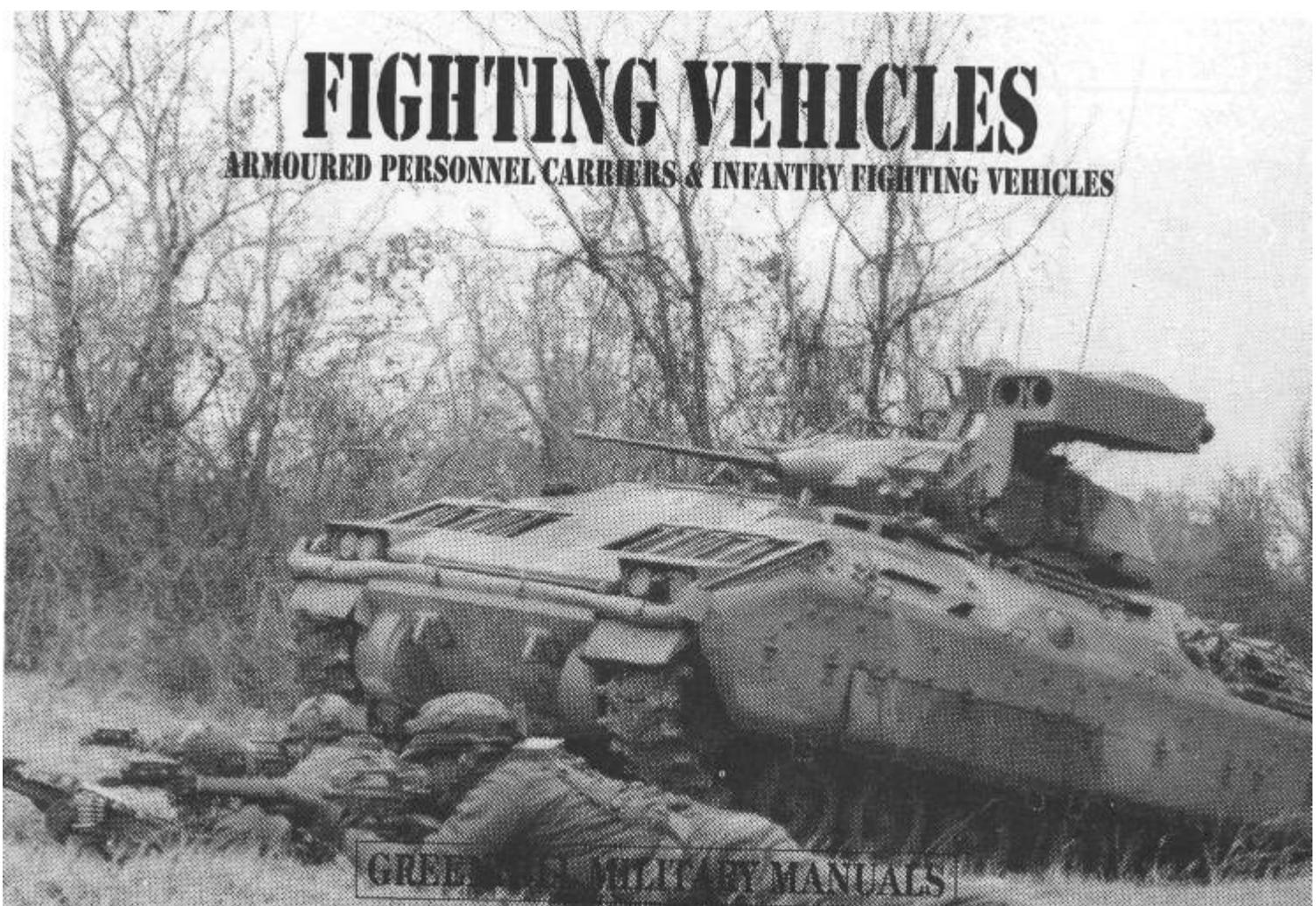


FIGHTING VEHICLES

ARMoured PERSONNEL CARRIERS & INFANTRY FIGHTING VEHICLES



GREENE MILITARY MANUALS

Fighting Vehicles: Armoured Personnel Carriers and Infantry Fighting Vehicles

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Introduction

Compared to the tank, the armoured personnel carrier (APC) and the infantry fighting vehicle (IFV) have had a brief history. During the Great War a few visionaries had the notion of using armoured vehicles to transport soldiers around the battlefield and the first tanks were able to carry a few infantrymen, But it was not until the 1930s that the writings of armoured warfare prophets Fuller and Liddell Hart led to the first dedicated 'battlefield taxis'.

Both men forecast that future armoured warfare would involve not just tanks but specialised armoured vehicles to transport the support arms upon which the tanks would depend and with whom they would co-operate. The infantry needed something better than their leg-power or road-bound trucks to maintain contact with the mobile armoured spearheads that Liddell Hart and Fuller foresaw.

At first the only nation to absorb their message was Germany, which during the early to mid 1930s was in the throes of a political and social revolution in the aftermath of Hitler coming to power. The concept of what was to become known as 'Blitzkrieg', or Lightning War, followed, based on infantry tactics devised during the Great War. This entailed the use of concentrated offensive power at one point followed by deep and rapid thrusts into the enemy rear, to disrupt and isolate opposing forces. The tank, though ideal for this concept, had to have support,

The result was an array of armoured combat vehicles which covered all aspects of modern warfare from communications to artillery. Among these were infantry half-tracks, a combination of conventional road wheels for steering plus tracks supporting a lightly armoured open body. Such vehicles were complicated and expensive, so

relatively few German infantry could be transported like this into battle.

Later came the American M3 half-tracks which were churned out in thousands. The British had their own APCs. In the late 1930s they had small tracked carriers, usually known as Bren Gun or Universal Carriers, but these were more often employed as specialised troop or team transporters rather than as all-purpose APCs, for they could carry only a few troops in an open compartment.

When land battles grew in intensity, the Allies began to use turretless tank chassis as troop carriers to ensure that the infantry could survive. Usually known as Kangaroos, these vehicles were old or obsolete tank chassis with limited carrying capacity.

It was some years after 1945 before the first of what we now recognise as APCs appeared. Initially they were little more than armoured boxes on tracks or wheels. Troops had virtually no view of the outside world and could not use their weapons from within their armoured protection; but were protected against enemy small arms fire and overhead artillery bursts and could thus travel and survive better on the modern battlefield, This generation was typified by the British FV432, the American M59 and (later) the M113.

The Soviet Union was rather late in the APC field, During the Great Patriotic War (as they called the Second World War) Red Army 'tank descent' troops were carried into battle on tank exteriors. After 1945 that procedure was gradually discarded in favour of transport inside a well-designed APC, which became the yardstick that the West would follow.

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The Future

There is no firm line of thought as to which path the next generations of APCs and IFVs might take, There seems to be a general reluctance to follow the usual tank path of 'larger and heavier' for the design limits of the armoured infantry vehicles appear to have been reached. Some IFVs (such as the German Marder 1) already resemble light tanks and certainly weigh as much. To emphasise this point there are already some IFVs being considered as platforms for low recoil 105 mm guns originally intended for mounting on tanks. While such upgrades will remove such heavily-armed vehicles from the IFV category the fact that such an option is available demonstrates how the IFV/APC has grown from a mobile armoured box to a powerful armoured combat vehicle.

No firm preference for tracks over wheels has emerged, Both have established their place on the battlefield, Tracks may provide more mobility but wheels are less complex and expensive and, in general terms, more suited to long range operations, (The South African Ratel, with an operational range of of some 1,000km, is a good example of the latter.)

There seems to be a general acceptance that protection levels will have to increase to counter ever-growing threats that ATGWs and close-in infantry anti-armour weapons can produce but a point will be reached where the weights imposed by thick armoured carapaces will seriously impede performance. However, relatively lightweight non-metallic armours are already in service and further developments in this area are to be expected.

There will almost certainly be firepower enhancements. The current IFV armament calibre bracket is from 20 to 30 mm. As armoured protection increases gun calibres will need to grow accordingly, There are several avenues of thought on this subject, The Swedes have already adopted 40 mm gun as the main armament for their CV 90 IFV

while in both France and the UK consideration is being given to a 45 mm gun firing low volume cased telescoped ammunition (CTA) more than capable of destroying any future opposition IFV. For yet another indication of current fire enhancement approaches, the Bradley 25 mm cannon performance has recently been greatly improved by the introduction of more powerful kinetic energy ammunition, delaying any need for weapon replacement for the foreseeable future.

While on this subject, the missile will not completely replace gun armaments for the gun has demonstrated that it can be a far more versatile, economic and effective projectile delivery system than the expensive one-shot guided missile.

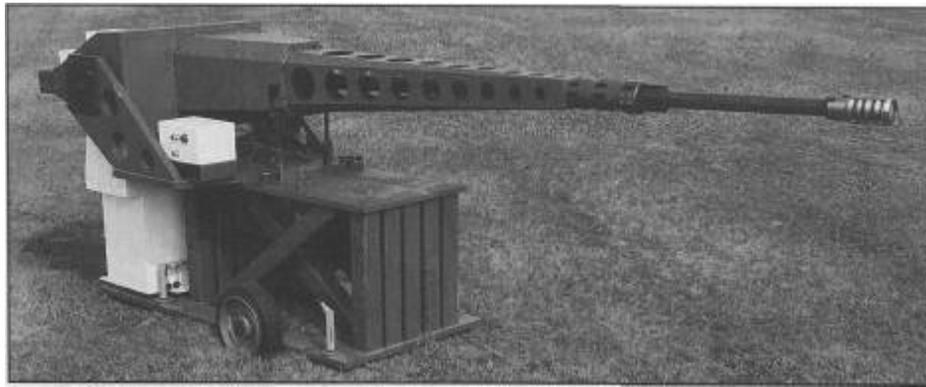
It may well emerge that models such as the M2/M3 Bradley, Warrior, Pandur and Piranha will remain the yardsticks of IFV/APC development for some time to come, However, that does not mean that their forms will remain fixed. We are already into the second generation of IFVs which, in general terms, have enhanced performance fire control systems, the option of add-on armour, advanced drive trains and suspensions, and better all-round crew protection (such as engine compartment fire suppression) and high performance communications systems. The latest Bradleys are very different visually and mechanically from the original models.

The IFV is not completely replacing the APC. There is still a requirement for dedicated APCs for many tasks, not the least being for the many support arms who provide specialist teams such as combat engineers, signallers, recovery and repair specialists, medical services and so forth, most of which are covered in this book. For many such roles protected internal space is still more important than external firepower so the APC still has a long future ahead.



Above: A vision of the future - troops leaving a future French 8x8 IFV design armed with a 30 mm cannon.

Below: A glance into the future, the proposed French - British 45 mm gun designed to fire CTA ammunition and destined for the next generation of IFVs.



Above: The way ahead, examples of the 45 mm CTA rounds with the projectile totally enclosed within the propellant.

TAMSE VCTP

Although allocated under Argentina the TAMSE VCTP was originally a German development, the firm of Thyssen having been awarded a 1974 contract by the Argentinian government for the development of a 105 mm gun tank and an IFV using the same basic chassis and hull.

Argentinian development and production of the VCTP IFV and its variants was erratic due to the state of the local economy to the point when production in Argentina was terminated after 350 examples (of all types, including the tank variant) out of a planned 500 plus had been completed.

The basic VCTP IFV is essentially similar in layout to the German Marder but simplified and modified to meet Argentinian Army requirements and has a more powerful 720 hp MTU diesel power pack.

The main armament is carried in a two-man power-operated turret armed with a 20 mm Oerlikon cannon and an externally mounted 7.62 mm MG for air and local defence,

A further 7.62 mm MG is located in a remotely-controlled mounting

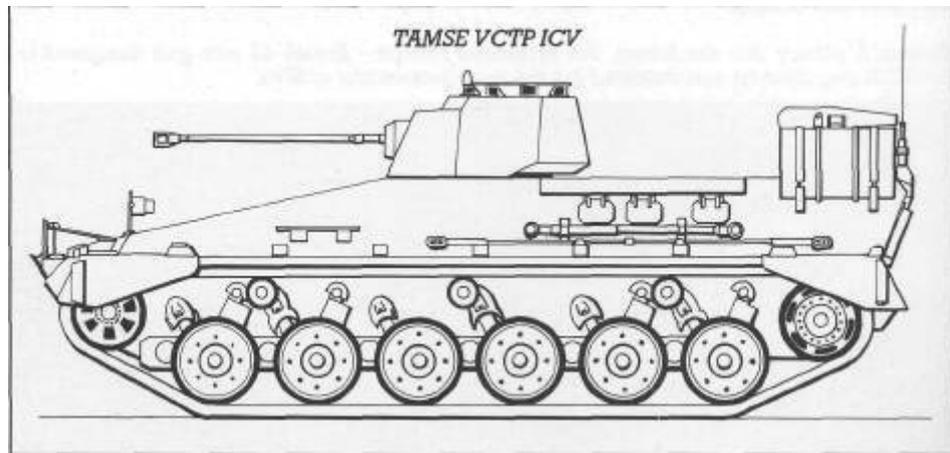
over the hull rear. This MG is controlled from within the troop compartment which can accommodate up to ten soldiers and their personal equipment. The troops enter and leave the vehicle via a door in the hull rear and there are also roof hatches.

Firing ports and vision devices are located around the troop compartment for use by the occupants, Four smoke grenade launchers are mounted each side of the hull, An essentially similar command post variant has provision

for only six in the troop compartment and lacks a turret, as does a 120 mm mortar carrier version (the VCTM) which has a crew of five.

An ARV version was produced in prototype form and only two 155 mm self-propelled guns (the VGA) were produced. The VCLC MRL was intended to fire 160 or 350 mm artillery rockets from pre-loaded 'packs' but only prototypes were completed for testing before production ceased,

Argentina



Specification

Crew: 2
Seating: 10
Weight: (combat) 28,000 kg
Length: 6.83 m
Width: 3.32 m
Height: 2.68 m
Ground clearance: 0.45 m
Track: 2.62 m
Max speed: (road) 80 km/h
Fuel capacity: 640 + 400 litres
Range: 590 + 350 km

Fording: 1.5 m
Vertical obstacle: 1 m
Engine: MTU MB 833 V6 diesel
Power output: 720 hp
Suspension: torsion bar
Armament: 20 mm cannon, 2 x 7.62 mm machine guns
Variants: VCPC command post, VCRT ARV, VCLC MRL, VCTM mortar carrier, VGA self-propelled gun

The VCTPIFV, the Argentinian-built version of the German Marder travelling through heavy mud.



Steyr Pandur

The Steyr-Daimler-Puch **Pandur** is a 6 x 6 configuration wheeled combat vehicle (6 x 4 on roads) which can only be described as multi-purpose for it was developed to fulfil a wide variety of combat roles, with all variants sharing the same automotive components,

Developed as a private venture, the first example appeared in 1985. Since then a series of pre-production variants have been produced to demonstrate a number of roles, from unarmed ambulance to various turreted models mounting weapons from 12.7 mm MGs to 30 mm cannon.

The base model Pandur APC does not have a turret, although firing ports for the occupants' weapons can be provided in the hull sides, while two doors for the passengers are provided at the rear; there are also roof hatches.

An Austrian Army APC variant, the first **Pandur** production model ordered in 1994 and intended for United Nations duties, has a raised rear hull roof to increase internal head space for the eight troops carried, plus an externally mounted and protected 12.7 mm Browning M2 MG over the commander's cupola; the initial order was for 68 units although

the final totals for this variant could be much higher.

Turreted versions of the **Pandur** are several, one being the MICV127 carrying a one-man turret armed with one 12.7 and one 7.62 mm MG, while another model has been demonstrated carrying a two man turret armed with a Mauser 30 mm cannon.

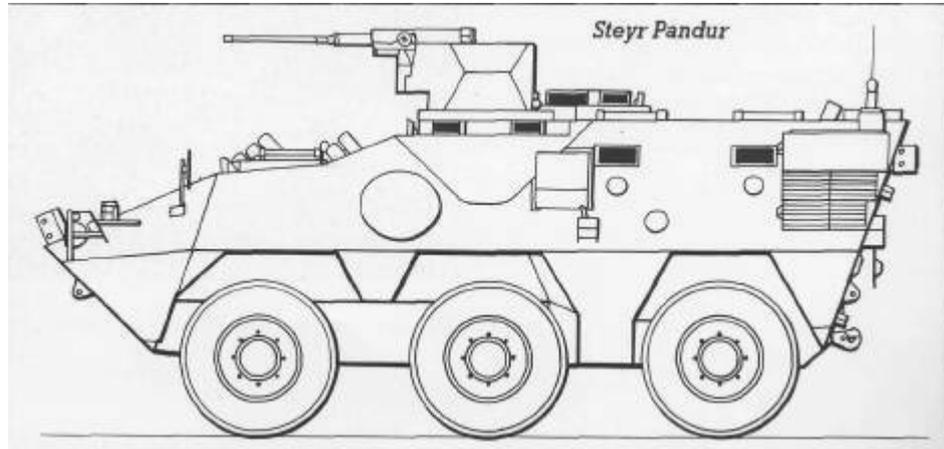
A fire support version has been armed with various types of 90 mm gun intended for the support of armoured reconnaissance units. The all-steel welded hull configuration (two hull lengths are available) allows the **Pandur**

Austria

to be configured for many roles, typical weapon fits being an 81 mm mortar firing through hull roof hatches, an anti-tank guided missile turret, or an air defence gun or missile turret.

An ARV model is under development as is a command vehicle, along with carriers for various electronic warfare (EW) suites or similar specialised systems. Firm orders for these latter variants have yet to be placed although they are anticipated.

Licence production in Greece is planned.



Specification

Crew: 2

Seating: 8

Weight: (combat) 13,000 kg

Length: 5.7 m

Width: 2.5 m

Height: (hull) 1.82 m

Ground clearance: 0.43 m

Track: 2.148 m

Max speed: (road) 100 km/h

Fuel capacity: 295 litres

Range: 600 km

Fording: 1.2 m

Vertical obstacle: 0.5 m

Engine: Steyr WD oiliesel

Power output: 260hp

Suspension: independent

Armament: see text

Variants: APC, MICV 127, fire support vehicle, mortar carrier, missile carrier, ambulance, command, etc.



The Steyr Pandur configured as a reconnaissance vehicle armed with a 90 mm gun.

Saurer 4K 4FA APC

Austria

The first prototype of the Saurer 4K 4FA series was produced in 1958, to be followed by a series of 'product improved' prototypes which differed mainly in having increasingly powerful engines until the 250 hp 4K 4FA series emerged.

The series remained in production until 1969 by which time Saurer had been taken over by Steyr-Daimler-Puch and a series of variants with designations of bewildering complexity had appeared; the final production total was 445, all of them going to the Austrian Army

The base vehicle is a turretless APC based on a well-sloped welded steel hull with the front plates proof against 20 mm projectiles and with internal provision for eight soldiers plus the two-man crew (commander and driver); the main armament is a 12.7 mm Browning M2 MG over the commander's cupola while 7.62 mm MGs can be mounted on various roof locations close to the troop compartment roof hatches.

A close variant has a small turret armed with a 20 mm Oerlikon cannon which can be used against ground and

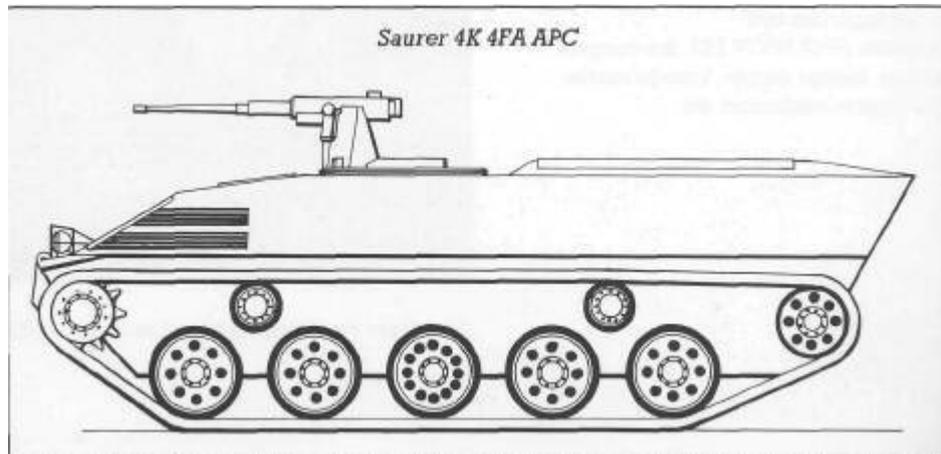
air targets, An 81 mm mortar carrier, converted from APCs, fires through open roof hatches and there is also a rocket launcher variant launching Oerlikon magazine-fed 81 mm rockets from two barrels mounted on a turntable.

At least four special-purpose models exist, fitted out for high level commanders, air defence or artillery commanders, or various communications equipments. There is also an unarmed ambulance model,

Several experimental models, such as a 120 mm mortar carrier and a

flamethrower model, were not proceeded with.

All the 4K 4FA variants tend to demonstrate their age by their lack of NBC protection systems for the occupants and crew, no provision for night vision equipment (other than hand-held units) and by not being amphibious. However, despite having been superseded by the Steyr 4K 7FA series (see following entry) there are plans to upgrade the 4K 4FA units to enable them to remain operational until the late 1990s at least.



Specification

Crew: 2

Seating: 8

Weight: (combat, 20 mm turret) 15,000 kg

Length: 5.4m

Width: 2.5 m

Height: (hull) 1.65m

Ground clearance: 0.42 m

Track: 2.12m

Max speed: (road) 65 km/h

Fuel capacity: 184 litres

Range: 370km

Fording: 1 m

Vertical obstacle: 0.8 m

Engine: Sauer Model 4FA diesel

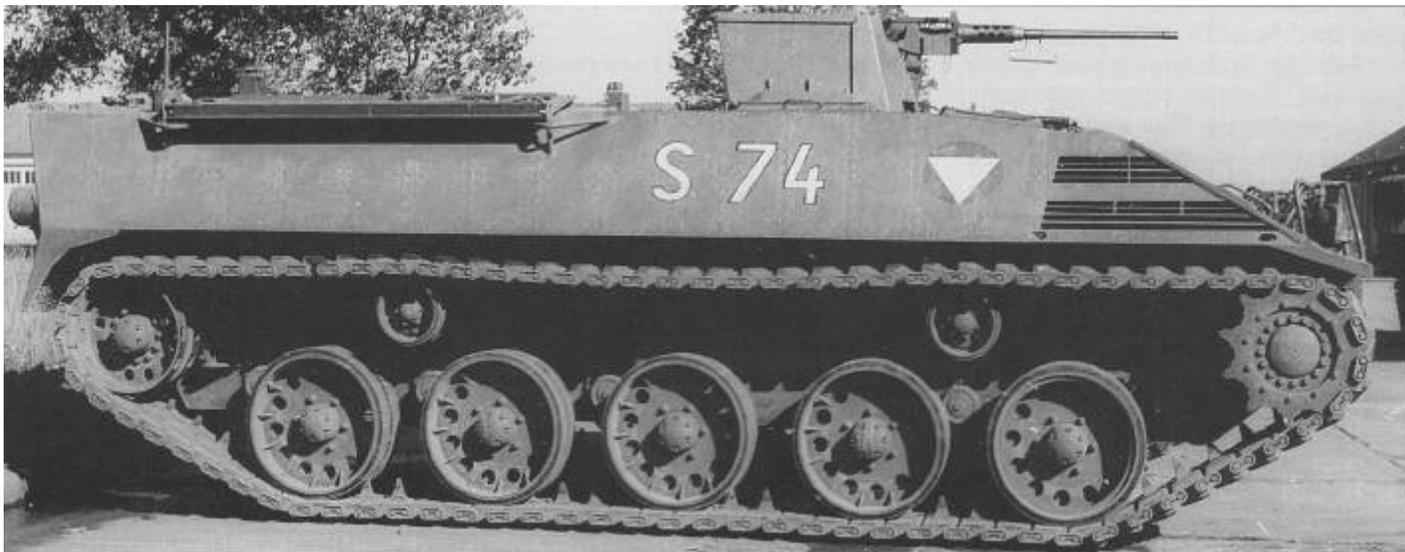
Power output: 250 hp

Suspension: torsion bar

Armament: 1 x 12.7 mm MG or 20 mm cannon

Variants: see text

Side view of the Sauer 4K4FAAPC.



Steyr 4K 7FA APC

The **Steyr 4K 7FA** series may be regarded as an updated version of the Saurer 4K 4FA (see previous entry) and *is* provided with extra armour, a more powerful engine and other changes,

The overall layout and appearance of the **4K 7FA** are very similar to the earlier model but detail changes include the provision of a collective NBC system, improved internal ventilation and an automatic fire prevention system.

The first example, the 4K 7FA G127, appeared in 1976, with production commencing the following year. This is the base APC model carrying two crew and eight troops. It is armed with a 12,7 mm Browning MG over the commander's cupola and there are ball-type firing ports in the walls of the troop compartment to allow the occupants to utilise their personal weapons. There is also an arrangement which allows 7.62 mm MGs to be fired from around the open roof hatches. Variants follow the same general lines as the **4K 4FA** series and include an 81 mm mortar carrier, a command version with extra radios and other command equipment, and an unarmed armoured ambulance for two

stretcher cases plus four seated casualties.

Various other models have been produced in one-off form, including one with a 30 mm cannon one-man turret, various 20 and 30 mm air defence gun systems, and a fire support vehicle with a 90 mm gun turret.

Unlike the previous model, the **4K 7FA** has achieved a degree of export success with sales to Bolivia (6) and Nigeria (170). The vehicle is licence produced in Greece where it is known as the **Leonidas**.

About 200 units have been produced

Austria, Greece

by ELBO for the Greek Army, plus a further undetermined quantity for Cyprus.

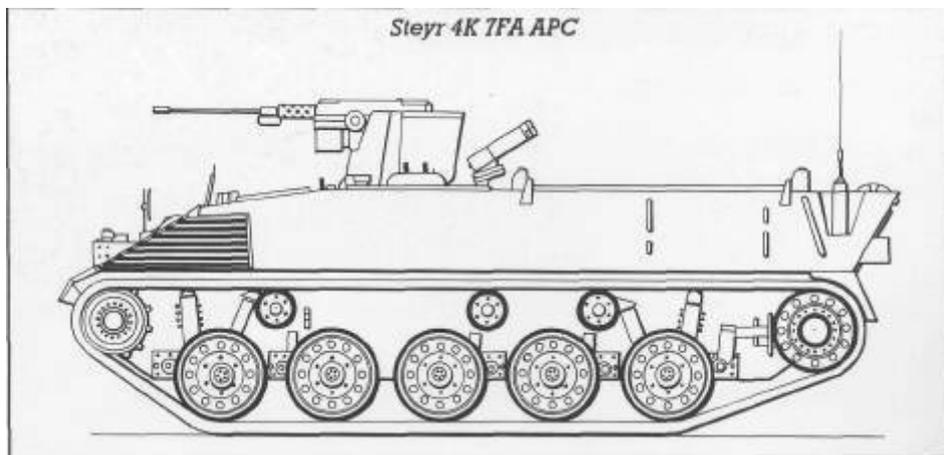
The **Leonidas** has been trialled carrying a number of turret designs mounting 25 mm cannon as a possible solution to a Greek Army requirement for an AIFV.

Trials have also been conducted with a **Leonidas** carrying a 90 mm gun turret.

The outcome of these trials has yet to be announced.

Production in Austria has ceased but could be restarted if further orders materialise.

Production is still under way in Greece.



Specification

Crew: 2
Seating: 8
Weight: (combat) 14,800kg
Length: 5.87 m
Width: 2.5 m
Height: 1.61 m
Ground clearance: 0.42 m
Track: 2.12m
Max speed: (road) 70 km/h
Fuel capacity: 360 litres
Range: 520 km
Fording: 1 m
Vertical obstacle: 0.8 m
Engine: Steyr 7FA turbo diesel
Power output: 320 hp
Suspension: torsion bar
Armament: 12.7 mm MG or 20 mm cannon
Variants: See text, Leonidas APC



The Leonidas, the license-produced version of the Steyr 4K 7FA APC.

BOX APC

Belgium

The **BDX APC** is the result of a licence agreement between Beherman Demoen of Belgium and an Irish holding company to manufacture the Timoney 4x4 wheeled APC in Belgium. The result, the **BDX**, first produced in 1977, is based on an Irish design which has been produced in Ireland in limited numbers for the Irish Army. The Belgian **BDX** has been produced for both the Belgian Air Force (43) and the State Gendarmerie (80), while a further five have been supplied to Argentina.

While the **BDX** is essentially similar to the Timoney some changes were introduced to suit Belgian requirements. The basic **BDX APC** does not have a turret, being an armoured steel hull with access doors in the

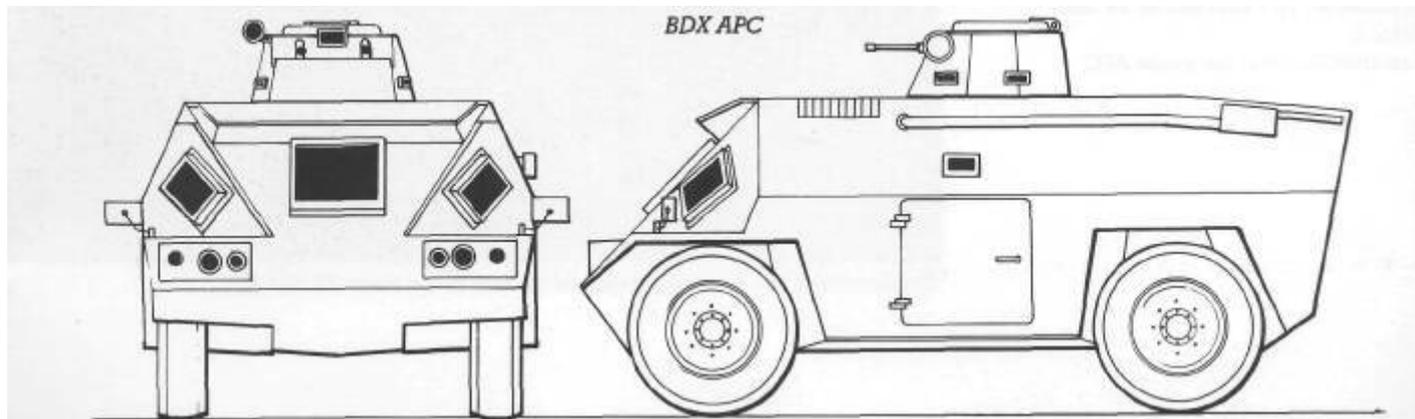
sides and rear. The troop compartment can accommodate up to 10 occupants, all provided with individual seating; an NBC collective protection or air conditioning system can be added,

Some vehicles have a small dozer blade at the front for obstacle clearing. One unusual feature of the **BDX** is that, despite its bulk, it is amphibious, propulsion when in the water being supplied from the wheels although water jet units can be fitted to improve performance. A total of 13 of the Belgian Gendarmerie vehicles are fitted with an 81 mm mortar firing to the rear through roof hatches. It is also possible to instal a small turret on the forward hull roof to accommodate either one or two

7.62 mm MGs. Other turreted weapons could include 20 mm cannon, a breech-loaded 81 mm mortar, or a 90 mm gun.

Various other variants have been proposed, including turreted anti-tank missile-carriers, an ambulance and a 51 mm MRL. A diesel engine has been tested as a possible option.

Since the **BDX** entered service numerous modifications and improvements, such as a revised suspension to allow greater weights to be carried and a revised front hull to provide the driver with more space, have been incorporated into an upgraded model known as the **Valkyr**. This variant is now produced in the United Kingdom by Vickers Defence Systems.



Specification

Crew: 2

Seating: up to 10

Weight: (combat) 10,700 kg

Length: 5.05 m

Width: 2.5 m

Height: (hull) 2.06 m

Ground clearance: 0.4 m

Track: 1.93 m

Max speed: (road) 100 km/h

Fuel capacity: 248 litres

Range: up to 900 km

Fording: amphibious

Vertical obstacle: 0.4 m

Engine: Chrysler V-8 petrol

Power output: 180 hp

Suspension: independent

Armament: see text

Variants: Timoney, Valkyr - also see text



A Belgian manufactured version of the BOX.

ENGESA EE-11 Urutu APC

Brazil

At one time it seemed very likely that the Brazilian EE-11 Urutu APC would become one of the most numerous of all current military vehicles.

First run out by ENGESA during 1970, the Brazilian Army placed an order and from 1974 onwards further orders came in from all around the world, one of the most significant being a large order from Iraq.

Based around components also employed in the design of the ENGESA EE-9 armoured car, including the 'boomerang' rear suspension, the EE-11 Urutu is a simple and unsophisticated 6 x 6 design with a spacious passenger compartment entered through a single door at the rear; troop loads can vary from 8 to 12 and roof hatches are provided.

Although relatively bulky the vehicle is amphibious. The Urutu was designed to be a relatively low cost APC capable of being produced in a variety of forms from the basic APC with only 7.62 or 12.7 mm MGs for armament to a fire support vehicle armed with an ENGESA 90 mm gun. Other armaments have included turreted 60 mm breech-loaded mortars and 20 or 25 mm cannon. Also

produced have been 81 mm mortar carriers, command versions with extra radios, ambulance models with a raised roof to increase internal space, and a variant capable of recovering and repairing damaged or stranded vehicles.

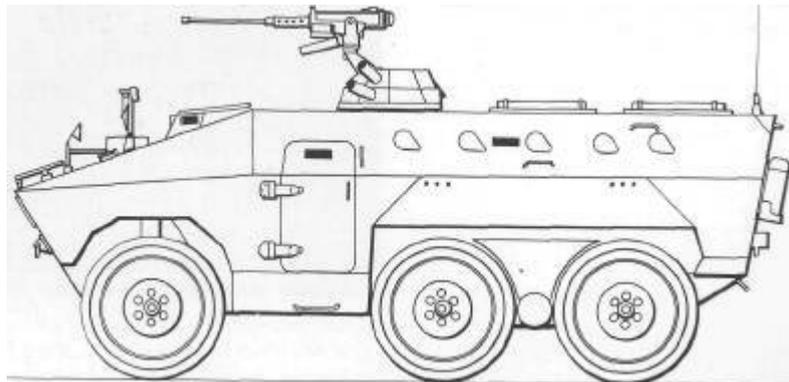
There was also an armoured cargo carrier capable of carrying 2 tonnes of ammunition or other front line supplies in the seatless troop compartment. An internal security/riot control model with a front-mounted obstacle-clearing dozer blade was also produced, some being ordered by Jordan.

Exports to nations as disparate as

Angola, Cyprus, Libya and Venezuela were made, the latter nation alone ordering 100 units.

In all some 17 nations ordered the Urutu in one form or another. However, with the end of the Iran-Iraq war, one of the largest customers, Iraq, was no longer in the market. ENGESA subsequently contracted financial difficulties and production of all ENGESA vehicles and other defence products ceased.

EE-11 Urutu APC



Specification

Crew: 1 or 2

Seating: up to 12

Weight: (combat) 14,000 kg

Length: 6.1 m

Width: 2.65m

Height: (huU)2.125m

Ground clearance: 0.38 m

Track: 2.2m

Max speed: (road) 105 km/h

Fuel capacity: 380 litres

Range: 850 km

Fording: amphibious

Vertical obstacle: 0.6 m

Engine: Detroit Diesel 6V-53T diesel

Power output: 260 hp

Suspension: front independent, rear,
boomerang

Armament: see text

Variants: Many - see text



The Brazilian Urutu 6x6 APC seen here armed with a 12.7mm MG.

Light Armored Vehicle (LAV) 25

Canada

The **Light Armored Vehicle**, or **LAV**, is an 8x8 variant of the MOWAG Piranha licence produced by General Motors of Canada for the US Marine Corps, the US Army, Australia (who obtained 15 before ordering the Bison) and Saudi Arabia.

The **LAV** closely follows the overall layout of the Swiss Piranha, as do the 6x6 Canadian armed forces models which are named the **Husky**. The total of 758 8x8 LAVs for the US Marine Corps include the **LAV-25** APC with a 25 mm cannon in a turret, the **LAV(R)** recovery vehicle, the **LAV(L)** supply carrier, the **LAV(M)** 81 mm mortar carrier, the **LAV(C)** command vehicle and the **LAV(AT)** with TOW anti-tank missiles carried on a roof-mounted twin

missile launcher. Other proposed LAV variants for the Saudi Arabian National Guard order (which stands at a total of 1,117 of all types) include a 120 mm mortar carrier (probably with a breech-loaded mortar in a turret), an air defence version with a combined gun and missile armament, and an assault gun carrying a 90 mm gun; a 105 mm tank gun version of the latter has been proposed. From these initial models have emerged a host of others with the basic LAVs capacious hull being configured, for example, to accommodate electronic warfare (EW) suites while others are equipped as long range reconnaissance vehicles. There has even been a proposed 'disrupter' version to clear unexploded

ordnance from airfields but the development funds were withdrawn. An NBC reconnaissance version has been produced but was not proceeded with. **LAVs** in service have undergone some modification and armour-increase projects involving armourtiles.

Further enhancement programmes may include increased tyre widths with tyre chains to enable them to cross soft terrain or beaches, and (possibly) an increase in engine output. **LAVs** are air-transportable and have been para-dropped. Many saw action in Grenada and during Operation Desert Storm.

For details of the visually similar **Bison**, refer to the following entry.

