A3 chassis with HVSS. The engine was moved forward and a recoil spade and working platform added at the rear. Total production between January 1945 (when production began at Pressed Steel) and the end of World War II in Europe was 311. The M40 fought in N.W. Europe (its first action being in the bombardment of Cologne) and later in Korea.
M43 HMC. Similar to the M40 but with an 8-inch howitzer. 48 were built.

SHERMAN IN BATTLE

By 1944 the Sherman had reached the peak of its development and in its final form with HVSS and the 76-mm gun, it proved equal to the "blitzkrieg" role for which it was mainly used. Ironically the U.S. armoured divisions in N.W. Europe at this time were using these tactics against the German army which had demonstrated their effectiveness four years earlier. This time the German army was on the defensive and had developed armour – such as the Tigers, Panthers and the various heavy assault guns – more suitable for a defensive war than the lighter Panzers which spearheaded the armoured battles of 1939–42. No Sherman could – on paper – stand up to a Tiger or Panther, but the U.S. Armies in N.W. Europe had the priceless advantage of supporting air power, adequate reserves, superb logistics, and overwhelming superiority of numbers. In these conditions, the tank became a component of a coordinated attack scheme. The main requirement was for mobility, reliability, and adequate armament, and the M4A3 Sherman 76-mm had all of these qualities. In vast outflanking movements which avoided the heaviest enemy armour – leaving it to be dealt with by tank destroyers and aircraft – the Sherman was used spectacularly as an instrument of advance and exploitation. Exceptional distances like the 151 miles covered in 36 hours by a battalion of the 4th Armored Division during the Battle of the Bulge serve as an indication of the M4's true value as a fighting weapon.

Certainly the Sherman, best known and most widely produced tank in the history of armoured warfare, earns its place in posterity alone by its success against the German panzers in 1944–45. That it was also used by the armies of a dozen other nations and could still figure prominently in the Israeli-Egyptian war of 1967, when most of its contemporary designs remain only as museum exhibits, is remarkable, particularly if it is remembered that the Sherman was a utility design owing its development to the early successes of the German armoured forces it later was to trounce. Matched tank for tank, the Sherman was vastly inferior to its German opponents. But the Allies had the advantages of sheer weight of numbers, better maintenance, better logistics and, in the final analysis, better tactics. It might also be argued that the U.S. Ordnance Board had better judgement than their German – or British – contemporaries by standardising on one type of tank, centralising production control and progressing with a standard design in the light of experience rather than waste time and capacity in a continual quest for alternative, improved designs.

The T83 prototype of the M40 GMC which mounted the 155mm "Long Tom" on a modified M4A3 chassis with HVSS.



AFV Series Editor : DUNCAN CROW

SPECIFICATION

M4A3 MEDIUM TANK (TYPICAL OF M4 SERIES)

Length, overall (with sand shield)	20 ft. 7 in.
M4A3 (76-mm) – including gun	24 ft. 8 in.
Width overall (with sand shield)	8 ft. 9 in.
Height, over top of A.A. pintle stand	
M4A3 (76-mm)	138⅞ in.
M4A3 (75-mm)	132⅞ in.
M4A3 (105-mm)	132⅞ in.
Tread (centre to centre)	83 in.
Crew	5 men
Weight of vehicle (empty) approximate	
M4A3 (75-mm)	63,097 lb.
M4A3 (76-mm)	65,127 lb.
M4A3 (105-mm)	63,357 lb.
Weight of vehicle (loaded) approximate	
M4A3 (75-mm)	69,565 lb.
M4A3 (76-mm)	71,175 lb.
M4A3 (105-mm)	69,915 lb.
Ground pressure	
23 inch wide track (HVSS)	10·3 p.s.i.
16 inch wide track (VVSS)	14·3 p.s.i.
Ground contact area	
16 inch wide track (VVSS)	4,870 sq. in.
23 inch wide track (HVSS)	6,760 sq. in.
Ground clearance	17⅛ in.
Net horsepower with 80 octane gasoline	500 at 2,600 rpm.
Maximum speed on hard roads	26 mph.
Typical cross-country speed for various terrains	4 to 26 mph.
Minimum engine idling speed	500 rpm.
Maximum allowable engine speed – no load	2,800 rpm.
Maximum width of ditch tank will cross	90 in.
Maximum vertical obstacle, such as wall, tank will climb	24 in.
Maximum fording depth (at slowest forward speed)	36 in.
Number of miles without refuelling (approx.)	100
Oil consumption (approx.)	50 miles per gallon

AFV/Weapons Profiles

Edited by DUNCAN CROW

Starting with AFV/WEAPONS PROFILE 24 the Publishers intend to step up the frequency of publication. This departure, taken in order to meet the great demand for coverage of more AFVs more quickly than in the programme that has been running for the past two years, has necessitated some further re-arrangement in the list of titles.

30 Armoured Cars—Marmon-Herrington, Alvis-Straussler, Light Reconnaissance

The South African-built Marmon-Herringtons were familiar to all armoured car regiments in the Middle East in World War II; although only a handful of Alvis-Strausslers were used these were a significant advance in the design of wheeled fighting vehicles; the section on Light Reconnaissance Cars describes the vehicles that equipped the Reconnaissance Corps formed in 1941 to provide reconnaissance units for infantry divisions: BY B. T. WHITE, author of *British Tanks and Fighting Vehicles 1914–1945, Tanks and other Armoured Fighting Vehicles 1900–1918,* etc., *and AFV Profiles 1, 6 and AFV/Weapons Profile 21.*

31 Australian Cruiser–Sentinel; and Australian Matildas

Designed and built in Australia during World War II the Sentinel was a remarkable achievement for a limited engineering industry, and in its cast hull, for a tank of this size, it preceded the American M48 by about 10 years; it was not the Sentinel, however, that was used in action in the South-West Pacific by the Australians but the Matilda, for which they developed specialised equipments and tactics: BY MAJOR JAMES BINGHAM, *Royal Tank Regiment,* author of *AFV Profile 8 and AFV/Weapons Profile 25.*

32 M6 Heavy and M26 (Pershing)

This Profile describes the curious history of the U.S. M6 Heavy Tank and highlights the fierce controversy that raged over "giant" tanks—not only in the United States, it must be added; the M26, named after General Pershing, also started life as a heavy tank, and a few were in action in Germany in 1945. In May 1946 the Pershing's designation was changed from Heavy Tank M26 to Medium Tank M26, and as such it fought in Korea along with the M46 and M47 Mediums (Patton) that were a re-built version of it: BY COLONEL ROBERT J. ICKS, author of *AFV Profile 16* and *AFV/Weapons Profiles 24, 26,* who has a close knowledge of the tanks' development.

33 German Armoured Cars

As light tanks became popular in the 1930s the importance of armoured cars declined . . . except in Germany and France; Germany attached great importance to them and they were the basic vehicles of the Panzer divisions' reconnaissance units in World War II, achieving great success as this Profile shows: BY MAJOR-GENERAL N. W. DUNCAN, whose distinguished military career in armour has included service in armoured cars in the *Royal Tank Corps,* and command of the *30th Armoured Brigade* in *79th Armoured Division.* General Duncan has been Representative Colonel Commandant of the *Royal Tank Regiment, Governor of the Royal Hospital Chelsea,* and *Curator of the Royal Armoured Corps Tank Museum.* He is the author of *AFV Profiles 5, 9, 12, 15.*

34 Scorpion

Britain's new aluminium light tank, weighing eight tons, powered by a conventional Jaguar XK 6-cylinder engine of 4,200 c.c., and mounting a 76-mm. gun, is the first all-aluminium armoured vehicle in the world: BY R. M. OGORKIEWICZ, author of *AFV/Weapons Profile 28,* who is the first non-American and only the tenth person in its 85-year history to be made an honorary life member of the *U.S. Army Armor Association.*

35 Wheels, Tracks and Transporters British Armoured Recovery Vehicles

The problems of getting tanks to the battle and recovering them when they have been disabled are the subject of this Profile, in which MAJOR-GENERAL DUNCAN (author of *AFV Profiles 5, 9, 12, 15, and AFV/Weapons Profile 33*) traces the development in Britain of machines—some like "skyscrapers on roller skates"—to overcome the track wear bugbear until the adoption of wheeled transporters proved a better solution, and Peter Chamberlain describes the armoured recovery vehicles used by British and Commonwealth units in World War II.

36 French H35, H39 and S35

37 Russian BT

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The publishers intend issuing one part per month and the initial programme which at this stage is subject to revision will be as follows :

1. HMS Dreadnought
The first all-big-gun ship which heralded the new era that was to last for fifty years: by John Wingate, D.S.C., *Warships' Series Editor.*

2. HMS Cossack
Tribal Class Destroyer. The class of super-destroyers which were to serve with such distinction in World War II: by Lieutenant David Lyon, R.N.R., M.A., National Maritime Museum, Greenwich.

3. USS Hornet (CV 8)
Aircraft carrier who, with a life of only 372 days, launched Doolittle's raid on Tokyo before she finally paid the penalty: by Lieutenant-Commander W. H. Cracknell, USN, former observer in the US Navy Air Force.

4. Kriegsmarine Admiral Graf Spee
Pocket. Battleship, the first class of all-welded, diesel-powered capital ships, specifically designed as commerce raiders. The Battle of the River Plate sealed her fate: by Kapitän zur See Gerhard Bidlingmaier, lately Naval Historian of the Federal German Navy, Navigating Officer of *Tirpitz* during World War II.

5. HMS Campbeltown (USS Buchanan)
One of the 'four-stackers' to be turned over by the USN to the RN. Her life ended gloriously during the Raid on St Nazaire in 1942: by John Wingate, D.S.C., *Warships' Series Editor.*

6. Kriegsmarine Prinz Eugen
Heavy Cruiser. She took part in some of the most dramatic actions of World War II: by Fregattenkapitän a.D. Paul Schmalenbach who was her Gunnery Officer and is now a naval historian.

7. HM Motor Torpedo Boats:
THE VOSPER 70ft BOAT
This class of boat formed the backbone of Coastal Forces' Motor Torpedo Boats during World War II. The development of the boat, the resultant tactics and strategy and the action reports are described by the author, David Cobb, R.O.I., R.S.M.A., the marine artist, who was himself a Commanding Officer and MTB Controller.

8. Kriegsmarine U-107
The life history of a German World War II submarine, described in detail by the world's leading authority on U-boat warfare, Dr. Jürgen Rohwer, Head of Modern Historical Section, Bibliothek für Zeitgeschichte, Stuttgart.

9. USS Charles Ausburne
DD 570, Fletcher Class destroyer, of Admiral Arleigh (31-knot) Burke's famous Squadron. This fighting destroyer saw operational service from World War II until the Vietnam War: by Lieutenant-Commander W. H. Cracknell, USN, author of *Warship Profile Hornet.*

10. HMS Illustrious
Aircraft Carrier, 1939–1942. The history of this ship will appear as two Profiles during the same month: From design stage to her major refit in America. This phase includes her attack on Taranto (the first carrier-borne attack in history, to be copied later by the Japanese at Pearl Harbour) and her terrible punishment suffered off Malta at the hands of the Luftwaffe: by Lieutenant David Lyon, R.N.R., M.A., author of *Warship Profile Cossack.*

11. HMS Illustrious
Aircraft Carrier, 1942–1946. Following the US refit, through the Madagascar landings to her final recall after her active service in the Pacific theatre of war: by J. D. Brown, a former Royal Naval aviator, author of *Aircraft Profile 224*, *Supermarine, Walrus and Seagull variants* and 'Carrier Operations of World War Two'.

12. IJN Kongo
Battleship. This ship, the world's largest warship of the time, saw continuous action until she was finally sunk in April 1945: by a Japanese author yet to be commissioned.

13. HMS Exeter
8-inch-gun Cruiser, 1928–1942. Her life includes the *Battle of the River Plate* against *Admiral Graf Spee* (*Warship Profile No. 4*) and the *Battle of the Java Sea*: by Robin Tonks, M.A., Assistant Director of Studies and Head of History Department, Britannia Royal Naval College, Dartmouth.

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