

# AFV

# 14

## CARRIERS

FIVE SHILLINGS







*Universal Carrier Mark II with Canadian crew south of Caen in the battle for Falaise, August 9, 1944. Note mudguard shape and Stacey towing attachment. Vehicle has been modified as a medium machine-gun carrier.*

# Carriers

By Peter Chamberlain and Duncan Crow

“IS a Bren gun carrier an AFV?”

That was a question in the military quiz which appeared regularly in the Army Bureau of Current Affairs’ fortnightly publication *War*. This one was in issue No. 19 of May 30, 1942. The date is interesting because by mid-1942 carriers were preponderantly of the Universal type; but the name Bren stuck and for most of World War II was eponymous for carrier.

It is almost impossible that anyone who saw *War* did not know what a Bren carrier was. The carrier was the most ubiquitous vehicle in the British army and in any general action photograph there is almost invariably a carrier somewhere in shot. But only, it must be added, if the photograph is of British or Commonwealth troops. The tracked carrier was peculiar to the British and Commonwealth armies—although when carriers fell into enemy hands they were soon put to use.

But while most *War* readers must have known what a Bren gun carrier was, it is probable that many could not answer the question correctly. The answer was:

“No. It is a fire power transport. Its crew fight dismounted.”

In practice, however, this was not always true. The carrier was often an AFV in deed, if not in name.

## EARLY DEVELOPMENT

The carrier stemmed from the idea of giving armoured mobility to infantry—“armoured skirmishers” the French General Estienne envisaged them as. Development in Britain began simultaneously at two points in 1925. Major (later Lieutenant-General Sir Gifford) le Q. Martel, who had been G.S.O.2 at Tank Corps H.Q. in France during the war, built a “one-man tank” at his home near Camberley; and Captain (later Sir John) Carden, who was to become one of Britain’s most brilliant and ingenious tank designers, built a one-man track-laying vehicle at the garage in London which he managed for Captain V. Loyd.

Martel’s vehicle was a “one-man tank” in two senses. Not only was it designed to carry one man, but it was built by Martel himself alone. In the evenings when he got home from his job at the War Office, and at week-ends, he constructed his “tankette”—as this type of vehicle came to be called—using the engine from an old Maxwell car and the back-axle from a Ford lorry. The tracks, which were the most costly item, were specially made for him by the Roadless Traction Company, the firm founded by another famous tank designer, Lieut.-Colonel Philip Johnson of Medium D fame. In all, Martel’s out-of-



pocket expenses were about £400. In August 1925 the home-made tankette was tested on the heathland outside his garden gate. Its performance, according to Liddell Hart in his history of *The Tanks*, was 20 m.p.h. on the level, 6-8 m.p.h. on rough ground, and up hill it climbed four-foot banks and slopes of 1 in 1. It was eight feet long, five feet high, and four-and-a-half-feet wide. The track was shorter than the length of the vehicle and a pair of wheels was added at the back "to steady the machine, increase its gap-crossing span, and check the risk of overturning when climbing a steep bank."

After the demonstration the War Office ordered four Martel machines, which were built by Morris Motors using ordinary commercial parts except for the tracks and the armour. There was a 16 h.p. engine and the weight of the machine was just over two tons. The first two were delivered in March 1926, one of which was a two-man version as it was decided that one man would not be able to carry out all the duties effectively. In subsequent models the tankette's length was increased to twelve feet, the tracks being seven feet long. Eight of the two-man improved models were built for the Experimental Mechanized Force and during the two years of the Force's existence they proved more reliable than eight Carden-Loyd machines which were also built for and issued to the Force. But Morris Motors were too busy with building cars and Martel was too busy at the War Office to develop the Morris-Martel tankettes any further, and it was through the Carden-Loyds that the main stream of carrier development continued.

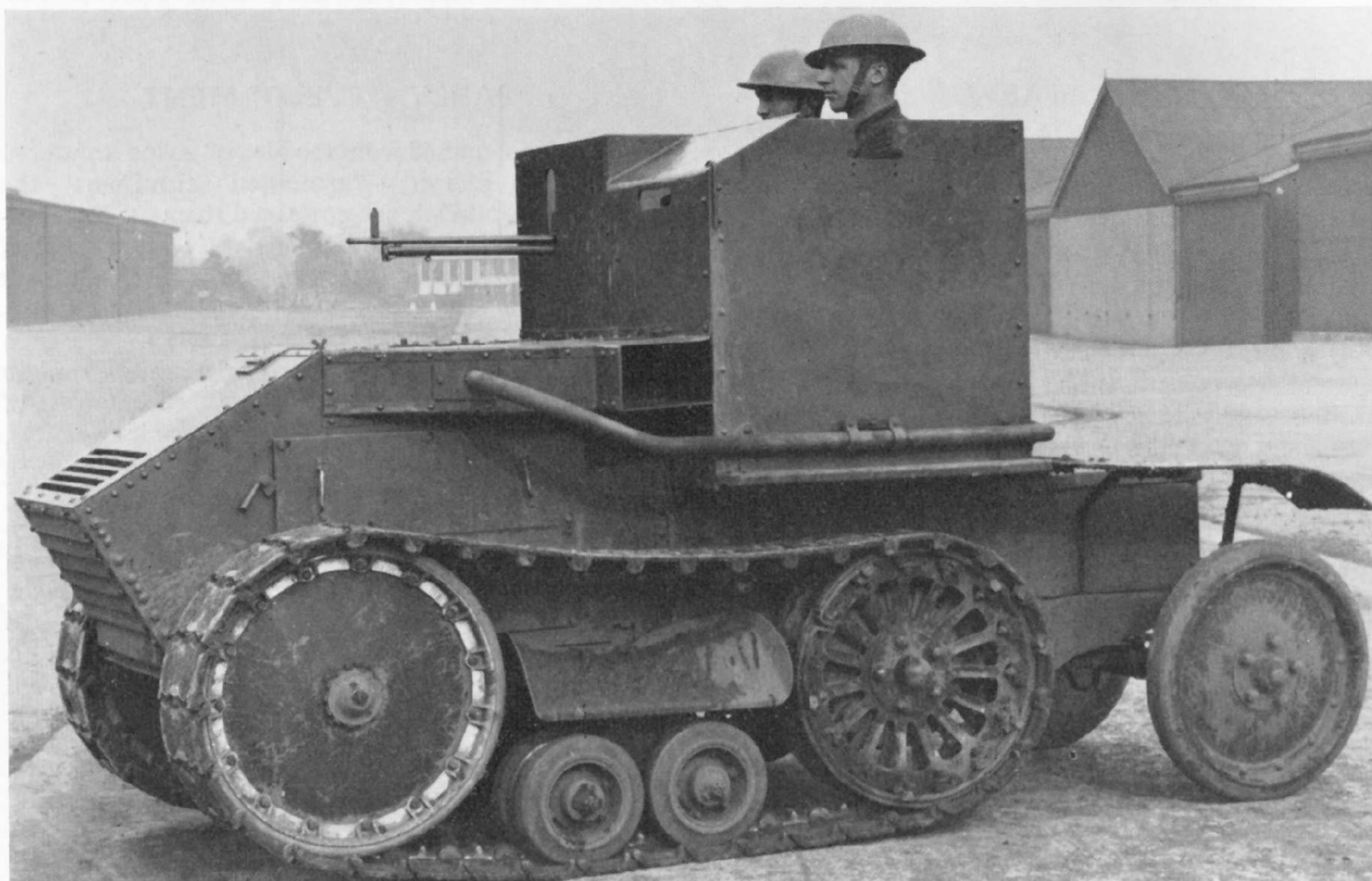
Carden's first machine had emerged from a cycle-car that he built soon after the war as a way of

making motoring inexpensive. While his cycle-car was popular with the public his experimental machine for giving the individual infantryman mobility aroused no interest in military quarters until Martel's machine was described by Liddell Hart in the *Daily Telegraph* of which he had just become military correspondent. Carden sought Martel's advice. Martel suggested he contact Colonel (later Major-General) S. C. Peck, Director of Mechanization at the War Office. Peck backed the idea, and a machine was ordered.

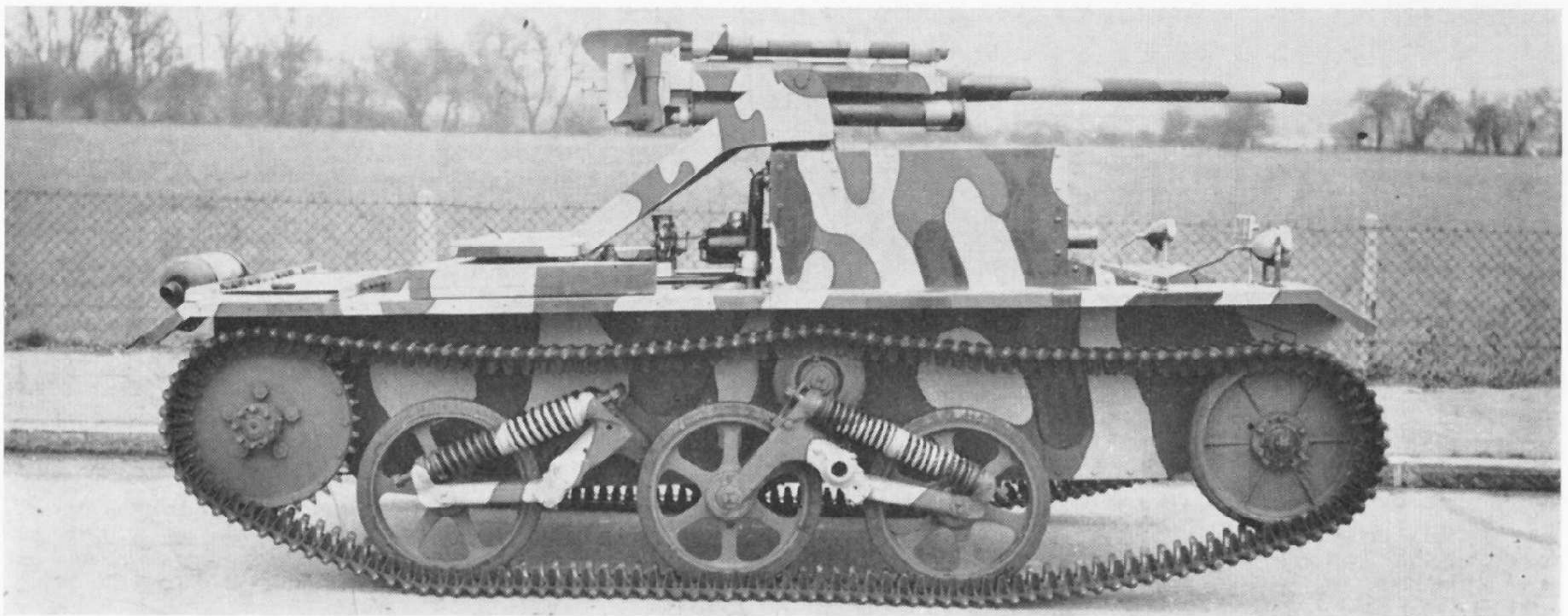
From this beginning the Carden-Loyd Tractors company improved on the design, producing seven successive types, mostly with a wheel and track device and mostly of one vehicle only, until the Mark IV arrived. It was eight of this type that were built for the Experimental Mechanized Force. Thereafter came a Mark V, and then a Mark V\* which was the first vehicle to be produced by the newly-merged Vickers-Carden-Loyd company. In 1928 the Mark VI appeared.

The Carden-Loyd Mk. VI Light Armoured Vehicle soon became one of the most talked about military vehicles ever produced. Basically it was a low two-man machine weighing 1.5 tons and capable of a speed of 25 m.p.h. It proved to be the progenitor of a long line of tracked carriers. Nearly 400 Mark VIs were built, some of them experimental models in a search for a more battle-worthy machine, others for use in a variety of ways. Mark VIs were used as tankettes, carriers of light and medium machine-guns, mortar carriers, smoke projector carriers, and light gun tractors. In the machine-gun carrier rôle the Vickers machine-gun could be dismounted from the front of the vehicle and re-mounted on a tripod that was normally carried on the front left side.

*Morris-Martel two-man Tankette. Eight of these machines were built, with eight Carden-Loyd Mark IVs as experimental scout machines or the Experimental Mechanized Force of 1927.*







*Tractor with 40 mm. Equipment. The VA.D50 tractor with re-worked suspension and converted as a self-propelled mount for a Vickers 40-mm. gun.*

## MACHINE-GUN CARRIERS

The next stage in carrier development occurred in late 1934 when, as a commercial project, Vickers-Armstrong built a vehicle that could be adapted to the rôles either of a machine-gun carrier or of a towing tractor for a light field gun. The vehicle, VA.D50, was fitted with Horstmann-type suspension with solid idler wheel and two return rollers on each side. The driver and front machine-gunner were enclosed in an armoured compartment, and there was a bench with a folding back on each side of the vehicle behind this compartment for seating the independent machine-gun unit or the field gun crew.

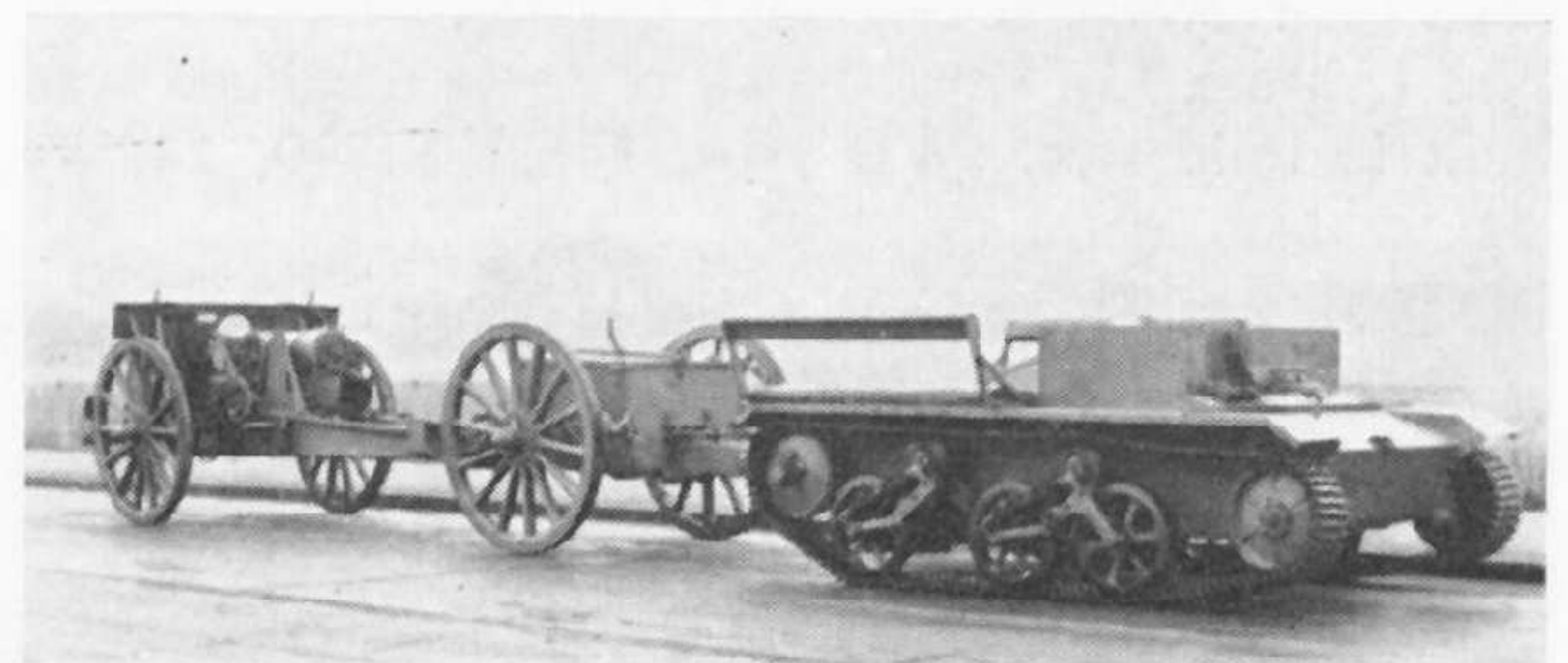
This vehicle was later tested as a self-propelled mount for a 40-mm. Vickers gun and was designated Tractor with 40 mm. Equipment. The conversion consisted of mounting the gun and trail on the engine behind the driver's compartment to achieve a 360 degrees traverse; other changes included the removal of the folding seats and the reversal of the front suspension unit with a reduction to one return roller each side.

On February 1, 1935, a meeting was held at the War Office to discuss this new type of vehicle as a replacement for the expensive and complicated light dragons then in use as gun towers. The War Office decided to purchase two modified versions of this machine for test purposes, one as a machine-gun carrier, the other as a light dragon. Designated Light Dragon Mark III, 69 of the vehicles in the latter rôle were eventually built. "Dragon", incidentally, was a generic name given to certain tracked vehicles used for gun-towing or troop-carrying.

In the machine-gun carrier rôle the vehicle was to have a driver, gunner, and machine-gun in an armoured front section so that enemy fire could be returned as the carrier advanced. There was also to be room to carry a machine-gun team of four men, with a machine-gun, tripod and ammunition, who could leave the carrier and operate independently. It was in fact to be a "fire power transport" as defined in the answer to *War's* quiz question.

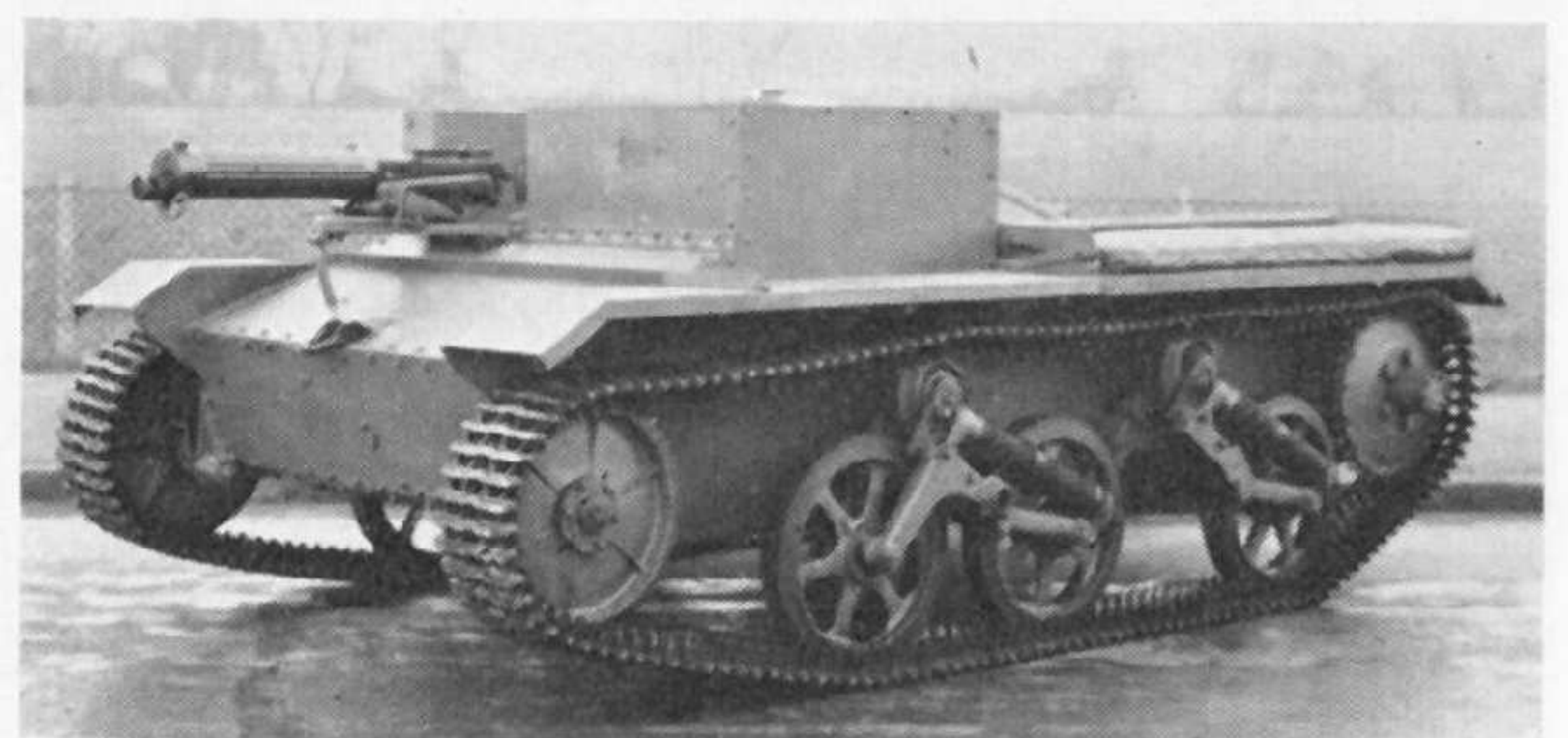
One machine, designated Carrier, Machine-Gun Experimental (Armoured) (WD No. T1583, Regd.

No. BMM939) was built to this specification. The basic chassis was similar to that of the 40-mm. SP equipment Tractor with improved suspension, but the top superstructure was considerably altered. The independent unit was seated on benches behind the compartment for the driver and the front gunner on either side of the Ford V-8 engine which was positioned centrally. The compartment for the driver and the front gunner was an armoured box with stowage bins fitted on each side, the engine was protected by steel hinged plates mounted on a frame, and the machine-gun unit was protected by two folding armoured back-rests fitted to the vehicle's rear sides which could be folded down inwards when not in

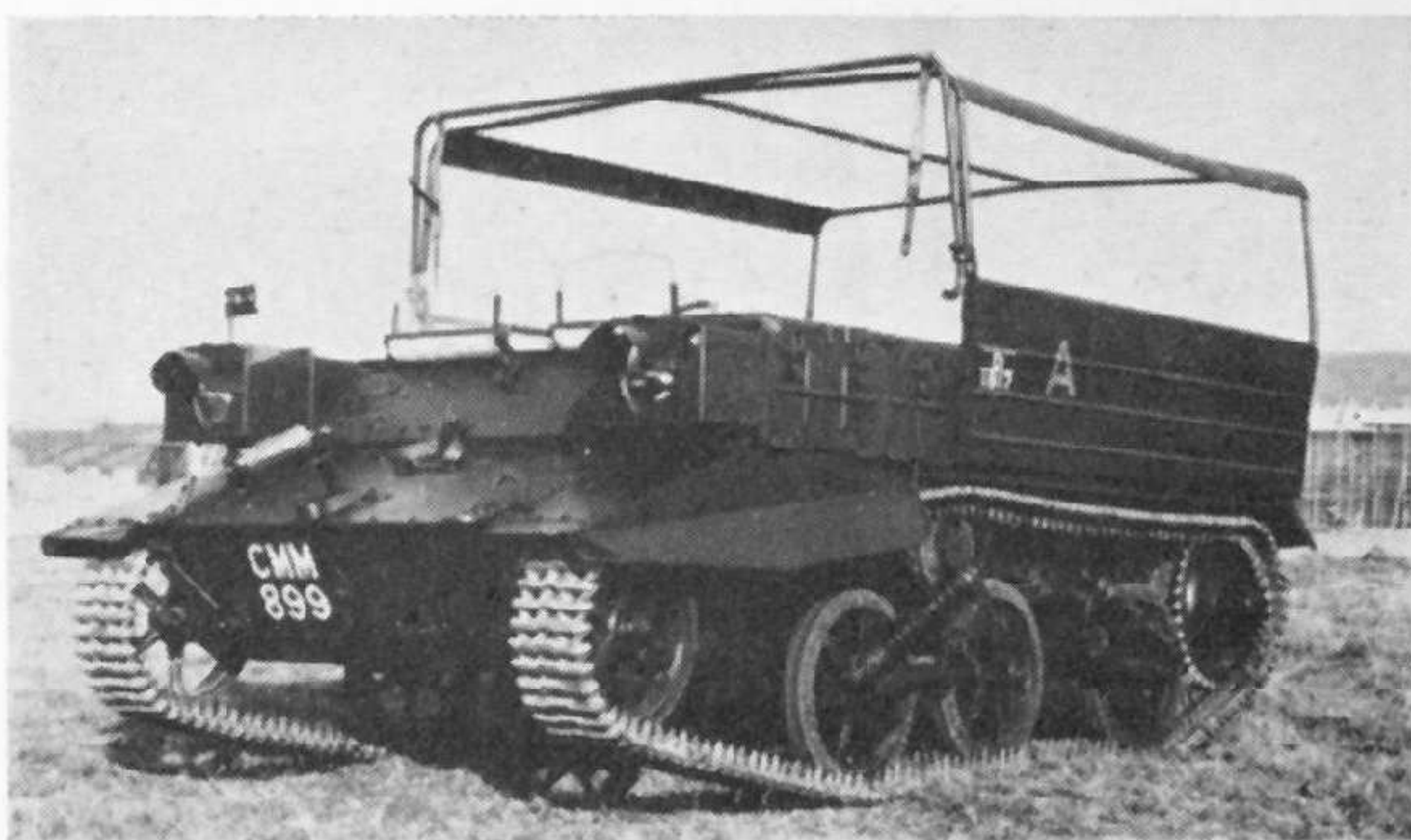


*VA.D50. This was a projected design by Vickers-Armstrong Ltd. as a light tractor to replace the Light Dragons in service as gun towers. Fitted with a modified coil spring Horstmann suspension. The driver and crew member sat protected in an armoured compartment with folding bench seats provided for the auxiliary crew. Note the mount for the fitting of a front Vickers machine-gun.*

*Three-quarter front view of VA.D50 with the Vickers machine-gun in position.*







*One of the two experimental machines ordered by the War Office, this version was to become the Dragon, Light Mark III. The suspension had again undergone modification, being strengthened and fitted with a new type of idler wheel.*



*The second experimental machine, designated Carrier, Machine-Gun, with same type of chassis as that of Light Dragon Mk. III but with superstructure adapted for its rôle of machine-gun carrier. Note stowage bin and folding armoured side, and one of the methods of mounting the machine-gun.*

use. In 1937 the vehicle was given a converted superstructure and called a General Service Vehicle. Around the top of the front gunner's compartment was fitted a grooved rail in which was enclosed a four-wheeled pinion mount carrying a Boys anti-tank rifle. The gunner was able to use this travelling mount to traverse the gun from the front to the side of the vehicle. A Bren LMG was carried in the normal machine-gun housing. This was an experimental prototype for the Scout Carrier.

In the next version of the machine-gun carrier the fundamental decision was taken to abandon the idea of carrying an independent machine-gun crew. The crew was reduced to three with just the front machine-gun, fitted with a small armoured shield, as armament. The folding sides were dispensed with and the left side of the superstructure was made a fixture forming a compartment for the third member of the crew. The right side of the vehicle was left open and was used for stowage. Designated Carrier, Machine-Gun No. 1, Mark I, a small batch of these machines was built in mild steel (WD Nos. T1828-T1840, T1921)

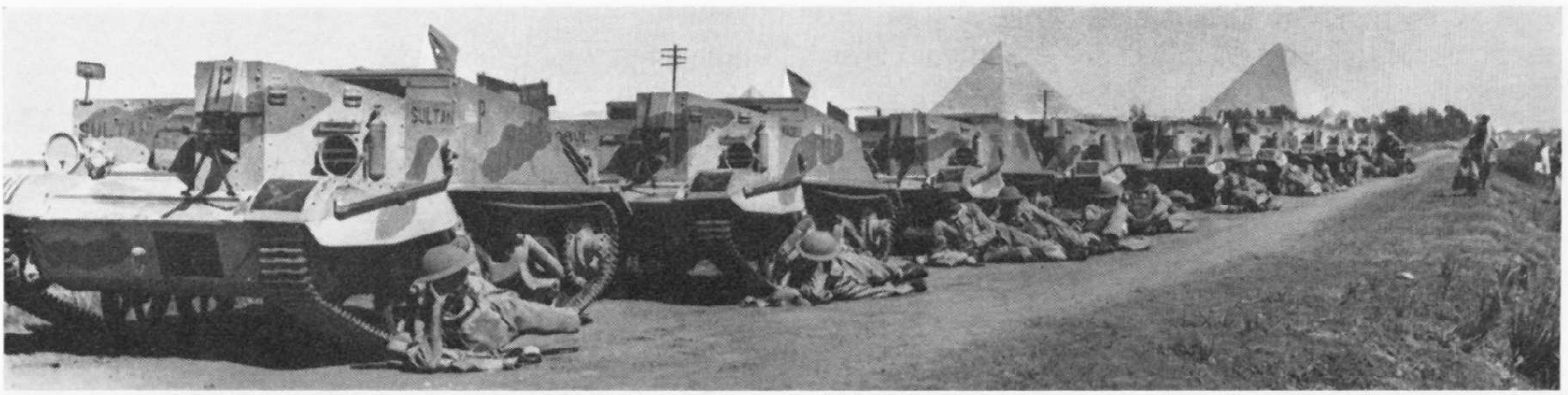
and introduced into service in 1936. Weight was 3.15 tons, armour was 10 mm. basis, engine was a Ford V-8 30 b.h.p. (liquid cooled). Six of these machines were later converted as pilot models for Carrier, Machine-Gun No. 2, Mark I, Cavalry Mark I, and Scout Mark I, while the remainder were used as instructional machines. Carrier, Machine-Gun No. 1, Mark I, was the prototype of the Machine-Gun and Bren carrier series.

Carrier, Machine-Gun No. 2, Mark I, appeared early in 1937. It was basically similar to No. 1, Mark I, but with a number of improvements. The Vickers machine-gun was mounted in an armoured housing on the left front, the engine air ducts which had been introduced on the No. 1, Mark I were modified, the steel boxes on the headlamps which the No. 1, Mark I had were removed, and a stowage box was put on the right side of the vehicle. The superstructure on the left side was improved and an armoured folding back-rest was fitted for the third man's protection and comfort. These vehicles were later equipped with the Bren LMG and/or with the

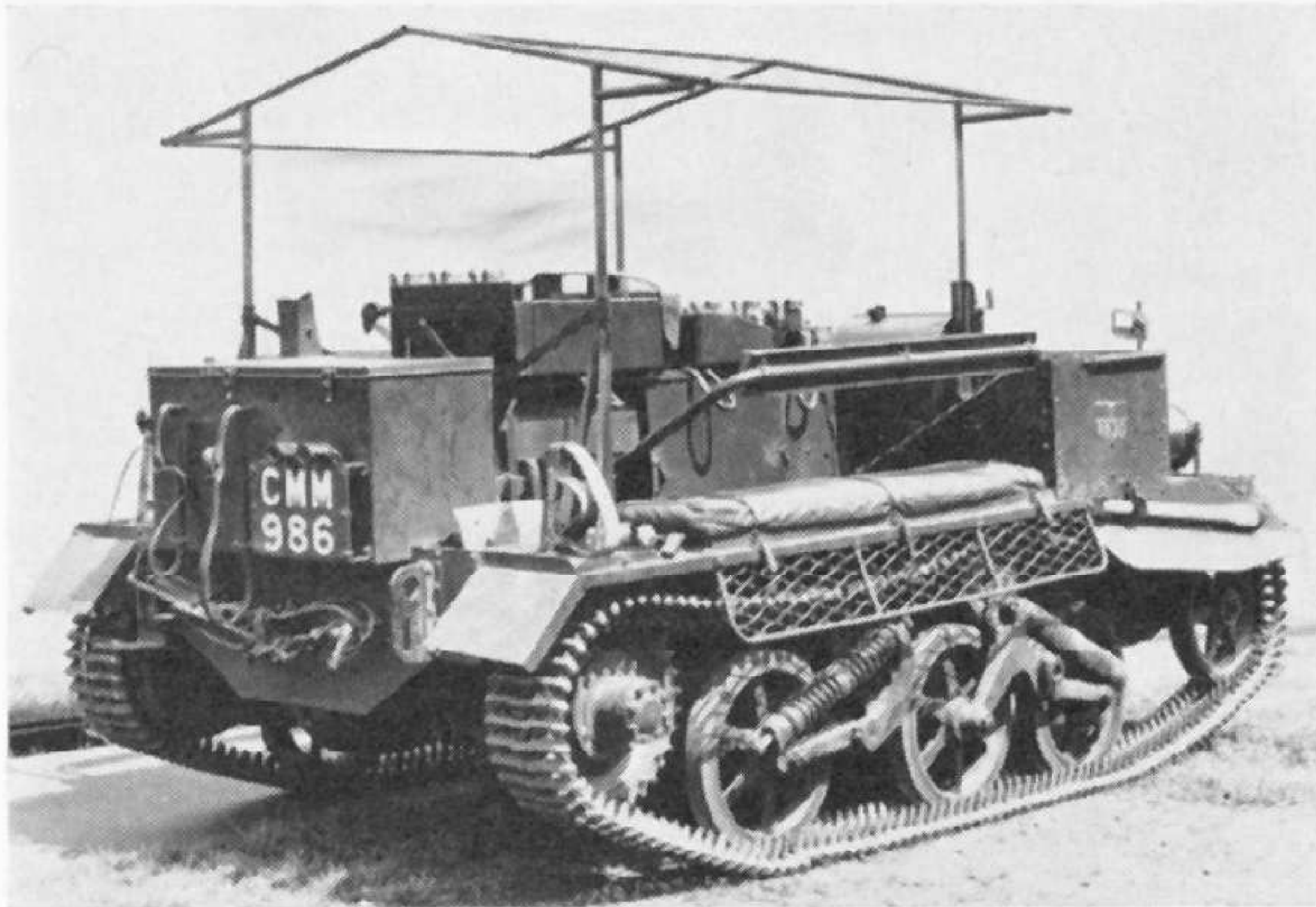
*Carrier, Machine-Gun, No. 1, Mark I. Developed from the Experimental Machine-Gun Carrier, this was the prototype of the carriers of the Machine-Gun and Bren series. The view shows the armoured box front headlamps and the small armoured shield for the machine-gun.*



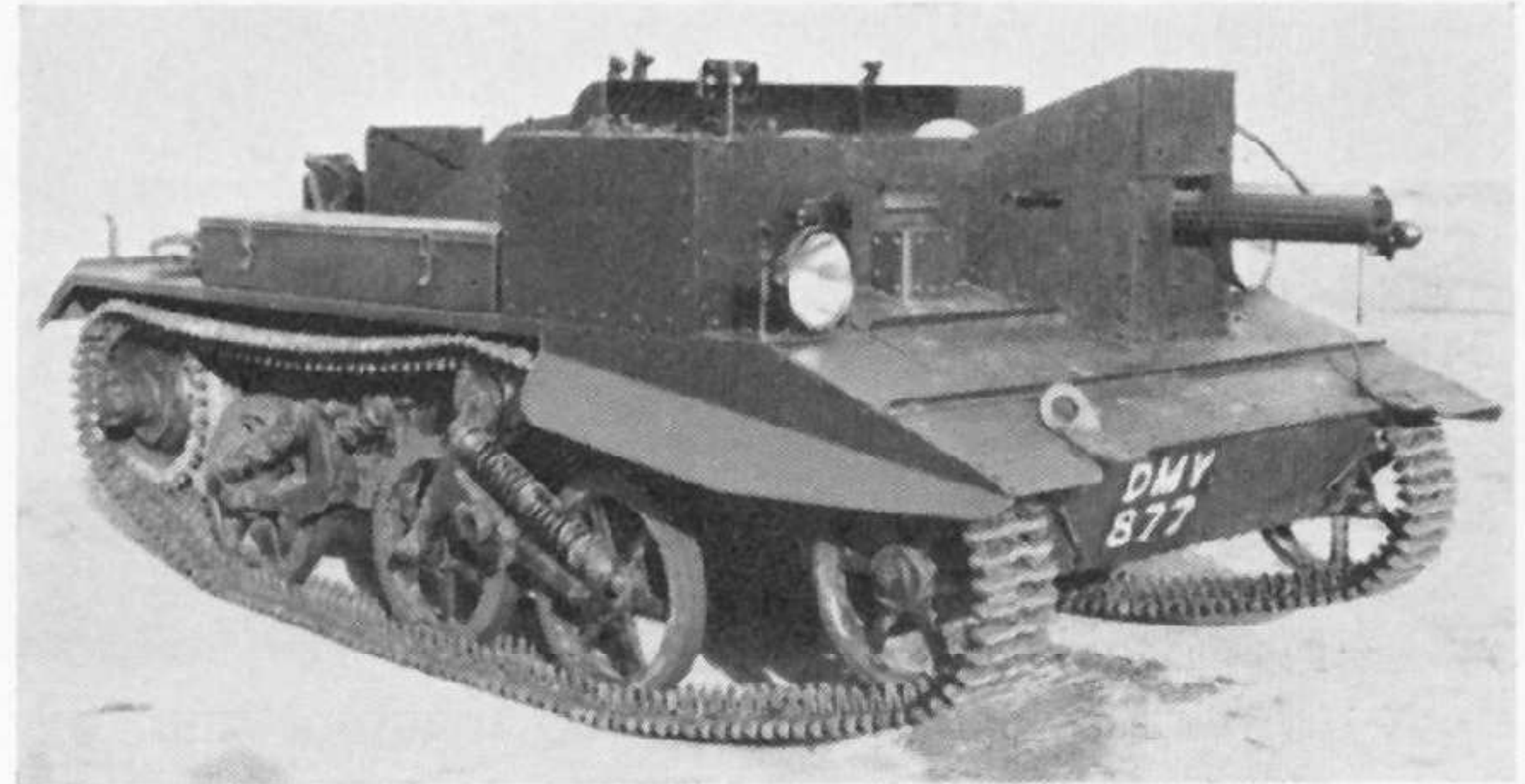




*Bren Carriers of 4th Indian Division resting on a desert road march in Egypt, May 1940.*



*Above: Carrier, Cavalry Mark I. Picture shows the prototype vehicle of this series. As the personnel sat facing outwards, safety guards were provided to protect their legs; a hinged hand rail was also fitted.*

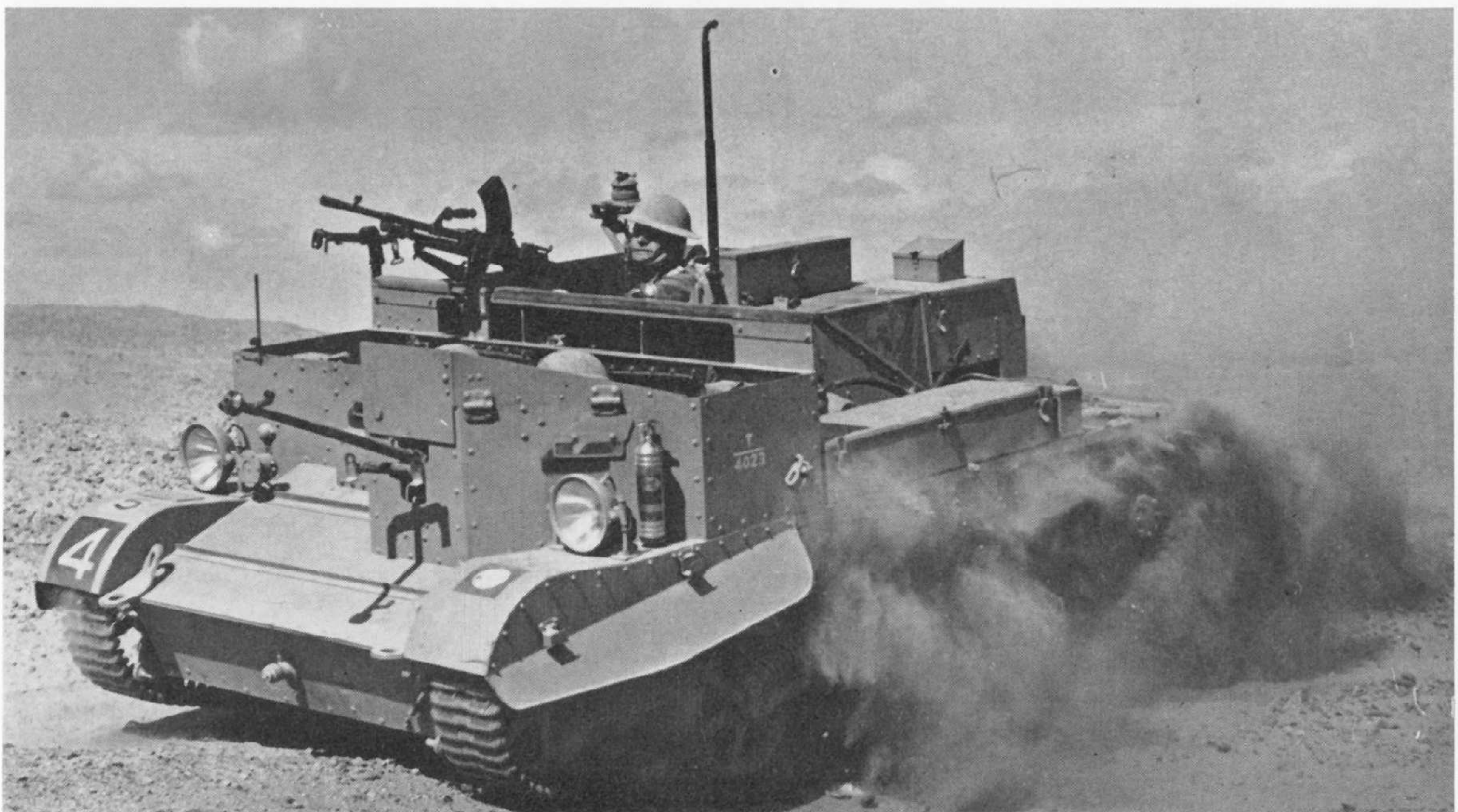


*Top right: Carrier, Machine-Gun No. 2, Mark I. View shows the redesigned front superstructure that was typical of the Bren and Universal Carriers.*



*Bottom right: Bren Carrier showing right side. Bren is on AA mounting, Boys anti-tank rifle in left front.*

*Below: Carrier, Scout Mark I, showing the pedestal-mounted Bren gun, with an alternative anti-aircraft mount. On this class of vehicle the built-up superstructure was reversed from that on the Bren Carrier.*





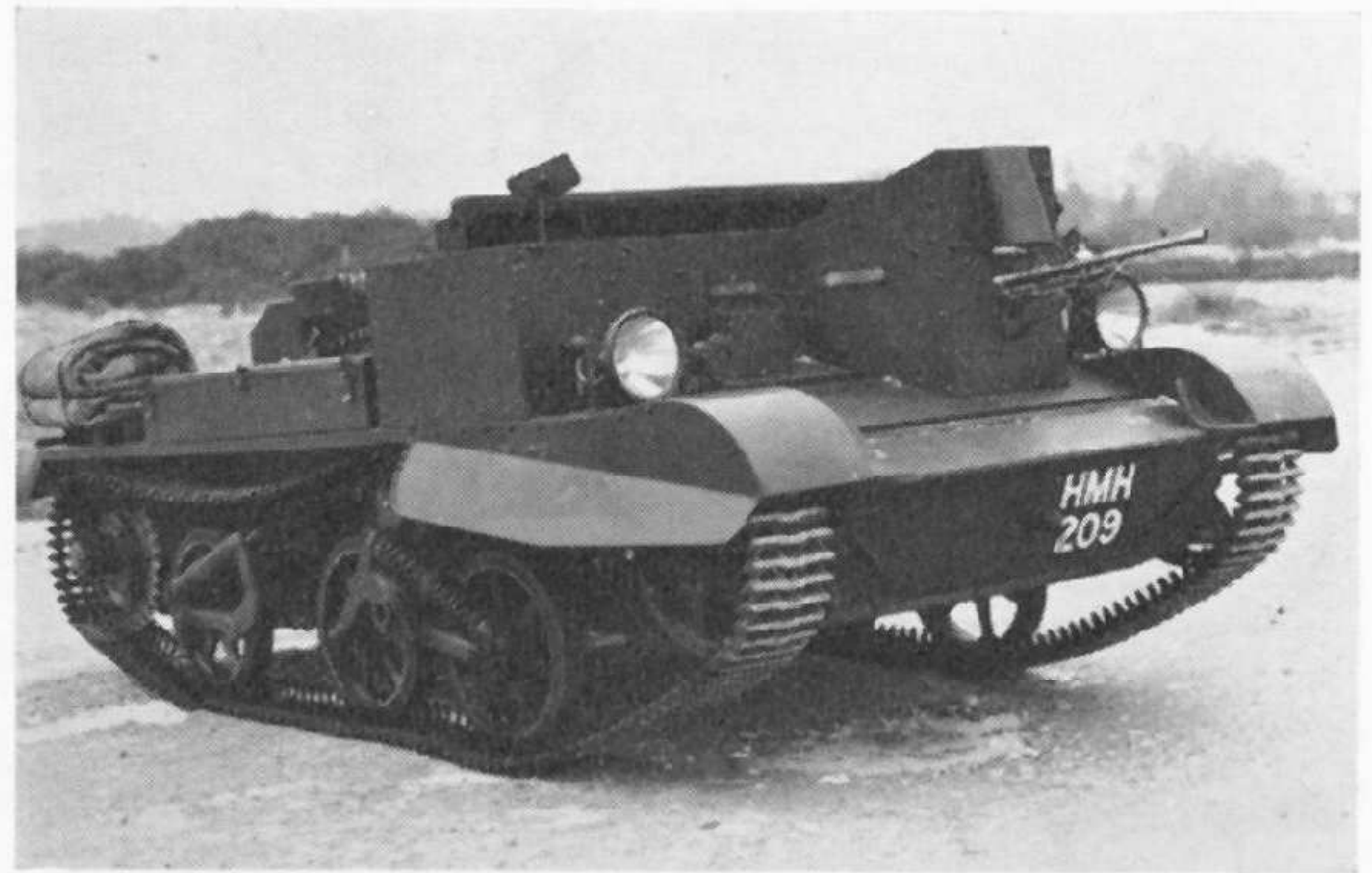
Boys anti-tank rifle which replaced the Vickers .303 machine-gun and were re-worked to Bren carrier standards.

During 1938 one of these No. 2, Mark Is was fitted with a 2-pdr. mounted above the engine and arranged to fire to the front through a fixed shield. The ammunition was carried in racks on the off-side of the gun. The crew numbered four and the vehicle (T2335/FME890) weighed 3.9 tons.

After Vickers had built 43 No. 2 Mark I carriers (T2294-T2336) their work on this type of vehicle came to an end. The development work which went back to Carden's first experimental machine and the production of thousands of carriers which was to follow now passed to other firms. These included Thornycroft (which built No. 2 Mark Is numbered T2531-T2621), Morris (T2832-T2982), Aveling Barford (T3231-T3291), and Sentinel Wagon (T3716-T3915).

### THE BREN CARRIER

Built primarily to carry a medium machine-gun, the No. 2 Mark I carrier was modified late in 1938 to mount the Bren Light Machine-Gun, which was a Czech weapon modified by the small arms section of the Director of Artillery's Design Department. In their new guise, with improved armour protection and modified machine-gun housing, some of them mounting a Boys anti-tank rifle as well as or instead of a Bren, the carriers were designated Carriers, Bren, No. 2, Marks I and II.



*Carrier, Bren, No. 2, Mark I. Basically the Carrier, Machine-Gun, No. 2, Mark I, but adapted to carry the Bren light machine-gun.*



*Carrier, Bren, No. 2, Mark I. Three-quarter rear view showing the built-up left side.*

*Carrier, Armoured, 2-pdr. Conversion of the Carrier, Machine-Gun, as a self-propelled mount for a 2-pdr. gun. The view shows the ammunition racks on the right-hand side of the fixed armoured shield.*







*Scout Carriers of the British Expeditionary Force in France, September or October, 1939. Note left side open for stowage. Rear vehicle has base for wireless aerial fitted.*

The weight of the carrier laden was 3.75 tons, the engine was a Ford V-8 85 b.h.p. (liquid cooled), speed was 30 m.p.h., and there was a crew of three. Bren carriers were issued to British infantry on the scale of ten per battalion and first saw action in France and the Low Countries in 1940. It was the beginning of a long battle experience for carriers.

The pilot model of the Bren carrier, a re-worked Carrier, Machine-Gun No. 2, Mark I, was converted by Thornycroft. Production was carried out by Thornycroft and other firms. WD numbers of the Bren carriers built were T2622-T2831, T2983-T3230, T3292-T3425, T4349-T4384, T4515-T4664, T4716-T5084, T5883-T5908—a total of 1,173. Production was also begun in Australia and New Zealand by 1941 and ended in 1943 after a total of 5,501 machines had been built in the Antipodes. The Australian version was welded, whereas the Bren carriers produced in Britain were of riveted construction.

## SCOUT AND CAVALRY CARRIERS

Also introduced into service before the outbreak of World War II in 1939 were two variants of the Bren carrier. The first of these was the Carrier, Scout, Mark I. This was very similar to the machine-gun and Bren carriers but provision was made for carrying either an extra man or a No. 11 wireless set, the batteries for which were stored in a bullet-proof box housed on the rear axle cover plate. Wire screens were put over the openings in the rear of the engine cover to suppress interference. In the Scout Carriers the built-up superstructure was reversed (except in the pilot model T1834/CMM992). A Boys anti-tank rifle was mounted in the front and there were sockets in the rear compartment for the Bren gun. The

vehicle weighed 3.25 tons unladen. 647 were built, their WD numbers being T3966-T4165, T4485-T4514, T5255-T5550, T5616-T5756.

Scout carriers were designed for the Mechanized Divisional Cavalry regiments of which there were seven in the BEF in 1939-40. Each regiment had 28 light tanks and 44 scout carriers.

Major P. E. C. Hayman, Technical Adjutant of the 15th/19th King's Royal Hussars, which was one of the Mechanized Divisional Cavalry regiments with the BEF in 1939-40, described the scout carrier in the following somewhat uncomplimentary terms in an appendix to the regimental history (by Major G. Courage, Gale and Polden, 1949, p. 267):

“The scout carrier was a low-sided open box on tracks divided into three compartments. Across the full width of the front was a compartment for the driver and gunner or Commander; behind this, down the centre of the carrier, lay the engine, a 90-b.h.p. Ford V-8, and transmission on either side of which (and close against them) were narrow compartments for the rest of the crew which totalled four and, in the Troop Commander's carrier only, a wireless set which replaced one man. The carrier was thus cramped and uncomfortable, open to the elements, yet made desperately hot in summer, especially for the crew in the side compartments, by the engine. It was also even more vulnerable than the light tank: its armour, 10-mm. in front and 7-mm. elsewhere, was proof only against small arms fire and splinters and except at the front was too low to provide complete cover to the crew. It must, however, be remembered that the carrier was not intended to be used tactically as an AFV in armoured battles [although, perforce, it was often used as a close contact fighting vehicle in May-June 1940], nor indeed, apart from its lack of armour, could it do so successfully with the armament provided. This consisted of a .303-



inch Bren LMG which could be fired either from a limited traverse mounting in the front compartment or from rests fitted in the sides and back of the carrier, and a Boys .55-inch single shot anti-tank rifle which could be fired from the front compartment or the ground.

“Mechanically, perhaps the most interesting feature of the carrier was its steering system: for sharp turns one track could be slowed down and the other speeded up—a process that could be continued until one track was locked and a skid turn resulted—but for gradual turns both tracks could be disaligned by forcing the centre bogie wheels away from the hull to left or right.”

While the scout carrier had the rôle of reconnaissance the second variant, the Carrier, Cavalry, Mark I, was designed to carry the dismounted personnel of the cavalry light tank regiments in the Mobile Division. With the evolution of the Mobile Division into the Armoured Division and the change in its organization the rôle for the Cavalry Carrier disappeared and only 50 were built (all by Nuffield, WD numbers T3916-T3965). The vehicle had seating accommodation for six men in addition to the driver and gunner, benches being fitted on either side behind the driver's compartment which was the only part that was armoured. A metal frame was fitted to carry a canvas hood for protection against the weather. The engine cover had sliding access doors and a louvre at the rear.

A third variant, which was virtually a variant of the scout carrier itself, appeared soon after September 1939. Known as Carrier, Armoured OP, Marks I and II, it was designed for use in the Royal Artillery as an armoured observation post. The principal modification from the scout carrier was an adjustable shutter in the machine-gun housing instead of the gun aperture. This was to allow protected vision for binoculars. The armoured OP carriers

had a No. 11 wireless set, a cable drum fitted at the rear, and a Bren LMG. Ninety-five were built (T5984-T6078).

## THE UNIVERSAL CARRIER

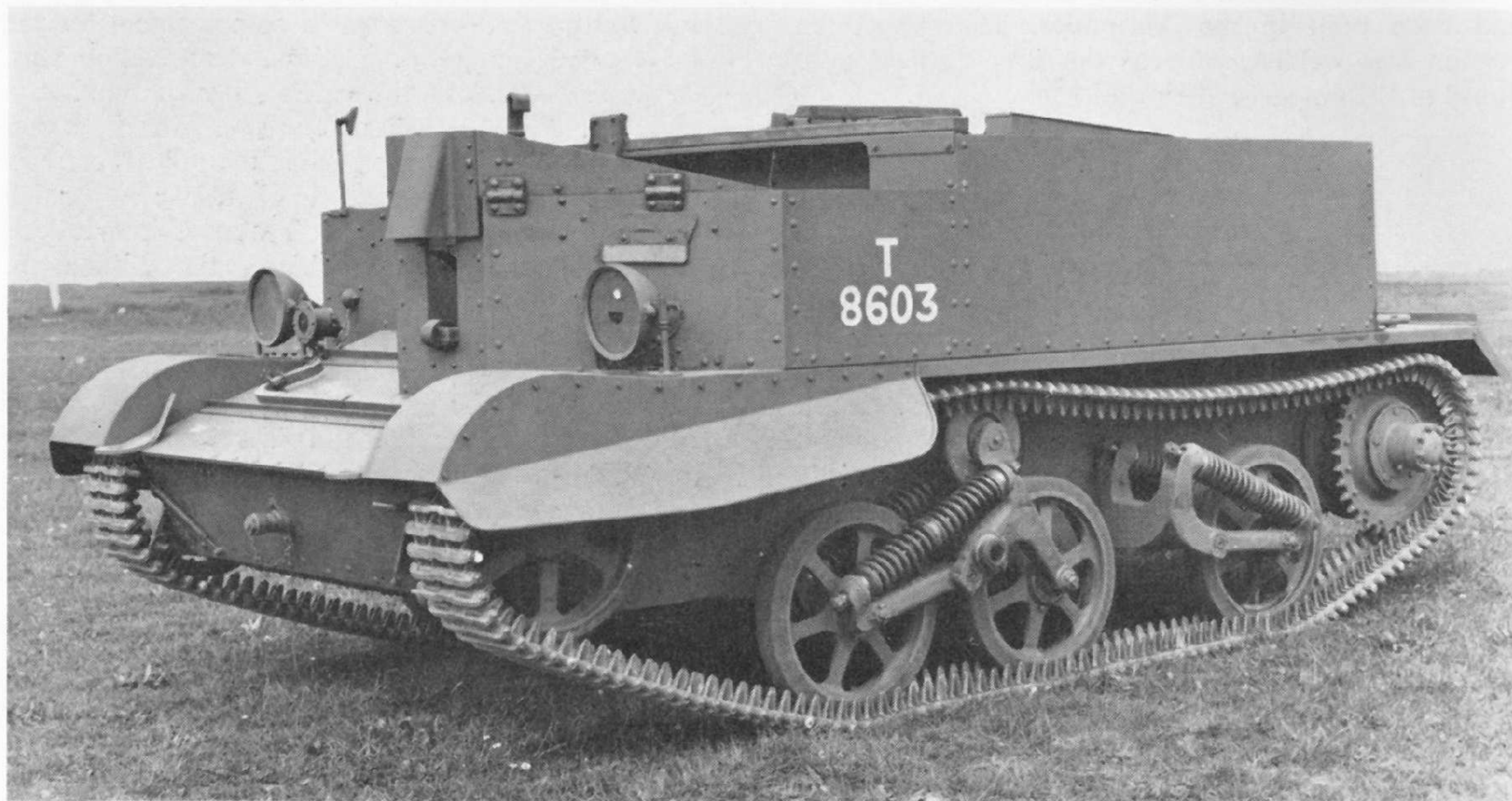
The proliferation of versions of a basic machine to carry out a variety of rôles was clearly uneconomic. Consequently in 1940 a Universal type of carrier was produced for all purposes, any special requirements being met by minor modifications. Designated Carrier, Universal, Marks I, II and III, this remained the standard combat carrier throughout the remainder of the war.

The general construction of the hull of the Universal was a combination of both the Bren and Scout carriers, but with protection plates on both sides, the earlier machines only having armour plate on one side—right on the Scout, left on the Bren. The engine cover had bullet-proof plates on top only, the side plates being of mild steel and easily detachable. Angular mud deflectors were fitted on the front track guards, and there was a rear step on each side of the vehicle.

The carrier had a front compartment for the driver and gunner and two rear compartments, the right-hand one for the third member of the crew, the left-hand one for passengers or gear. The main weapon fitted in the gun-housing varied; it was either a .303-inch Bren LMG or a .55-inch Boys anti-tank rifle, or—common practice on Australian carriers—a Vickers .303-inch medium machine-gun. When the Bren was fitted the vehicle was almost invariably, and erroneously, called a Bren carrier, retaining the old generic name.

In the front compartment the driver sat on the right with a car-type steering wheel mounted ver-

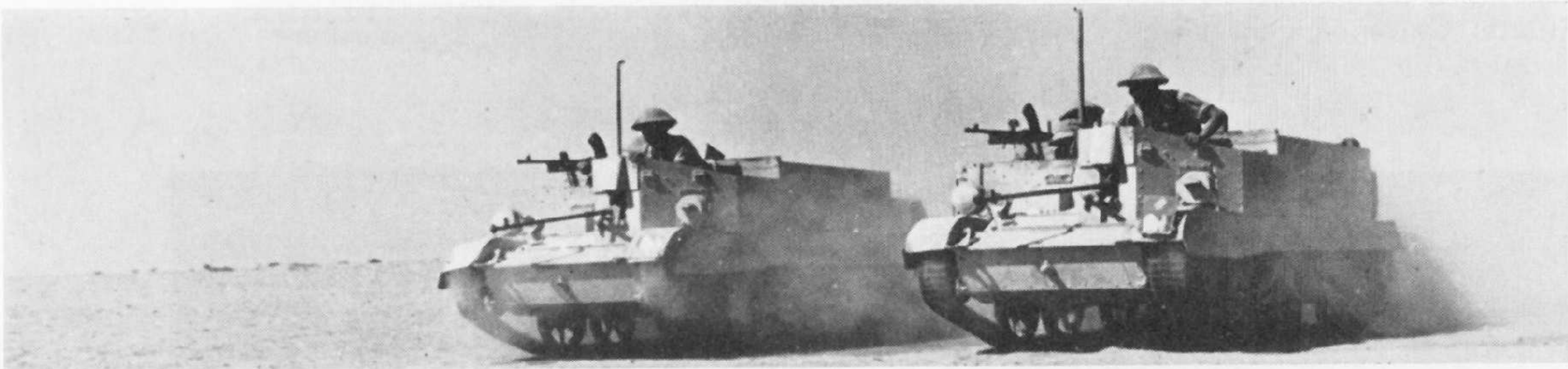
*Carrier, Universal, Mark I.*





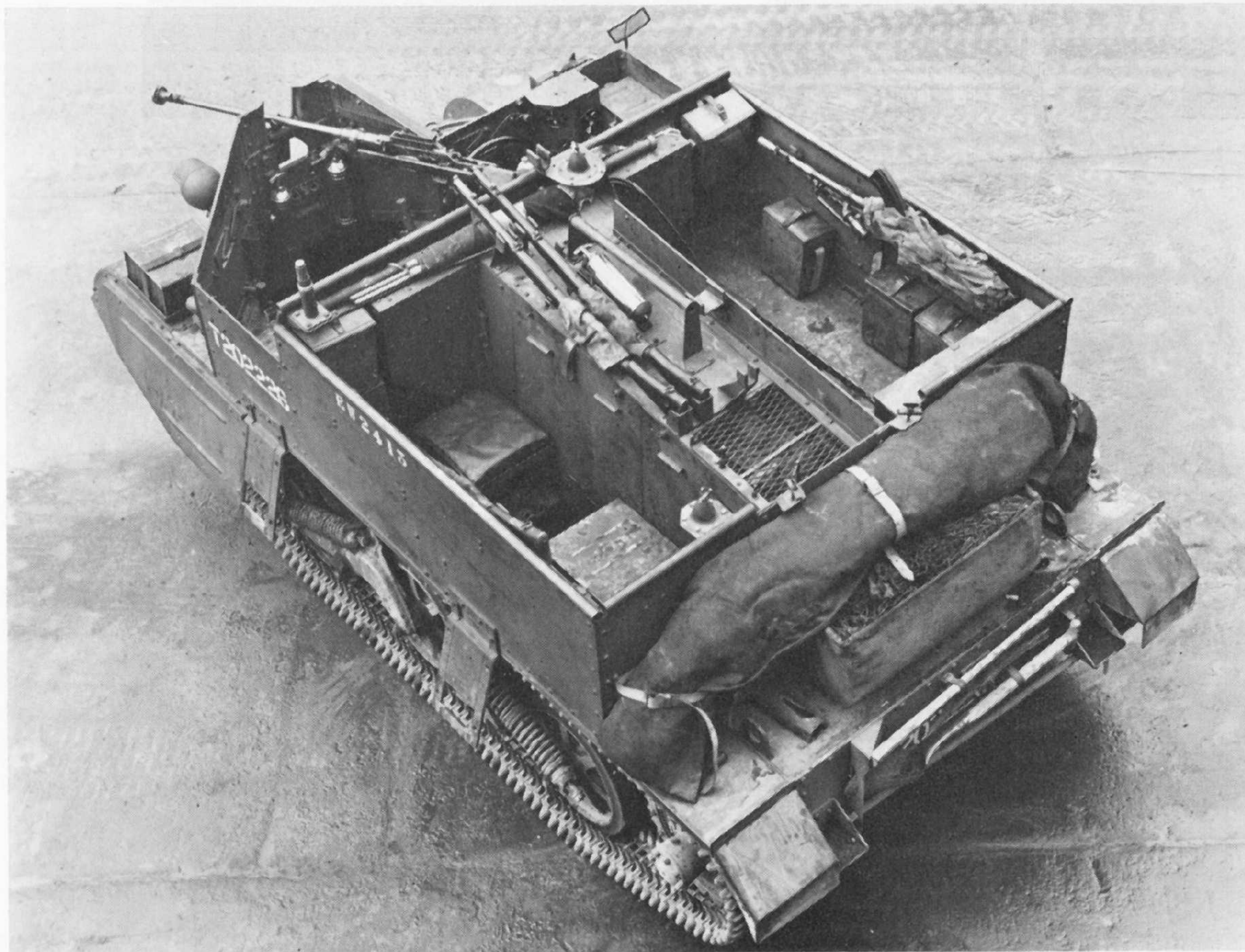


*Universal Carriers, Mark I, of 49th Division (the "Polar Bear" div.) in Iceland.*

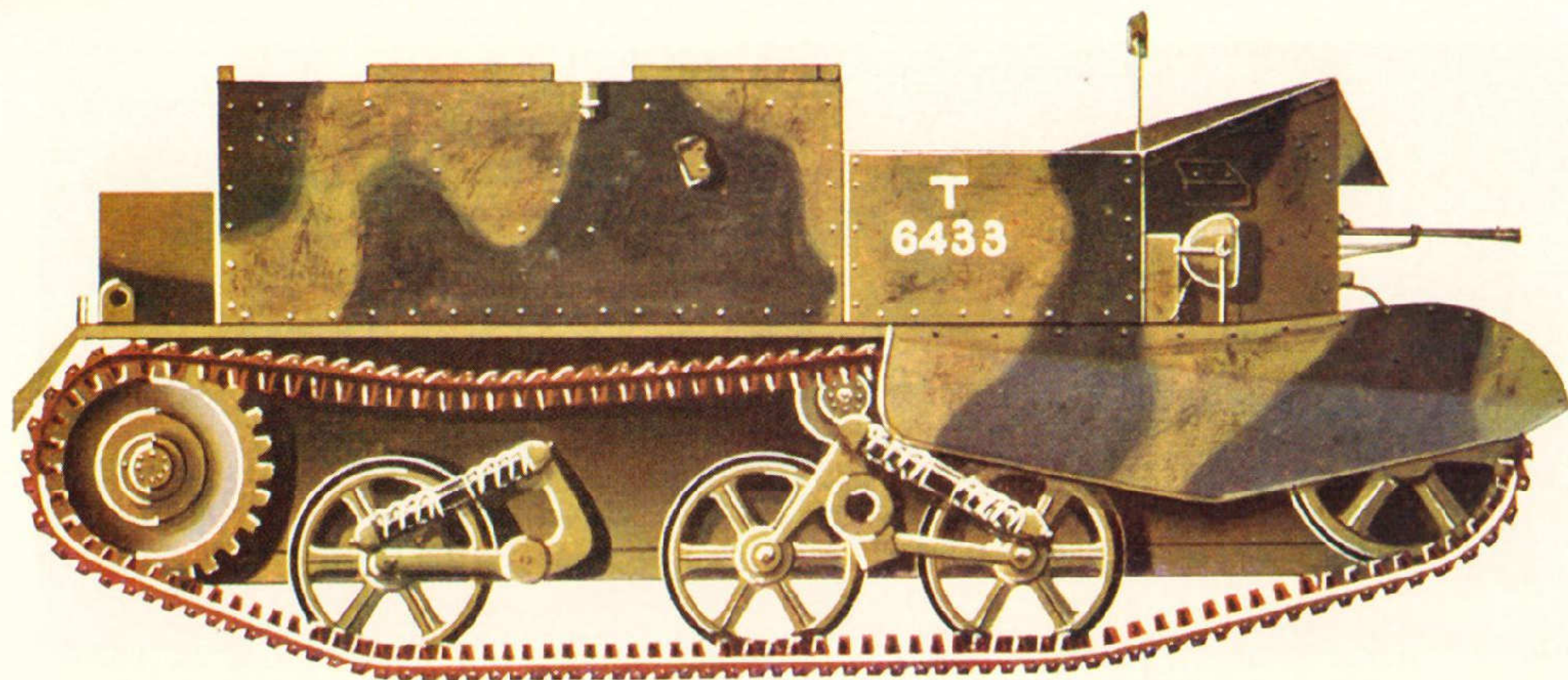


*Universal Carriers with sand shields, Bren gun, and Boys anti-tank rifle, manned by Free Greek troops in the Western Desert.*

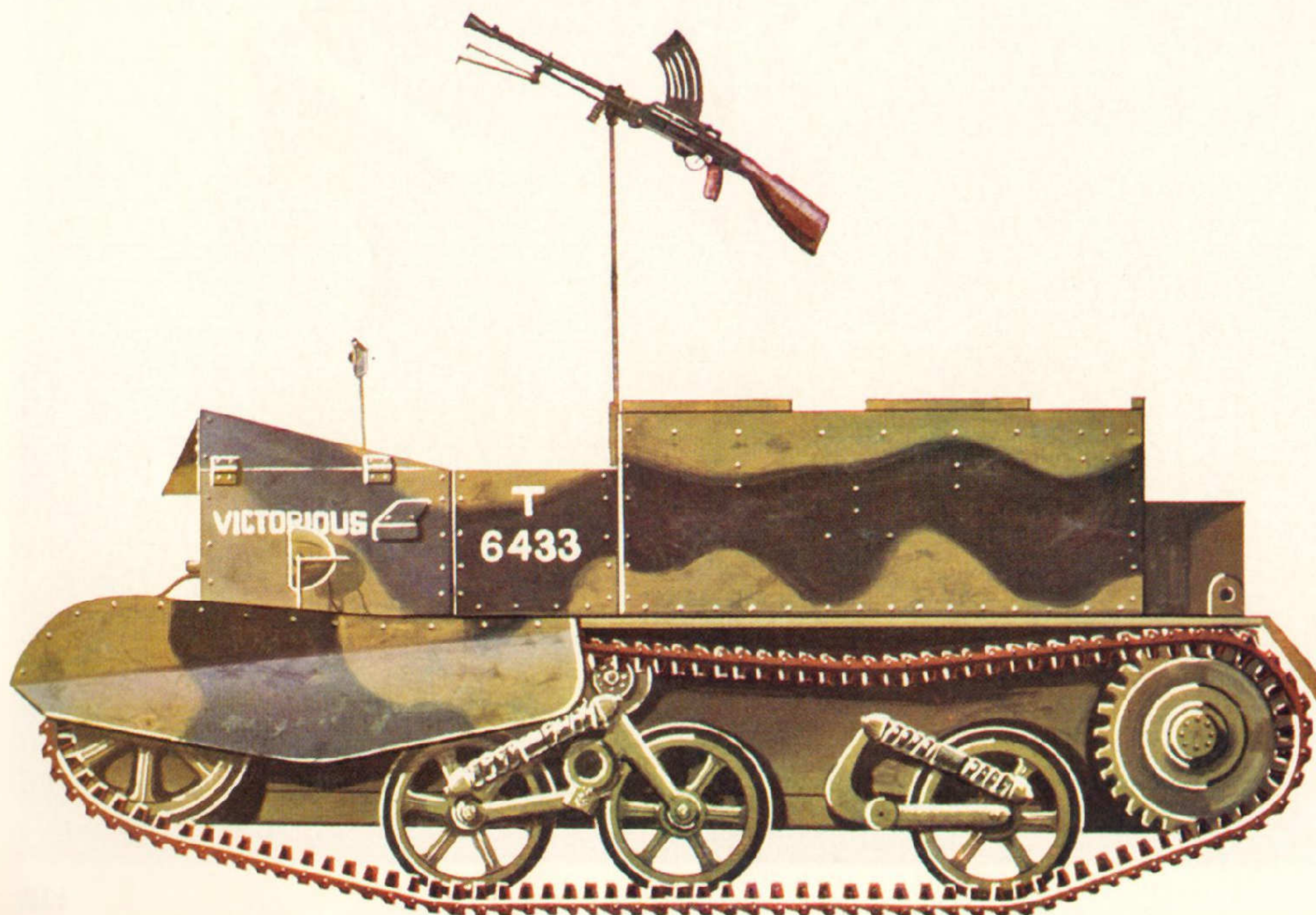
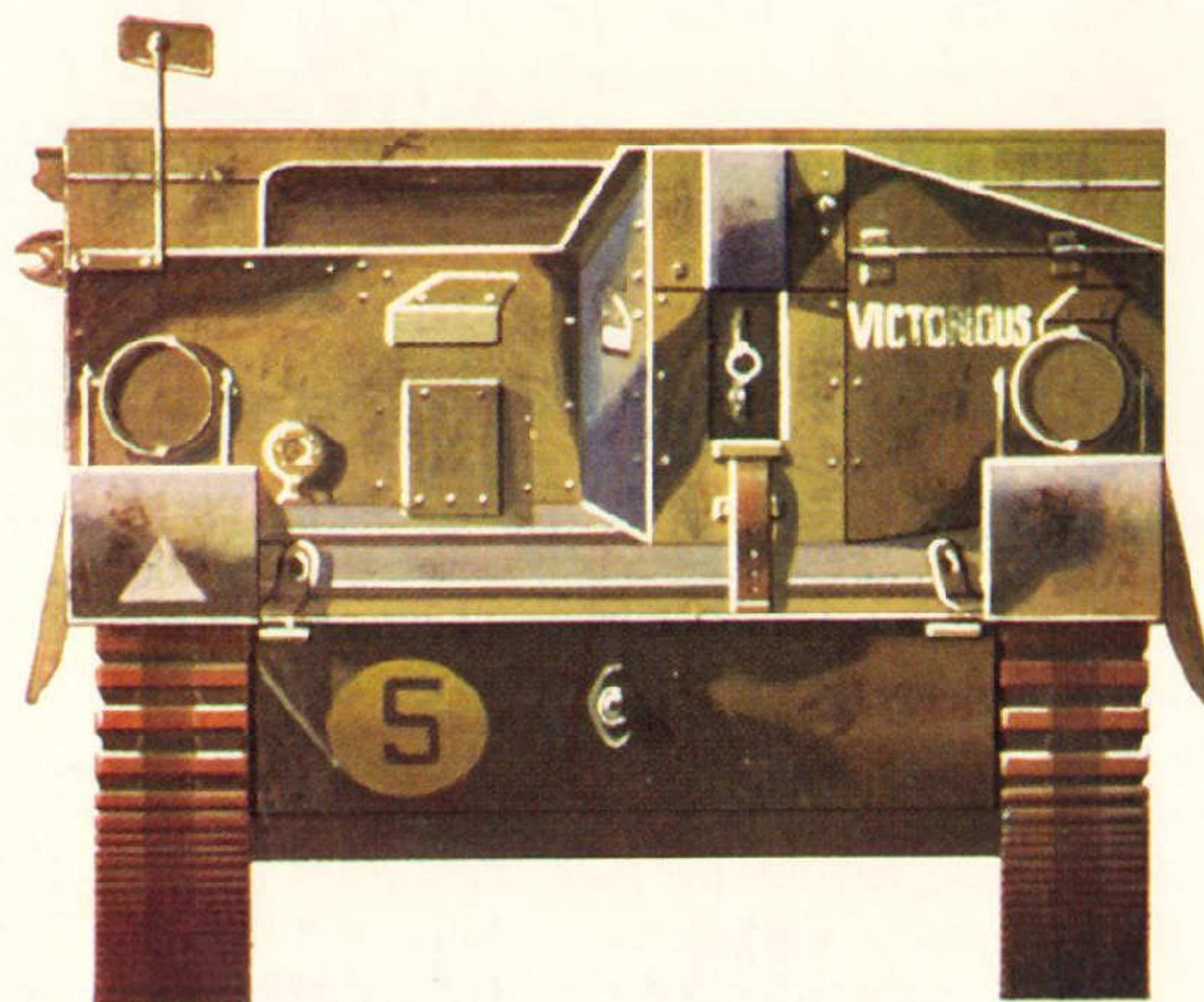
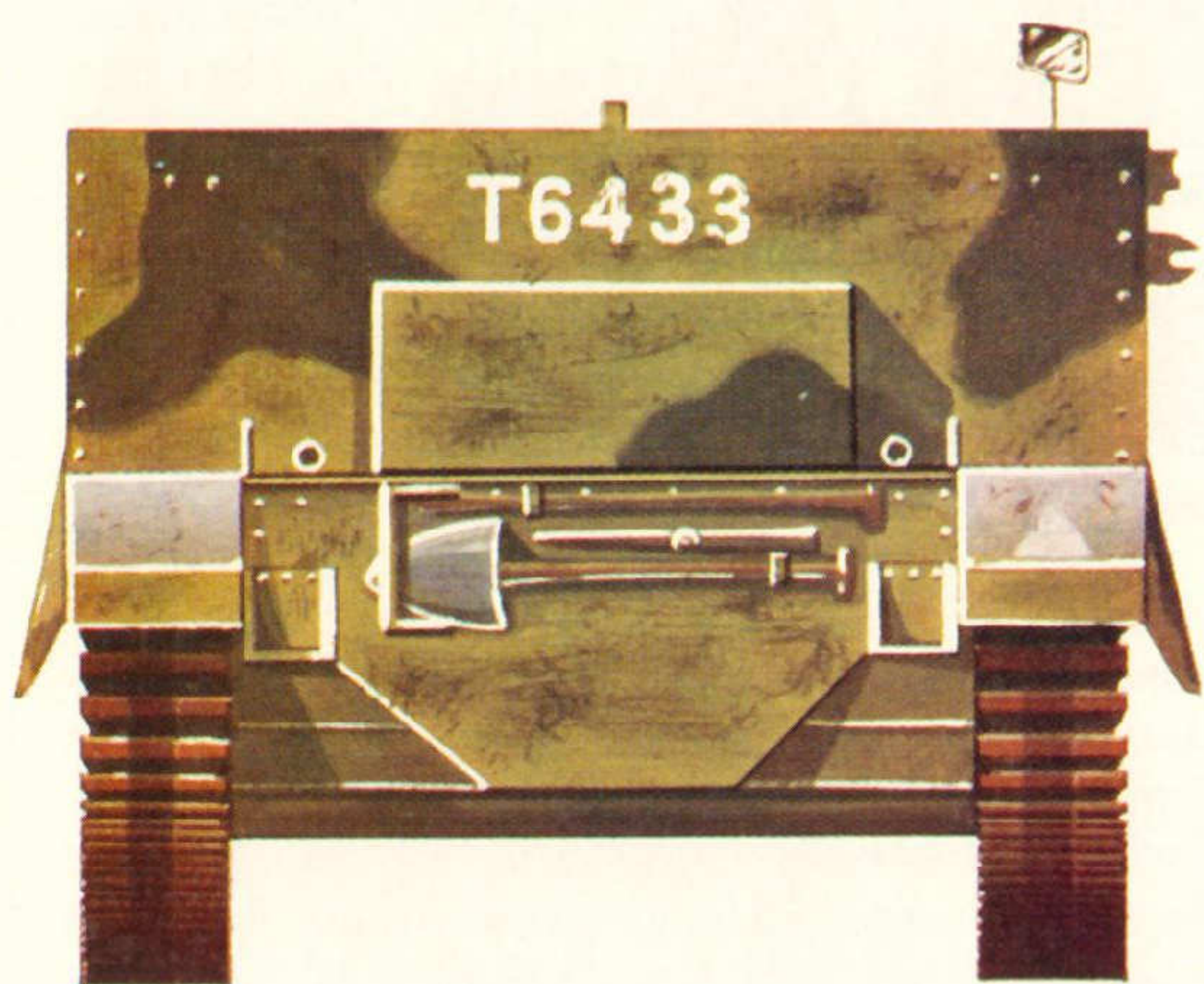
*Carrier, Universal, Mark II, showing stowage for a vehicle of the carrier platoon of an infantry battalion.*



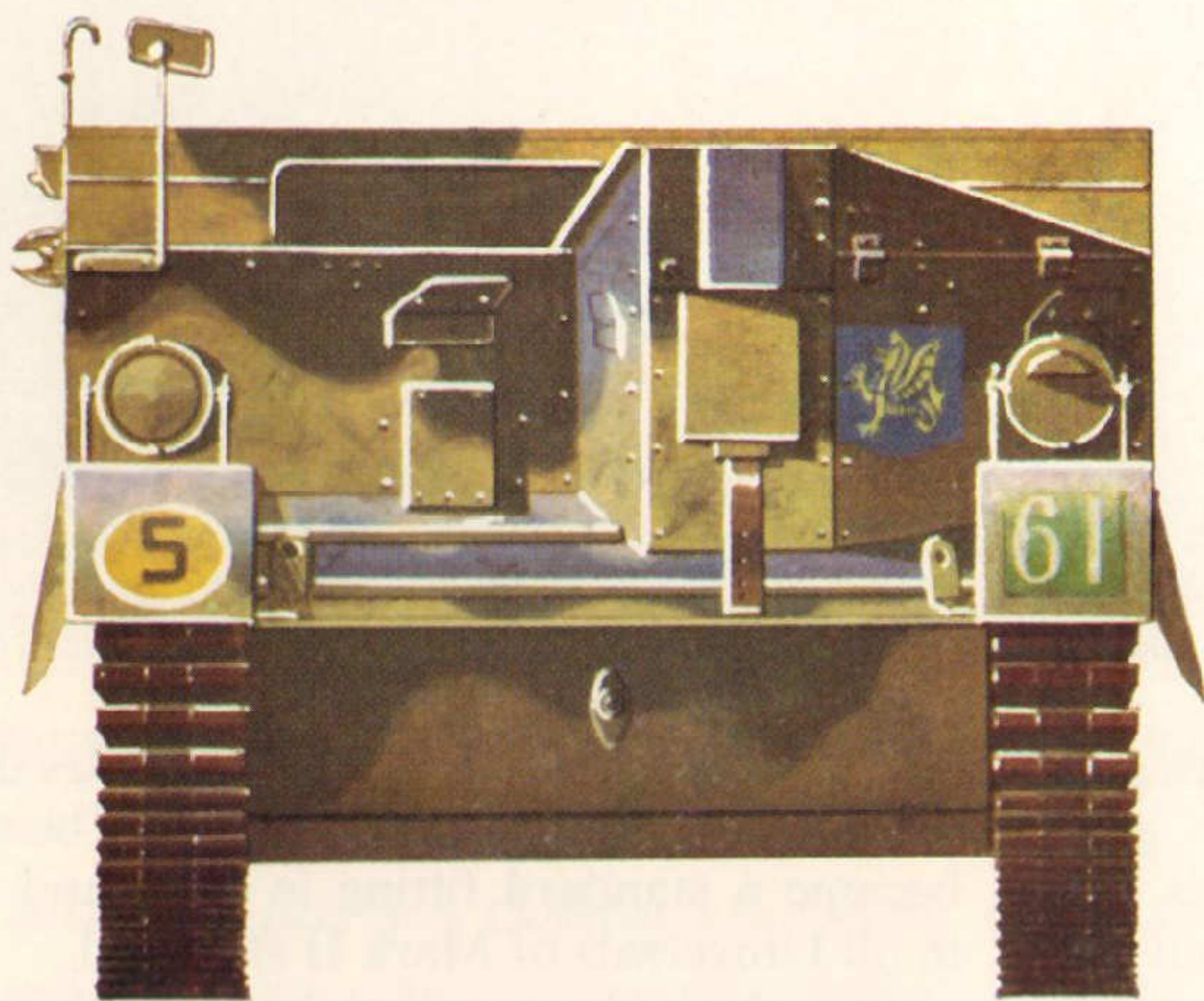
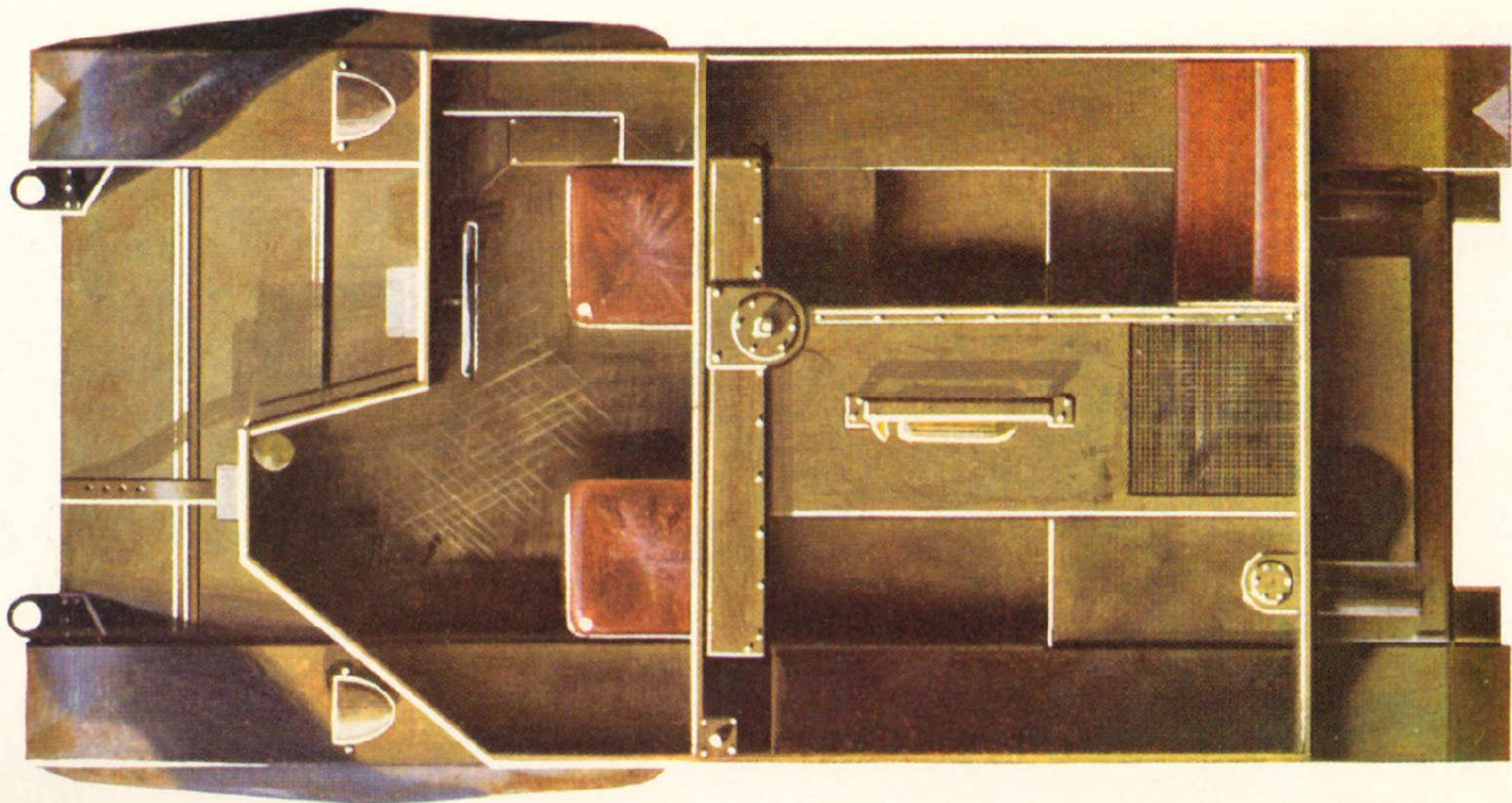




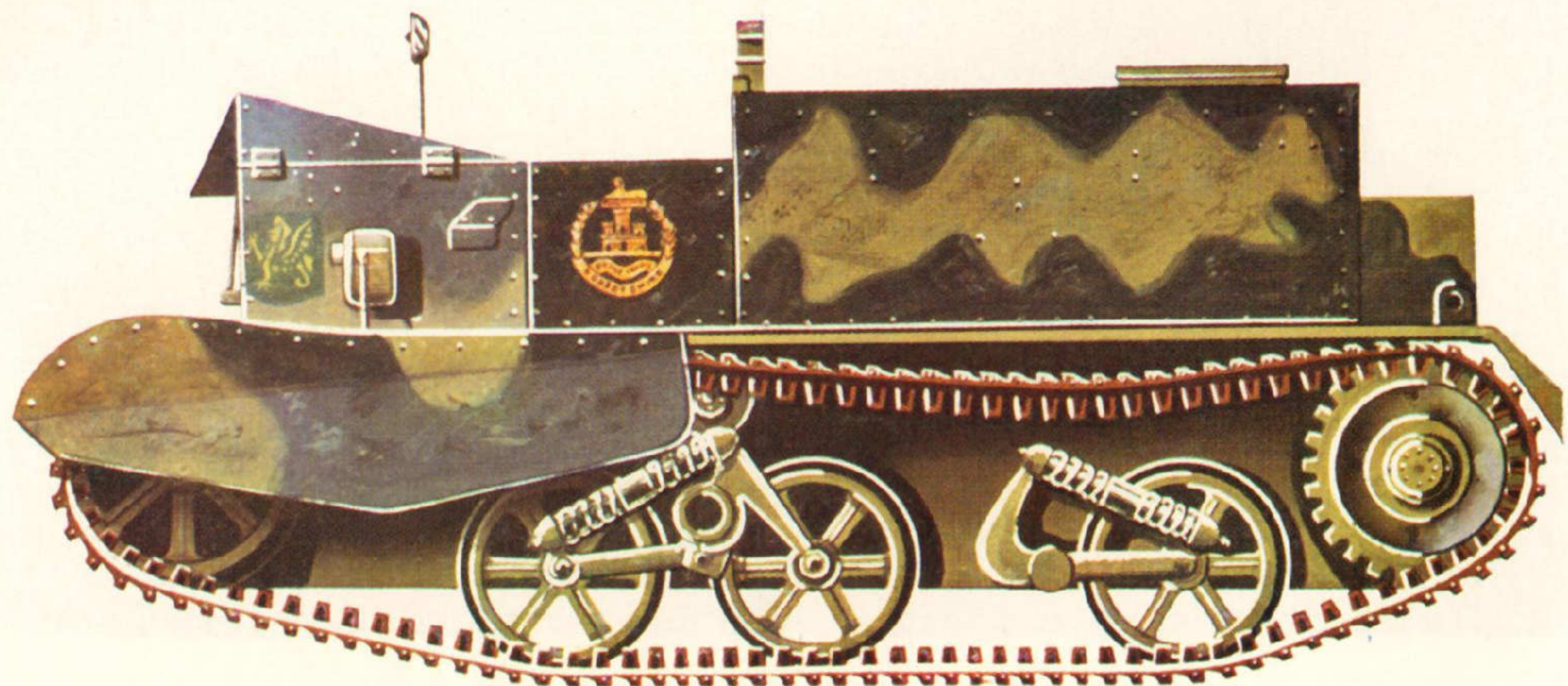
Universal Carrier No. 1, Mk I of Training Battalion, Grenadier Guards, Catterick, September, 1940.







Universal Carrier No. 1, Mk I Battalion Commander's vehicle of 4th Battalion, Dorsetshire Regiment, 43rd (Wessex) Division, October, 1942.





# LOCO PROFILE

---

PART ONE – PUBLISHED MAY 1970

---

This entirely new series of Locomotive Profiles, to be published at the rate of one a month, marks an extension of the well-known "reference" Profiles on aircraft, cars and armoured fighting vehicles, now numbering some hundreds of booklets of wide acceptance.

Each of the new series is to be devoted to a single locomotive-class or locomotive-group of world repute, and of British, European and American origins or association. Each issue is to have 28 pages including covers, some 8,000 words of text and tables, 25–35 photographs and drawings, and a centre full-colour spread giving an accurate representation of the specific locomotive class.

The series editor is well known as an author of railway and locomotive subjects for over 30 years; and the colour plates will be the work of Peter and David Warner, Arthur Wolstenholme and many other famous artist specialists in this field.

Material hitherto unpublished will be a feature, as will tables of the classes and sub-classes described.

*The first twelve titles to be published are:*

- 1 LNER Non-Streamlined Pacifics
- 2 New York Central Hudsons
- 3 Great Western Four-Cylinder 4-6-0s
- 4 The American 4-4-0
- 5 The British Single-Driver
- 6 The Mallets
- 7 Jones Goods & Indian Ls
- 8 Camels and Camelbacks
- 9 The "Met" Tanks
- 10 Union Pacific 4-12-2
- 11 British Railways Britannias
- 12 The Norris Locomotives

*Order NOW from your local bookseller or model shop*  
only 8s. (40 np) or send 9s. (45 np) to cover package and post to:

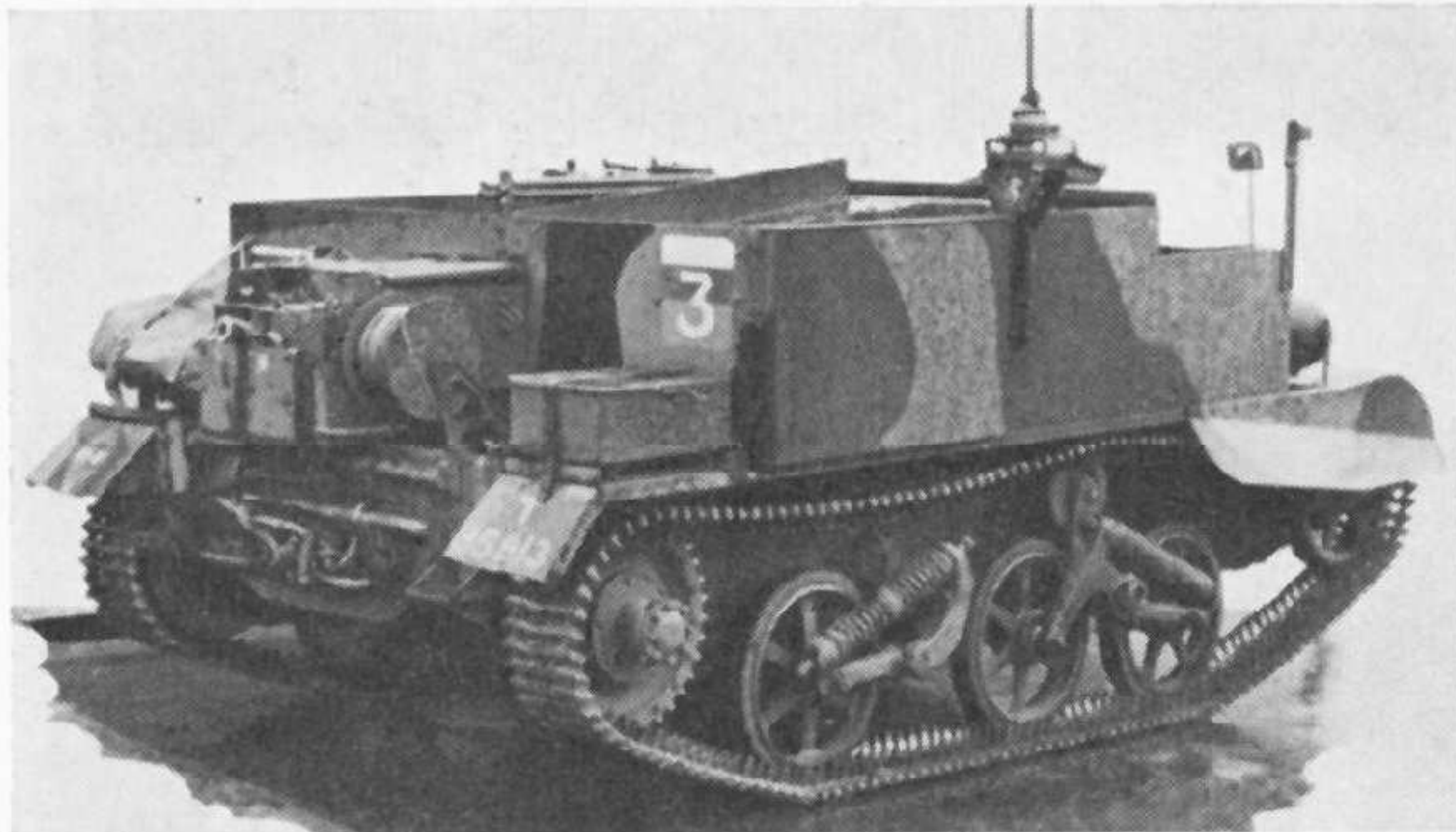
**PROFILE PUBLICATIONS Limited**  
**Coburg House, Sheet Street, Windsor, Berkshire,**  
**England**







*Universal Mark IIs towing 6-pdr. anti-tank guns in Holland, October 1944.*



*Carrier, Armoured OP No. 1, Mark II. Three-quarter rear view showing standard rear fittings including cable reel.*



*Three-inch mortar Carrier, Mark II, with .50 Browning machine-gun mounted in front.*

tically in front of him. The gunner's compartment projected forward and provided alternative gun ports: the one in the centre of the face plate was for the Bren, while the hinged flap at the top could be dropped to allow the Boys to be mounted. When not in use the Boys anti-tank rifle was stowed longitudinally in the left rear compartment and the Bren in a rack in the gunner's compartment. Clips for rifles were also provided as well as a rack for a rifle or a spare Bren. There was an AA mounting at the front and rear of the right-hand rear compartment and in the centre of the left-hand rear compartment on the inside wall. Ammunition was carried in the front two compartments as well as in the right rear compartment and there was a box for two grenades in each of the compartments except the gunner's. Three fire extinguishers were carried: one on top of the engine cover, one on the inside of the front protection plate to the left of the gunner, and one on the division plate to the right of the driver. Various storage containers were fitted to the back of the carrier. The detailed stowage arrangement of equipment depended on the rôle the vehicle was to undertake, whether as a scout, a Bren, or an infantry carrier.

Universal carriers were often re-armed in the field to suit users' requirements. The weapons mounted included .30-inch Browning MG, .50-inch Browning MG, and German 20-mm. Solothurn anti-tank gun. These were usually mounted on the AA pintle sockets in the rear compartments. Light weapons like the PIAT were sometimes fitted in the front compartment. Some carrier units with Mark I Universals unofficially mounted a 2-inch mortar on the engine cover. This additional fire-power proved so useful

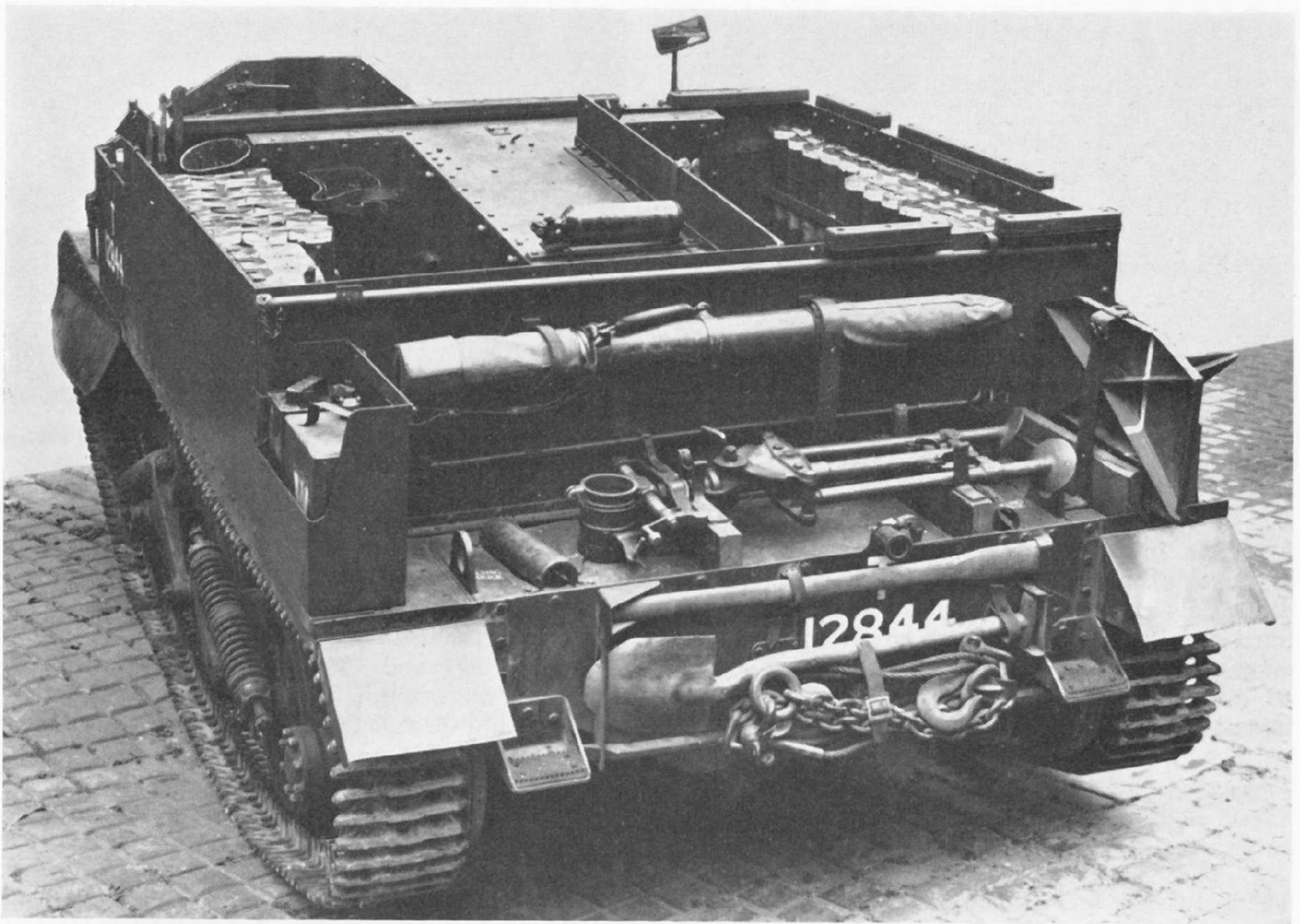
that a more satisfactory mounting was designed to be fitted in the gunner's compartment. The new mounting became a standard fitting in 1943 and was included in all Universals of Mark II standard.

The Mark II, as well as having a 2-inch mortar on the left side of the gunner's compartment, or a 4-inch smoke discharger, differed from the Mark I in various other particulars. It had a welded water-proofed hull, a new type of stowage arrangement, and a valance that enclosed the front quarter of the track run. Four foot steps, two on each side of the vehicle, were fitted. A spare wheel and tow rope were carried on the front and a large kit box across the rear.

As compared with the Mark I the Carrier, Universal, No. 1, Mark II, had a crew of four instead of three, weighed  $4\frac{1}{4}$  against  $3\frac{3}{4}$  tons, but its Ford V-8 engine still developed only the 85 b.h.p. of the Mark Is. Both had a speed of 30 m.p.h. and an armour basis of 7-10 mm. The Mark III (Carrier, Universal, No. 1, Mark III) had a welded hull like the Mark II, but with modified air inlet and engine cover. Crew, weight, b.h.p., speed, and armour basis were the same.

Universal carriers were modified for use as artillery armoured OP and command vehicles, as 3-inch mortar carriers (in 1942), and as Vickers medium machine-gun carriers (in 1943). Various marks and models of each were produced. Although occasionally the 3-inch mortar was assembled and fired from the front gunner's compartment, normal practice was for the mortar, bipod and base-plate to be secured at the rear of the vehicle with the ammunition stowed in racks inside and to be carried to the firing position where the crew dismounted and assembled the weapon



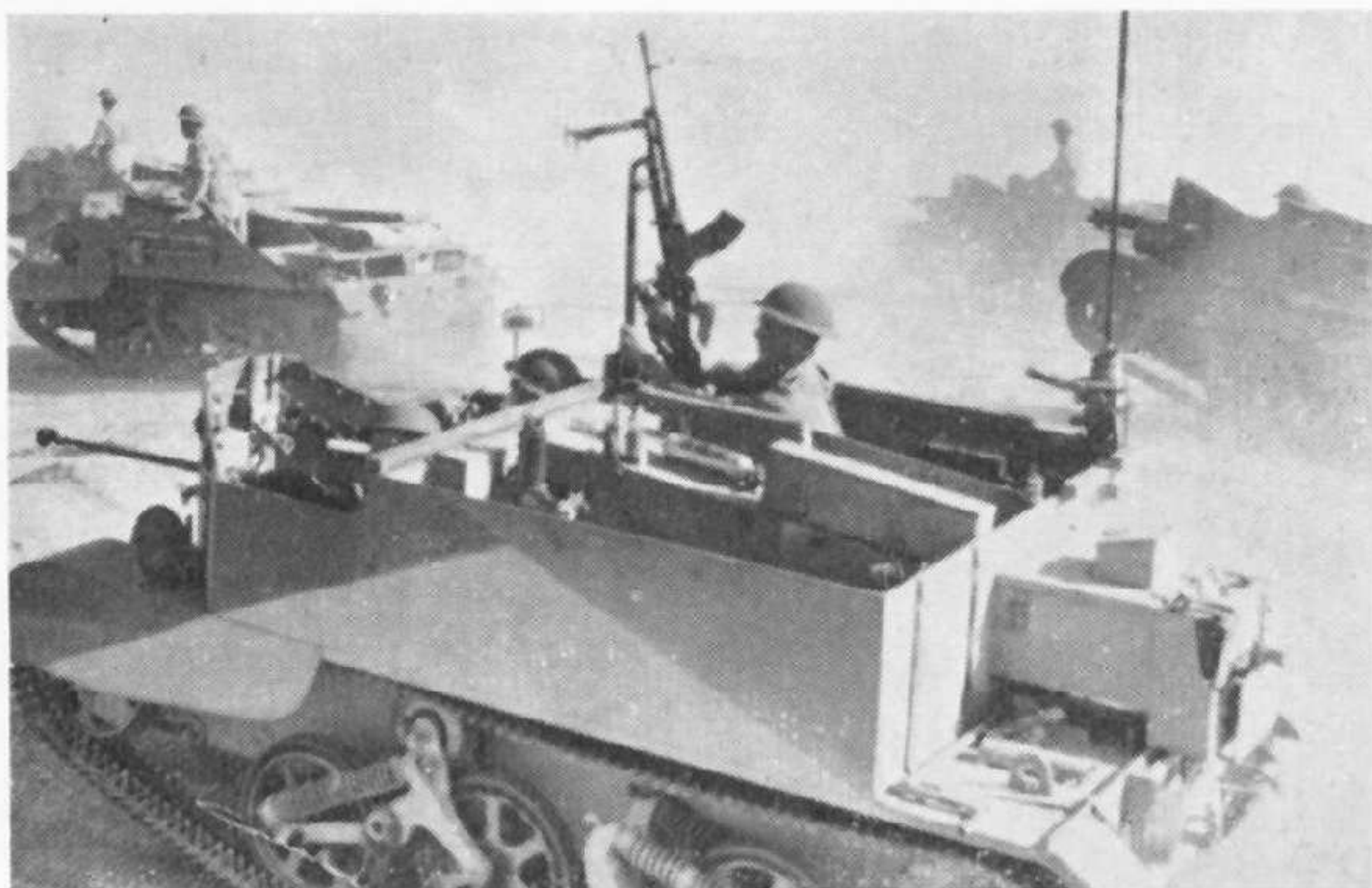


*Carrier, 3-inch Mortar, No. 1, Mark I. Rear view showing the complete stowage of mortar and ammunition.*

*Canadian 3-inch mortar in action. Note Canadian Army prefix "CT" on carrier.*







*Universal Mark I (in foreground) mounting Bren gun and Boys anti-tank rifle. Compare with Bren Carriers at rear mounting medium machine-guns. Australians in the Western Desert.*



*Universal Carriers with track ways carried on sides advancing east of the Chindwin, December 1944.*

for action. In the case of the vehicle's use as a medium machine-gun carrier the gun was sited behind the driver's compartment on a pedestal mount which was fitted on a strengthened engine cover. This position allowed an all-round field of fire. The gun could also be dismounted and fired from a tripod that was stowed on the vehicle. A crew of four was carried.

## RONSON AND WASP

There was also a modified Universal for use as a Wasp flame-thrower. The first carrier flame-throwing equipment was the Ronson device. This was pressure-operated, with two 60-gallon flame-fuel tanks attached to the outside rear of a Universal. The flame-gun was mounted on top of the front gunner's superstructure and the flame fuel came through a flow pipe that ran along the left side of the vehicle. Because the fuel tanks were outside the carrier had room for its normal crew. The Ronson, however, was not accepted for service by the British War Office. The Canadian army on the other hand was interested and Ronsons

*Ronson flame-throwing equipment under test.*



were produced in Canada. Twenty were sent from Canada to the Pacific theatre at the request of the U.S. Marine Corps who fitted them in M3A1 Light Tanks and renamed the equipment "Satan".

During 1941 and 1942 work by the Petroleum Warfare Department in Britain resulted in a new type of flame-thrower called the Wasp. There were three marks of Wasp Universal carrier:

Wasp Mk. I (FT, Transportable, No. 2, Mk. I).

This had the two flame-fuel tanks (40 and 60 gallons), pressure bottles, and connected equipment stowed inside the carrier. The flame-projector, of new design, had a range of 80 to 100 yards and was mounted over the left front of the carrier. Normal armament was discarded and there was a crew of two. An order for 1,000 was placed by the War Office in September 1942; production was completed by November 1943. Mark Is were then relegated to training purposes while production was switched to the Mark II. Several Mark Is were used in flotation trials.

Wasp Mk. II (FT, Transportable, No. 2, Mk. II).

The first prototype was tested in August 1943. It was markedly superior to the Mark I, the main



difference lying in the flame-projector which was of a completely new design and was mounted in the machine-gun housing of the carrier, making the vehicle less easily recognizable as a flame-thrower.

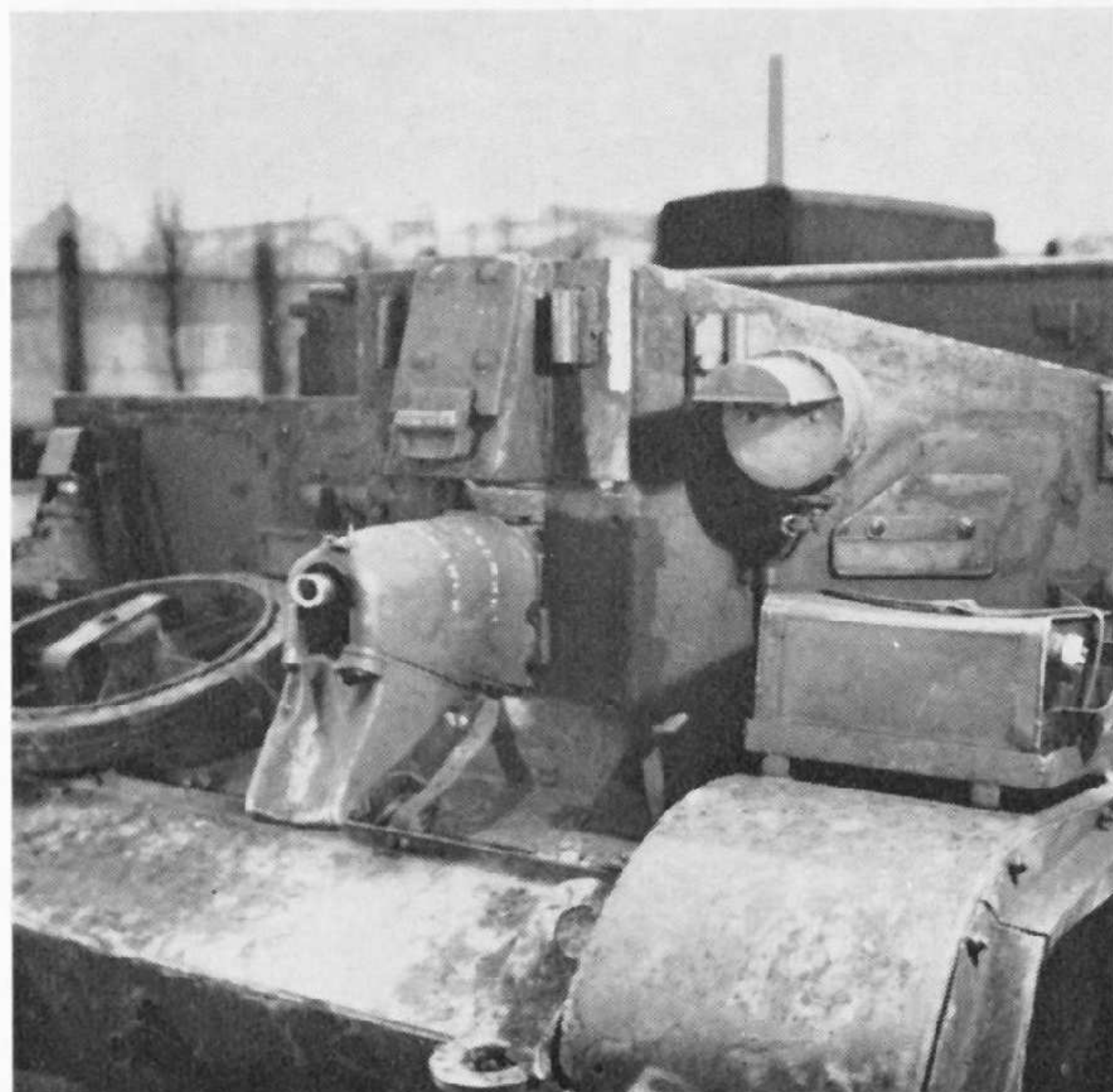
Wasp Mk. IIC (FT, Transportable, No. 2, Mk. IIC). "C" stood for "Canada" because the IIC was developed by the Canadian army and was first used by Canadian units in August 1944 during the battle of Falaise. The IIC differed from the II in that only one flame fuel container of 75 gallons was carried, mounted outside at the rear of the vehicle. This left room for a third crew member with a Bren LMG or a 2-inch mortar. The flame-gun was as in the Mk. II and mounted in the same place.

The Canadians had designed their Mk. IIC so that it could fulfil the rôle of a normal carrier as well as being a flame-thrower, and they accepted the disadvantage of the exterior-mounted fuel tank to attain this. Experience showed they were right. After the production programme of the Mk. II was completed in June 1944 all production was switched to the Mk. IIC. Some local conversions were also made in 21 Army Group by mounting the Mk. II's 60-gallon tank at the rear. Plastic armour was also fitted to the fronts of Mk. IIC Wasp Carriers in 21 Army Group for additional protection against German 7.92 mm. AP shells and 20 mm. fire.

By the beginning of 1945 the Wasp Mk. IIC had replaced the Mk. II in 21 Army Group. Most infantry battalions were issued with six. By the end of the war it had been accepted as the standard British carrier-borne flame-thrower. Three Wasps were sent to Russia for evaluation in February 1945.

As well as being modified as armoured OPs and to carry Wasps, mortars, or medium machine-guns, Universals were used in a number of specialized rôles, such as mine-clearing, demolition, and as ambulances in armoured units. There were a variety of miscellaneous types, some of which are illustrated. Many of these were experimental.

*Close-up of the Wasp Mk. II flame projector.*



*Universal Carrier in Italy fitted with .50 Browning machine-gun in rear compartment.*

## NORTH AMERICAN AND AUSTRALASIAN PRODUCTION

Used initially in the Western Desert and subsequently in all campaigns in all theatres of war, Universal carriers were supplied to all Allied armies (Russia receiving 200) except the U.S.A. Carriers formed the greater part of the vehicle strength of the Reconnaissance Corps regiments which were raised after the 1940 campaign to relieve the mechanized cavalry of the reconnaissance rôle in British infantry divisions. These regiments each had 63 carriers and 28 Humber scout cars. Carriers also equipped the support companies in British infantry rifle battalions, and there were 109 carriers in the 1940-41 type British armoured division of which each of the two motor battalions had 44.

The demand for the Universal carrier far exceeded the numbers that could be produced in the United Kingdom. Production was therefore also undertaken by Australia, which supplied its own army and sent 1,500 to China; by Canada, which built 33,987, supplying more than one fifth of British carrier needs; by New Zealand where a few were built for home use; and by the United States where many of the carrier engines were built. Both Canada and the United States also carried out experimental work aimed at designing a more satisfactory vehicle, for it was generally accepted that the Universal, useful as it was, was overloaded and under-powered.

The different models of engines and Universals built in Canada and the United States were:

Carrier, Universal, No. 2, Mk. I—similar to No. 1, Mk. I, but with Ford V-8, 85 b.h.p. GAEA engine built in U.S.A. for Allied use.

Carrier, Universal, No. 2A, Mk. I—as for No. 1, Mk. I, but with Ford V-8, 85 b.h.p. GAE engine. built in U.S.A. for Allied use.

Carrier, Universal, No. 3, Mk. I\*—as for No. 1, Mk. I, but with Ford V-8, 85 b.h.p. engine. Built in Canada.

Carrier, Universal, No. 2, Mk. II—as for No. 1, Mk. II, but with a Ford V-8, 85 b.h.p. GAE engine built in U.S.A. for Allied use.

Carrier, Universal, No. 2A, Mk. II—as for No. 1, Mk. II, but with Ford V-8, 85 b.h.p. GAEA engine built in U.S.A. for Allied use.



Carrier, Universal, No. 3, Mk. II\*—as for No. 1, Mk. II, but with Ford V-8, 85 b.h.p. engine. Built in Canada.

Carrier, Universal, No. 2, Mk. III—as for No. 1, Mk. III, but with Ford V-8, 85 b.h.p. GAE engine built in U.S.A. for Allied use.

Carrier, Universal, No. 2A, Mk. III—as for No. 1, Mk. III, but with Ford V-8, 85 b.h.p. GAEA engine built in U.S.A. for Allied use.

Carrier, Universal, No. 3, Mk. III\*—as for No. 1, Mk. III, but with Ford V-8, 85 b.h.p. engine. Built in Canada.

These vehicles were also adapted to the rôles of armoured OPs, medium machine-gun carriers, flame-throwing and mortar carriers.

The Canadians also built 213 Carriers, 2 Pdr Equipped. These were Universals Mk. I\* and Mk. II\* modified to allow the mounting of a 2-pdr. with necessary ammunition and stowage. The ammunition was stowed along the sides and the front of the division plate. The engine cover was re-designed to provide adequate clearance for recoil. These carriers were used for training in Canada.

The Universals built in Australia for the Australian army were modified in detail to suit local conditions. The various components of the carriers, except the power units which were imported from North America, were made by engineering sub-contractors and the carriers were then assembled in Australian state-owned workshops.

There were three Australian local pattern carriers:

Carrier, Machine-Gun, Local Pattern, No. 1, was basically similar to the British Bren gun carrier in

appearance but it had welded armour and other minor differences.

Universal Carrier, MG, Local Pattern, No. 2, had the Universal superstructure, and was fitted with 1938-39 Ford heavy duty commercial truck-type rear axles. Instead of having large stowage lockers on the right side as in Local Pattern No. 1, No. 2 had them at the rear.

Universal Carrier, MG, Local Pattern, No. 2A, was No. 2 with 1940 Ford heavy duty truck-type rear axles.

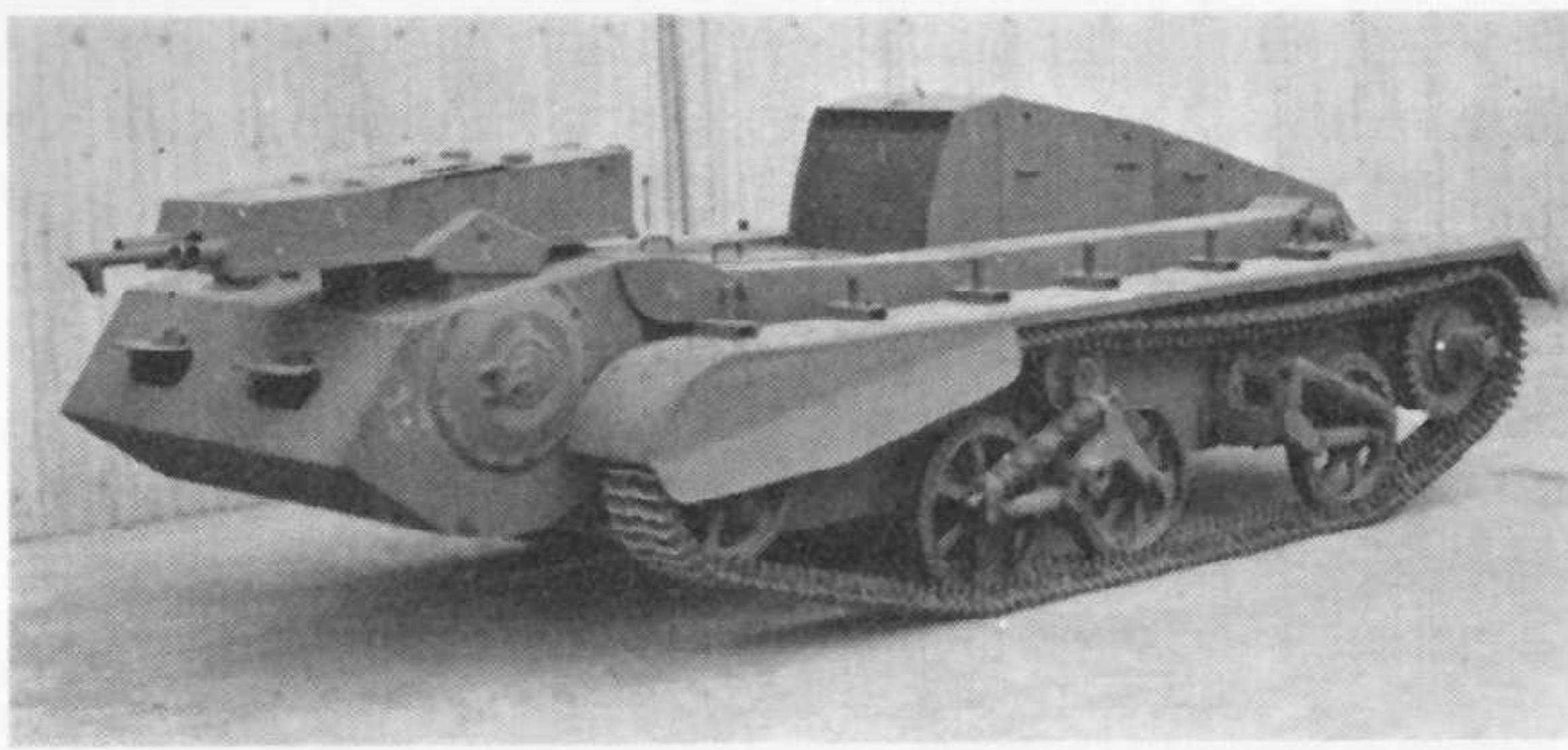
The Australians also built a Carrier, 2 Pdr, Tank Attack, and a Carrier, 3-inch Mortar. In both the weapon was fired from a turntable which allowed a 360 degree traverse and was in the rear of the vehicle, the engine being moved to the left of the driver. The Universal carrier, Local Pattern, was also used as a mortar carrier, the weapon being mounted on and fired from the top of the engine compartment. It could also, of course, be dismounted and fired from the ground, as could the mortar in the Carrier, 3-inch Mortar.

The carriers built in New Zealand were also modified to suit local conditions and the two models (Carrier, MG, Local Pattern, No. 1 and No. 2) were identical in virtually all respects to those built in Australia, which supplied the working drawings and machine-tools. Canada provided the Ford engines and the New Zealand State Railways workshops were the carriers' builders. Only 40 of No. 1 were built and both these and the more numerous No. 2 model were used almost exclusively in New Zealand, the New Zealand forces overseas using Australian-built carriers.

*Universal Carrier, MG, Local Pattern, No. 2, Australian-built, all welded and Australian manned.*



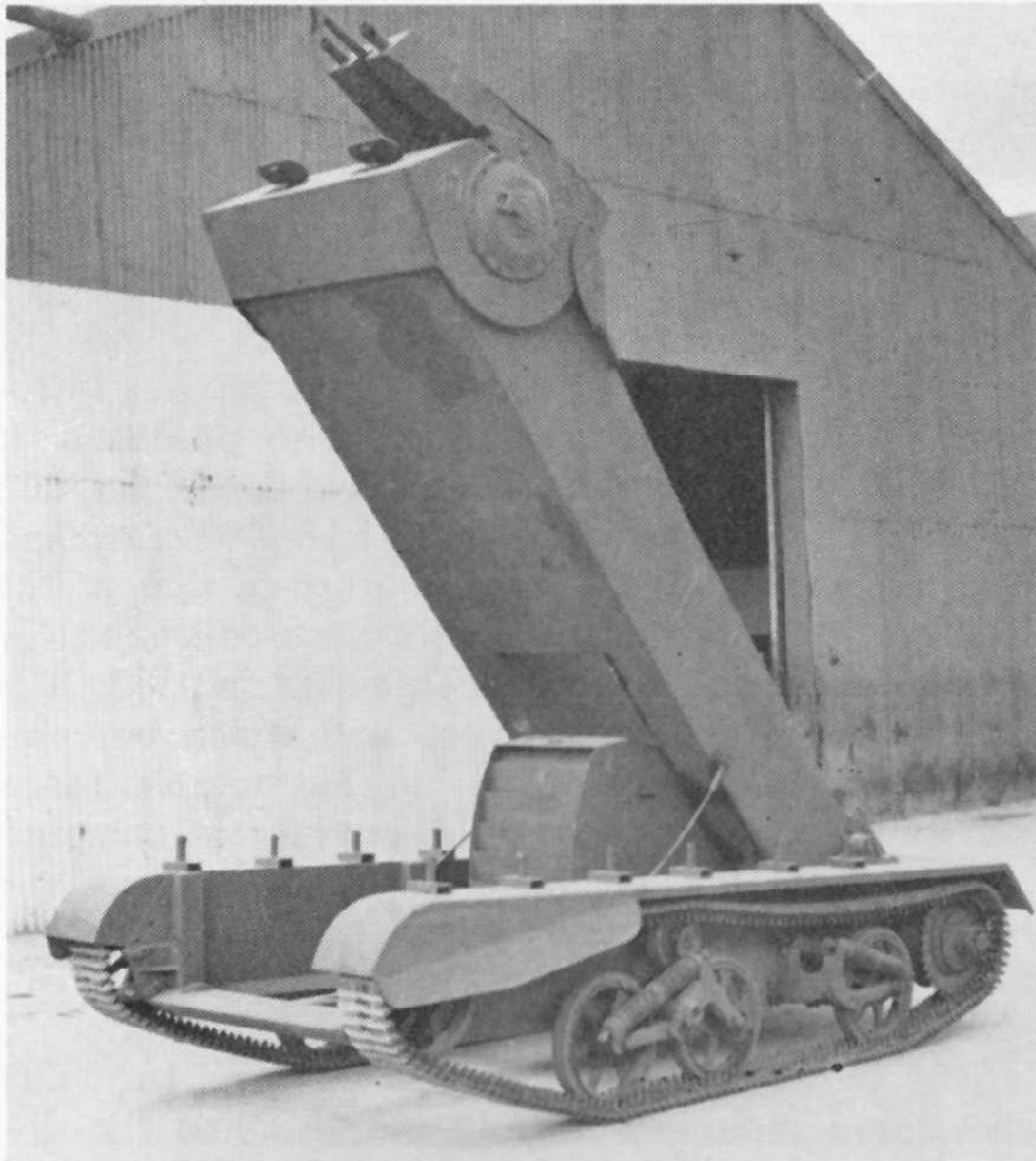




*Praying Mantis in travelling position.*



*Carrier, Medium Machine-Gun No. 3, Mark I. Canadian built Universal Carrier adapted to the MMG rôle.*



*Praying Mantis elevated for firing and revealing the reason for its name from its resemblance to the insect. Constructed from Universal Carrier parts, the idea was to use natural cover to best advantage by raising the armoured driving and fighting compartment to maximum of 12 ft. above the ground. Design work and testing extended intermittently from 1937 to 1944 but the machine was never used operationally.*

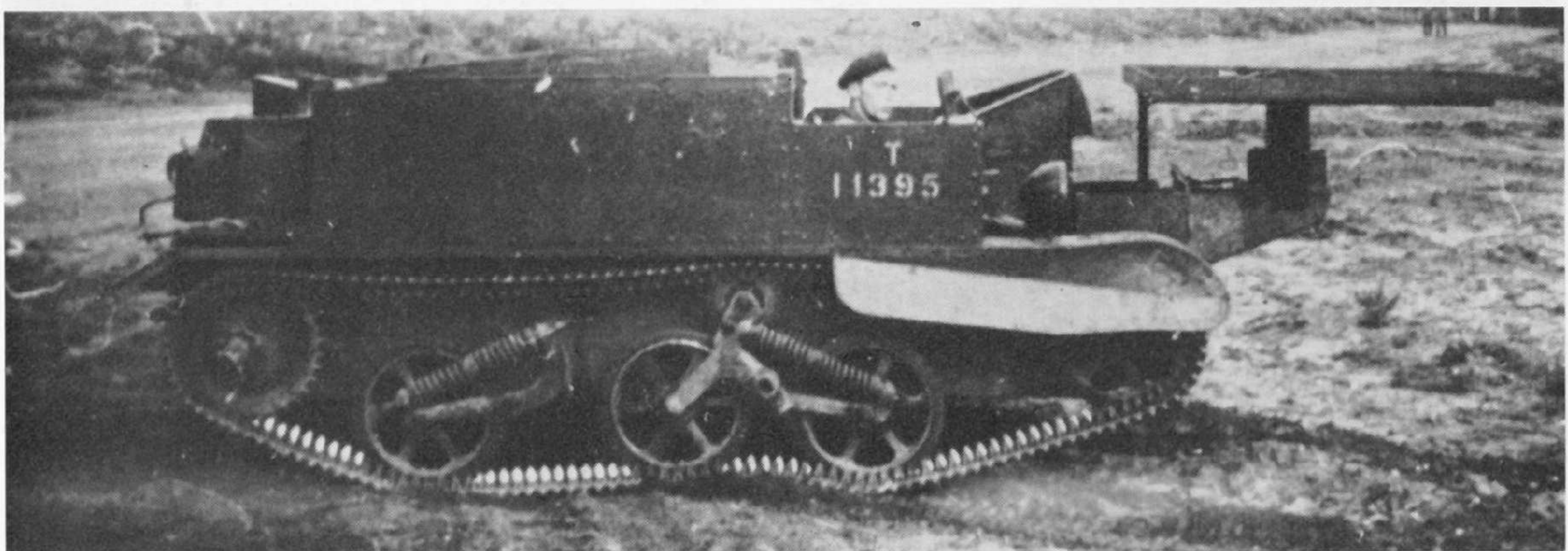


*Universal Carrier fitted for wading with heightened hull disembarking on Ramree Island, Arakan, January 1945.*

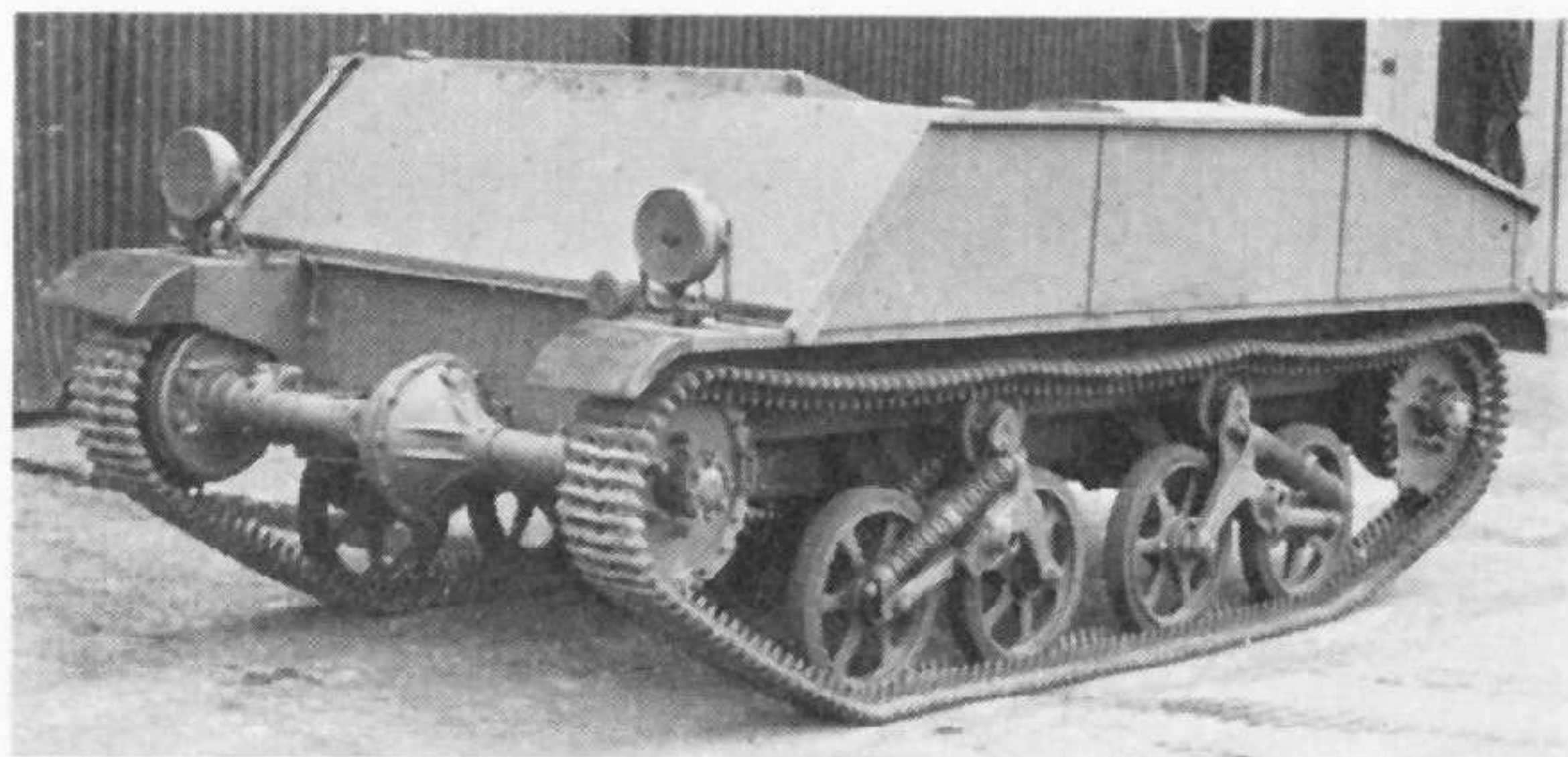
*Universal Carrier fitted with PIAT in front.*



*Universal Carrier with Kid explosive device for demolition of small concrete walls. The name "Kid" was a diminutive from the similar "Goat" device used with the Churchill tank.*







*Carrier, Tracked, Personnel Carrying. The Loyd Carrier as a personnel carrier.*

## THE T16

The experimental work carried out in the United States to improve on the Universal resulted in the T16. This was basically the Universal with a larger chassis, four bogie wheels and a larger engine. The original vehicle was designated Cargo Carrier T16 but was re-designated Universal Carrier T16 in order to be uniform with British nomenclature. It was designed in 1942 partly for British requirements and partly for United States army operations against the Japanese. The British were supplied with 2,625 T16s in 1944 and 604 the following year. The T16 was not considered entirely satisfactory by the British General Staff in spite of its improvements over the Universal in certain particulars because, at least until a late stage in the war, it was mechanically unreliable and furthermore had a payload even smaller than that of the Universal. A few T16s were used operationally in S.E.A.C. at the end of the war.

A modified version, the T16E2, was built late in 1945. This had altered bogie spacing to reduce track wear.

## THE WINDSOR

Canada's experimental work on carriers resulted in a much more promising design. This was the Windsor, produced in 1943 by the Ford Motor Co. with considerable backing from the Canadian Department of Munitions and Supply. Despite the fact that 90 per

*Universal Mark I during the advance into Syria, 1941. Manned by Australians, it mounts a Vickers machine-gun, a Boys anti-tank rifle, and a Bren LMG.*



cent of its components were from the Loyd carrier (see below), the Windsor's design was also based on that of the Universal, though it was larger and more powerful. It was specifically intended to replace the Loyd as a towing vehicle but it proved so satisfactory in its early trials that serious consideration was given to using it in the rôles of the Universal.

After the design had been approved and production begun at the rate of 500 a month mechanical troubles disclosed themselves. As a result the Windsor was only in operational use in small numbers by the end of the war in 1945. It was used in 21 Army Group as a towing vehicle for the 6-pdr. anti-tank gun. It is reported that "the project was not pursued by the General Staff with very great energy because, when it was first considered, the demand for carriers in general was too great to allow use of production capacity on an unproven design."

## THE LOYD CARRIER

In 1940, the year in which the Universal was introduced, a second new carrier was also produced. It was built by the firm of Vivian Loyd & Co. Captain Loyd, of Carden-Loyd fame, left Vickers, where he had been engaged in the foreign marketing side of the business, after the death of his close colleague, Sir John Carden, in an airplane accident in 1935. The new carrier which he designed and which bore his name was intended by him to be suitable for a variety of rôles, including the carriage of weapons ranging from machine-guns to anti-tank guns, the transport of troops and stores, and even as a one-man fighting machine—the "armoured skirmisher" idea revived yet again! The chassis was composed largely of Ford commercial vehicle parts to assure cheap and rapid production, but this had the disadvantage that it lacked mechanical reliability and was inferior to that of the Universal.

Unfortunately for Loyd, the demand for light tracked vehicles was limited when his new carrier made its appearance and initially it was used by the British army only as a troop carrier. In this rôle it had the great advantage over the Cavalry carrier of being able to carry eight men. It was tested as a 2-pdr. anti-tank SP, but was considered less suitable than the portee vehicle in which the anti-tank gun was mounted, facing the rear, on the open back of a four-wheeled lorry. Nevertheless, its importance grew. It was later adopted as a towing vehicle, thus taking the place of the pre-war dragon that had been discarded in favour of the four-wheel drive tractor. When the portee vehicle too proved unsuccessful, as well as the four-wheel drive tractor, for giving close support to AFVs, the Loyd came into its own. Its major importance arose from the urgent requirement for large numbers of mobile anti-tank guns, especially in the Western Desert fighting. As well as this the Loyd was the only general utility carrier available and was employed in many ancillary rôles, especially cable-laying and for carrying slave batteries which were of supreme importance for AFVs which ran their own batteries flat on constant wireless watch.

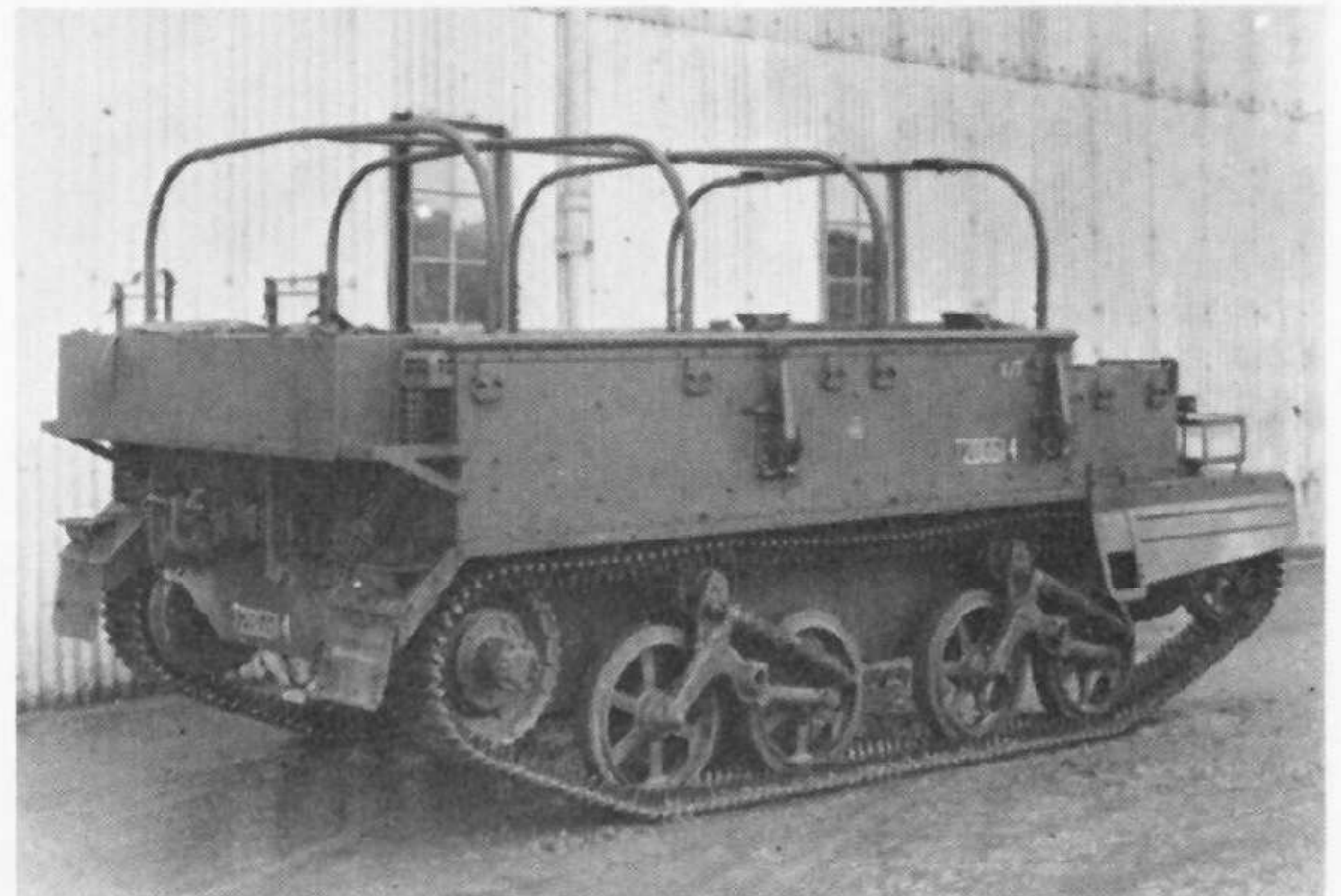
As a result of the demand for the Loyd as a towing vehicle for the 2-pdr. and later the 6-pdr., a need arose



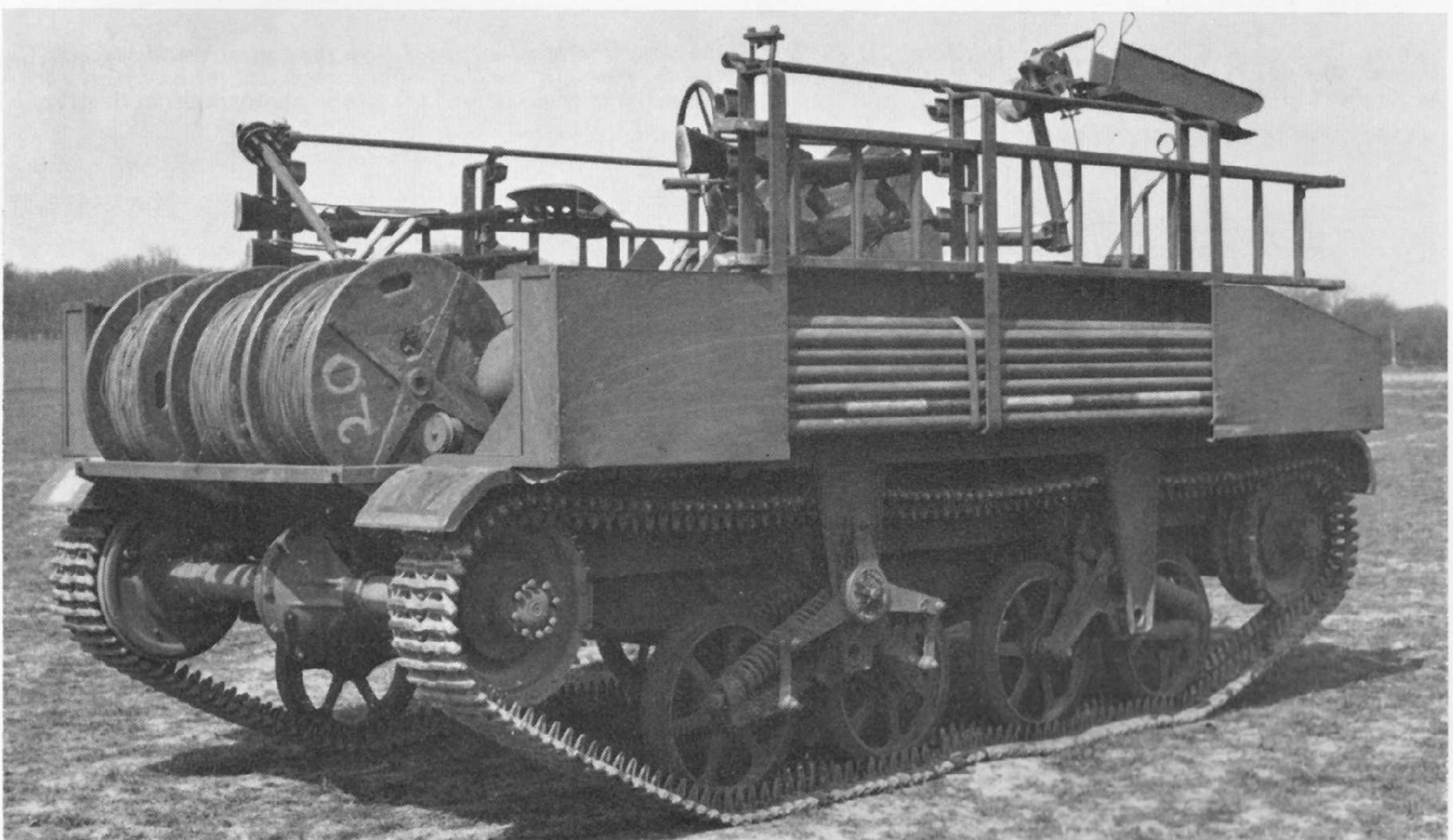


*Carrier, Universal, T.16. Designed and built in the United States, this was an attempt to develop a more satisfactory vehicle than the Universal Carrier. The principal changes in design were the use of the controlled differential steering system, Ford Mercury engine, two two-wheeled bogies on each side, refinement of the track and suspension, and a lengthened welded hull structure.*

*Right: Carrier, Windsor. Built in Canada and based on the design of the Universal Carrier, this machine incorporated 90 per cent of Loyd components. Like the T.16, the Windsor was a much bigger vehicle than the Universal, incorporating a four-wheeled bogie suspension very similar to that used on the Loyd Carrier. This rear view of the vehicle shows the towing attachment.*



*Carrier, Tracked, Cable Layer, Mechanical—one of the variants of the Loyd Carrier. This three-quarter front view shows the three cable drums mounted on the front and the cable laying unit mounted in the centre of the rear compartment. Mounted on the side are the linesmen's poles and ladders.*





for its load capacity and tractive ability to be improved, for both were considered inadequate for a gun tower. Work was therefore undertaken to develop several improved models of the Loyd during 1943, but due to the continued demand for the vehicle as a 6-pdr. gun tractor in quantity its mechanical weakness was perforce accepted and no modifications were allowed that would delay production of some 10,000 vehicles.

While the Universal could have undertaken the Loyd's rôle as a gun tower, it was decided that it should stick to its own rôles except in emergency. To provide for these emergencies the Stacey towing attachment was fitted to all Universal carriers (except the OP version) built in 1943, thus enabling them to tow the 6-pdr. over short distances. The troops themselves preferred the Loyd to the Universal as a tower because its steering and handling were simpler. The training of drivers was consequently simpler too.

#### CARRIER DETAILS

	M.G., No. 1 Mark I	Bren, No. 2 Marks I & II	Scout Mark I	Universal Mark I
<b>Weight</b> (tons and cwt.)				
Fully laden	3 3	3 16	3 16	3 16
Unladen	2 17	3 5	3 5	3 5
<b>Dimensions</b> (feet and inches)				
Height	4 8	4 9	5 2½	5 2½
Length	11 6	12 0	12 0	12 0
Width	6 9	6 9	6 9	6 9
Width, track centres	5 2¼	5 2¼	5 2¼	5 2¼
Width, outer edge of tracks	5 11¾	5 11¾	5 11¾	5 11¾
<b>Performance</b>				
Ground clearance	0 8	0 8	0 8	0 8
Trench	4 6	4 6	4 6	4 6
Speed	30 m.p.h.	30 m.p.h.	30 m.p.h.	30 m.p.h.
Fuel capacity (gallons)	20	20	20	20

The limitation of carriers to the two basic types, the Universal and the Loyd, considerably reduced production problems, especially as there were components common to both vehicles. Production of the Loyd was also undertaken by the Ford Motor Co. of Canada. Some designs for airborne tanks grew out of the Loyd carrier but were not adopted.

#### THE OXFORD (CT20)

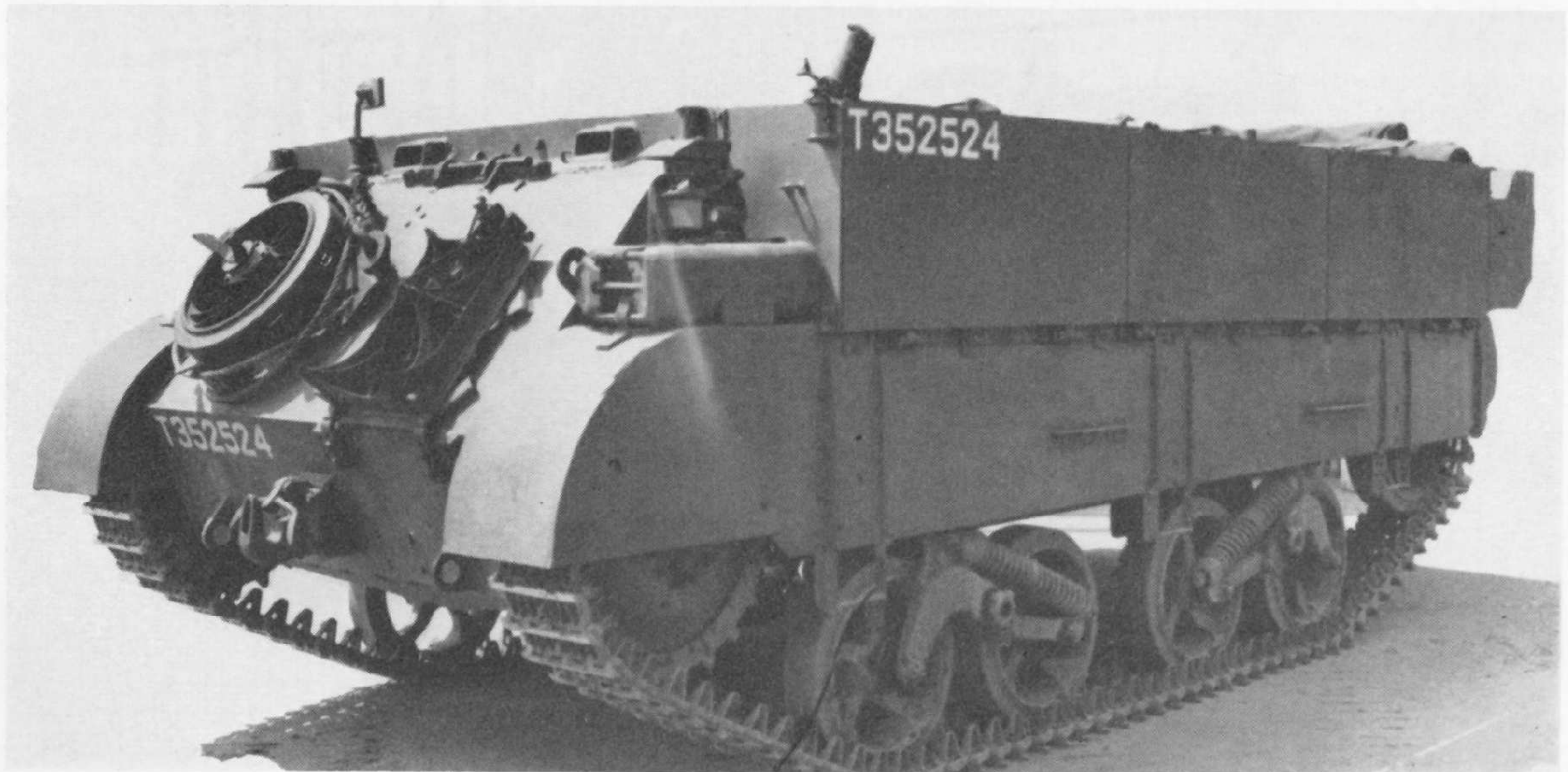
The Windsor carrier at a later stage in its development was regarded merely as a stop-gap until a long-term replacement for the Universal matured. This intended replacement was the Oxford—officially designated Carrier, Track, CT20 (Carrier, Oxford, Mark I). The Oxford was the last of the series of carriers developed from the early machine-gun carrier of 1934, and of which the "family characteristic" was the Horstmann suspension.

The Oxford was to replace the Loyd and the Universal as an all-purpose carrier. In the event only a few were made and they were tested at the very end of the war for towing 6-pdr. and 17-pdr. anti-tank guns and as a 3-inch mortar carrier. The Oxford was an open armoured box with a double floor as a protection against mines. It had improved Horstmann suspension, weighed just over 7 tons, was 14 ft. 9 in. long, 7 ft. 6 in. wide, and 5 ft. 7 in. high. It was powered by a Cadillac V-8, 110 b.h.p., liquid cooled engine, had a top speed of 38 m.p.h., and a range of 126 miles. Its armour basis was 20 mm.

With the demise of the Oxford, the future of carriers, after some hesitancy with the FV.401 Cambridge, turned at last in the late 1950s to the essential armoured personnel carriers of today.

A.F.V. Series Editor: DUNCAN CROW

*Carrier, Tracked. C.T.20 (Carrier, Oxford, Mark I). The last of the series that was descended from the Experimental Machine-Gun Carrier. The view is of the Oxford in the rôle of Mortar Carrier. Note the mortar in the front compartment and the base plate carried on the front of the machine.* (Imperial War Museum—as are all the photographs in this Profile)





# AFV Profiles

The list of titles has been revised and the series will be published as follows:

- |                                    |   |  |
|------------------------------------|---|--|
| 1 Churchill                        | 11 M3 Medium (Lee/Grant)                              | 22 PanzerKampfwagen 35(t) and 38(t) (28 pages—two in colour) |
| 2 PanzerKampfwagen III b           | 12 Mediums Marks I–III                                | 23 Modern Soviet Mediums (T-54/T-62)                         |
| 3 Tanks Marks I to V               | 13 Ram and Sexton                                     | 24 Sherman “75”  |
| 4 Light Tanks M1–M5 (Stuart/Honey) | 14 Carriers   | 25 German Armoured Cars                                      |
| 5 Light Tanks Marks I–VI           | 15 PanzerKampfwagen I and II (28 pages—two in colour) | 26 M48/M60   |
| 6 Valentine—Infantry Tank Mk. III  | 16 Landing Vehicles Tracked 1–4                       | 27 Saladin Armoured Car                                      |
| 7 Medium Tanks Marks A to D        | 17 Russian Kv and IS                                  | 28 French R35, H35 and S35                                   |
| 8 Crusader—Cruiser Mark VI         | 18 Chieftain  | 29 Russian BT  |
| 9 Early (British) Armoured Cars    | 19 Leopard  | 30 Conqueror and M103  |
| 10 PanzerKampfwagen V Panther      | 20 Churchill and Sherman Specials                     |  |
|                                    | 21 Armoured Cars—Guy, Daimler, Humber                 |  |

We would draw the attention of our regular readers to the fact that there has been some rearrangement in the numbering of the individual titles in this series. Whilst every effort will be made to maintain this programme the Publishers reserve the right to change the sequence.

*Price 5s. (25np) each from your local book or model shop or price 6s. (30 np) direct from the Publishers.*

---

## Armoured Fighting Vehicles of the World

A new and unrivalled publication in hard back bound volumes. Seven volumes will cover, in depth, the history of the AFV from the first lumbering giants of World War I to the Panzers, Cruisers and Shermans of World War II and the ultimate—the computerized killers of today with their infra-red illuminators and detectors. Each of the seven volumes includes a number of *AFV Profiles* together with revised issues of *Armour in Profile* with at least a third new material. Fully illustrated with colour plates, each volume gives a comprehensive picture of the period.

VOLUME ONE **AFVs of World War One**

VOLUME TWO **British AFVs 1919-1940**

VOLUME THREE **British AFVs 1940-1946**

VOLUME FOUR **American AFVs of World War Two**

VOLUME FIVE **German AFVs of World War Two**

VOLUME SIX **AFVs of World War Two: Russian, French, Japanese, Italian**

VOLUME SEVEN **Modern AFVs**

*Price £3 10s. (£3.50) each from your local book or model shop or £3 15s. (£3.75) direct from the Publishers.*

### *Just published: Volume 1*

167 pages, over 300 black and white illustrations, 19 pages of colour and a comprehensive index.

**Contents:** The Dramatic Innovation; Early Armoured Cars; Tanks Marks I to V; Tank Mark IV; A7V Sturmpanzerwagen; Schneider and St. Chamond; Renault F.T.; Medium Tanks Marks A to D; the 8th August 1918 (The Battle of Amiens); Tanks Marks VI and VII; Tank Mark VIII “The International”; Gun Carrier and Supply Tanks; American Tanks; The Experimentals; British Tanks 1915–1919 (Comparative Tables); Index.

Under the editorship of Duncan Crow, a team of authors and artists have produced a series of Profiles and bound volumes which will be recognized as a major work of reference on AFVs of the World.

*If you have any difficulty in obtaining Profiles from your local book or model shop please write direct to:*

**Mail Order/Subscription Department,**

**PROFILE PUBLICATIONS Ltd, Coburg House, Sheet Street, Windsor, Berks.**

---