P47(C)

THYSSEN PROJECT IN CANADA

Proposal

Thyssen BHI has offered to commence activity in Canada through an Initial R&D prototype activity for the TH 495 Multi Purpose Base Armoured Vehicle (MBAV) series of vehicles.

Upon securing support of the Canadian Government for the complete R&D phase, Thyssen will establish a Canadian prototype development facility followed by the placement of the world production mandate for the TH 495 MBAV at its Canadian facility for the full range of vehicle variants which are developed with Canadian prototype development support. The resulting export sales and advanced technology jobs will be of significant benefit to Canada.

Market

The target market for the TH 495 is international exports to NATO and NATO friendly countries where there is a pending demand of some 15,000 vehicles in the MBAV category. A NATO study on the MBAV concept and requirement which is due for release this autumn, confirms the company's approach to the critical area of vehicle design requirements. The Thyssen TH 495 meets or exceeds the preferred NATO MBAV design in every important category, and is the only vehicle existing in NATO countries to do so.

Employment

Direct employment associated with MBAV production							
Year	1	2	3	4	5	6	7
Phase 1 Prototype R&D	50	50	50				
Phase 2 MBAV Production			80	180	310	470	585
Total:	50	50	130	180	310	470	585

Additional Doubling of Employment through Diversification

After commencement of production in MBAV, a diversification will commence in the field of industrial products from the vast range of Thyssen held technologies. The objective of the diversification phase is to achieve an equal level of non-defence activities in this Canadian facility which will translate into a further doubling of the above MBAV employment projection.

Canadian Situation

There is no Canadian company with a competitive technological capability to develop an original vehicle design, as has been done with the Thyssen TH 495. The only company of significance in the field of armoured vehicles is GM Diesel Division (GMDD) of London, Ontario, and they are not original vehicle developers, but rather a licensed builder of the Swiss Mowag vehicle. It would not be reasonable to expect GMDD to be able to acquire a world product mandate for a vehicle capable of competing successfully internationally in the MBAV category.

26 August 1993

CHAPTER 2

INTRODUCTION

2.1 Introduction

2.1.1 All the countries in NATO employ fleets of wheeled or tracked light armoured vehicles (LAVs), such as the M113, VAB, TPz 1, Piranha/LAV, FV430 series, etc. These aging light armoured vehicle (LAV) fleets are still being used to perform troop carrying, combat support and logistics functions even though they lack the protection, mobility, firepower and capacity needed on the modern battlefield. Although a portion of these fleets has been replaced by modern infantry fighting vehicles (IFV) the cost of IFVs is too great for them to be employed in support roles. It will therefore be necessary for NATO countries to replace these LAVs with more capable platforms at an affordable cost. Some countries have already started national programs to replace these vehicles after the turn of the century and others are in the planning process. An opportunity therefore presents itself for potential cooperation leading to lower procurement and ownership costs, and to the possibility of achieving a high level of LAV standardisation and inter-operability within the Alliance.

2.1.2 NATO Army Armaments Group (NAAG) Panel II consequently formed a Working Group of Experts, WGE.5, to draft an Outline NATO Staff Target (ONST) for a family of LAVs to fulfil the perceived future requirement. The resultant concept was a vehicle family founded on a common multi-purpose base armoured vehicle, MBAV.

2.1.3 A NATO Industrial Advisory Group (NIAG) was invited to meet with WGE.5 in February 1991 to explore the need, scope, and adequacy of documentation for a NIAG prefeasibility study (PFS) on the MBAV concept. At their Plenary meeting of 27 March 1991, Heads of NIAG Delegations examined the recommendation of the Exploratory Group that a NIAG PFS should be conducted as the best approach to proceed to the development of a NATO Staff Target (NST). In consideration of this recommendation, the NIAG formed an Exploratory Group on a MBAV to organize the study effort.

June 10. / 93

Thyssen Henschel's TH 495 MICV

by Wolfgang Schneider

Those responsible for weapons procurement in Germany were surprised by the rapid changes following the demise of the Soviet Union. For more than three decades, Germany's efforts concentrated on the development of high-endurance, versatile multi-purpose armoured fighting vehicles (AFVs). These became bigger and increasingly complex, optimized for the defense of a Central Europe threatened by Warsaw Pact forces superior in both general combat and anti-tank capabilities. This resulted in clumsy, heavy tanks and infantry fighting vehicles exceeding 50 and 40t respectively.

Given recent emphasis upon UN-controlled crisis management, the unified German forces realized that they lacked an effective combat vehicle suitable for strategic movement. Even the 17t, 2.98m-wide 6×6 Fuchs is not air-transportable except by Starlifter or Galaxy aircraft. Faced with the possibility of significant politically led policy changes concerning Bundeswehr involvement with European rapid reaction forces, procurement planning has been suspended until a decision is made. This, despite limited funding, it was logical that the major German defense manufacturers should begin development of light AFVs suitable for crisis-management roles. Examples include the Diehl/Krauss Maffei Puma (as a possible M113 replacement) and the Krupp-MAK CV-90. Another interesting approach is the Thyssen Henschel TH 495, the first prototype of which recently had its roll-out in Kassel.

The first TH 495 prototype was built in a MICV configuration and forms the nucleus of a family of tracked vehicles able to meet all the requirements of an out-of-area mission. One of the main demands was that the vehicle should be transportable by C-130 Hercules. This limited weight to less than 20t, and both width and height to 2.8m. Nevertheless, it was decided to maximize protection by incorporating modular armour panels which could readily be altered to meet a specific threat. Otherwise, the MIVC-version resembles the Marder 2, with the engine at the front, a rear troop-carrying compartment, and a central cannon-armed turret to provide a favourable centre of gravity.

Good all-around (including overhead) protection is provided by spaced and/or special armour packages each of which can be removed or fitted by two crewmen within a few minutes. Spare or additional armour modules could, for example, be transported in a second aircraft together with the crew, fuel, and ammunition to reduce vehicle weight, thereby increasing aircraft range. (In the prototype configuration seen at Kassel – mounting an OTO-Melara T 25 turret – the TH 495 has a combat weight of 28t. Thyssen Henschel pointed out that any other comparable turret can be fitted with the TH 495 according to customers choice). Without its add-on armour modules the vehicle is only 2.72m wide. An internal spall-liner, NBC system, fire-suppression system (optional), and explosion-proof fuel tanks also raise crew protection beyond the standard for light armoured fighting vehicles.

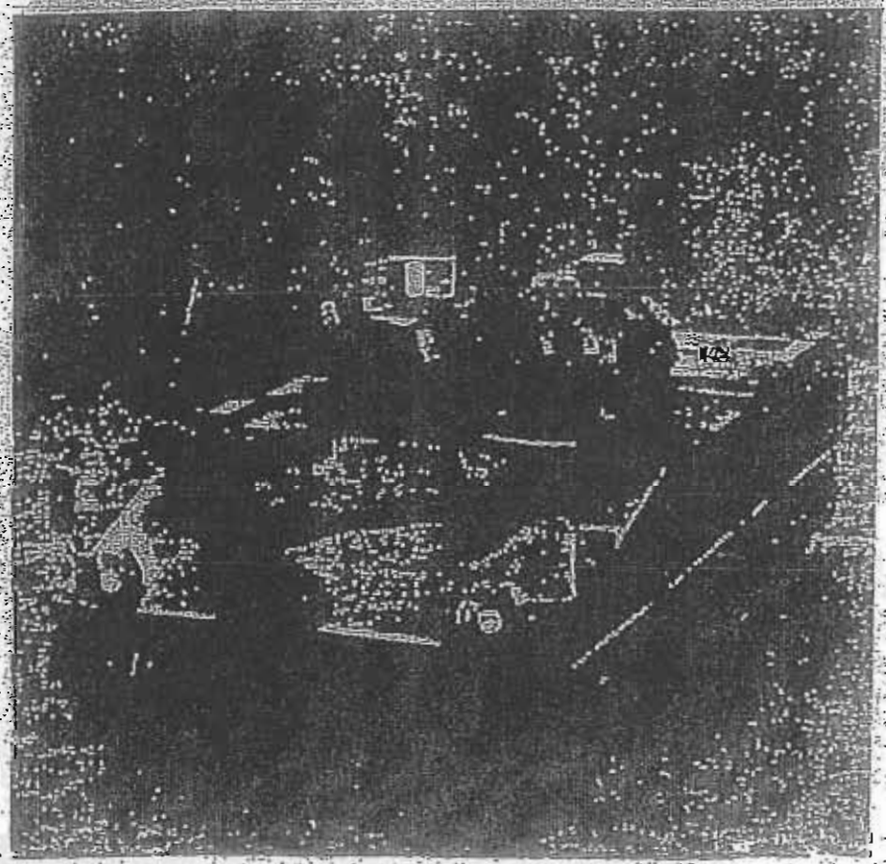
The MICV has a crew of three and carries seven in the troop compartment. The driver is on the left of the engine and is provided with three integral periscopes in the single-piece hatch, one of which can be replaced by an image-intensifier for night driving. The commander and gunner sit in the turret. In the spacious rear compartment an infantry section is seated in two rows facing inwards. Up to four soldiers can fire personal weapons from the two roof hatches; the side-hinged rear doors have two weapon-ports. When closed down, the section can view the battlefield on two monitors linked to side-mounted cameras.

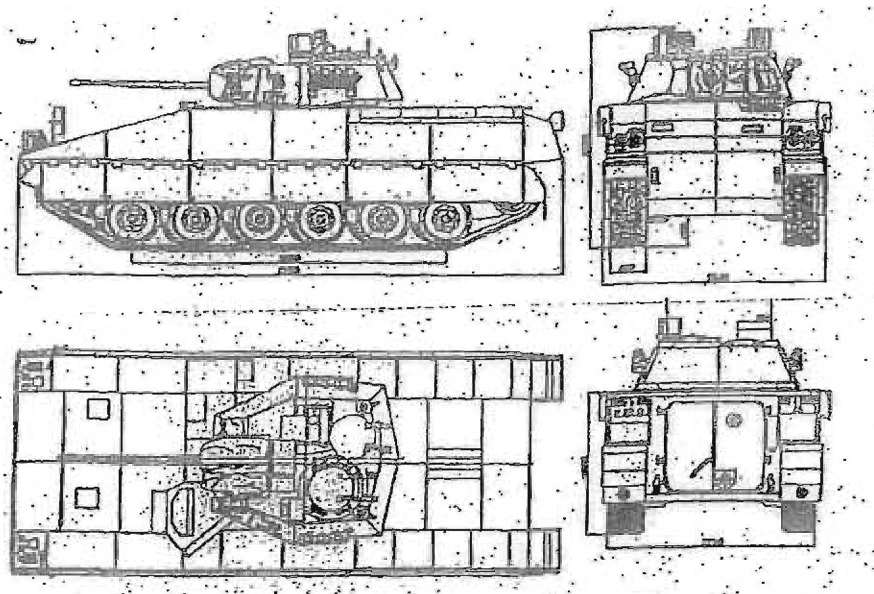
Emphasis has been placed upon a low infrared signature which has been achieved by ventilating the gap between the spaced armour and the hull, as w as by careful layout of the haust and engine-cooling s tems. Two cooling syste are located at the rear abo each sponson; hot gases fr the exhaust and cooling s tem are mixed with cold in an "IR grating", and th vented downwards from grill on the rear-right of t vehicle. The hot spot usually easily visil through a thermal sight is not identifial from the front. Radar reflection is reduc by a combination of the vehicle's smoo surface and an absorbent coating.

Mobility

The TH 495's mobility is also good. Tl prototype is powered by an MTU 183 T 22, 441kW (600hp) diesel, giving a powe to-weight ratio of more than 17kW (23HP/t). The track width of 450m makes for a ground pressure of 72.7kPa the MICV configuration and considerab less as an APC. The TH 495 is easily drive thanks to the improved ZF LSG 1500 fu automatic transmission, good ergonomic and high safety standards. The driver's st tion, together with all controls and info mation displays, is vertically adjustabl When driving with the hatch open, drive information is displayed on a pan mounted between hull roof and add-on a mour. A digital power supply is fitte microprocessors control all systems cu rently fitted, as well as monitoring the

Thyssen Henschel seems to have anticipated the shift in German requirements away from heavy armoured vehicles towards more mobile, modular designs with its private-venture TH 495 family.





The TH 495 MICV forms the basis of the range; the layout is conventional, and a variety of turrets can be fitted. Spaced armour and exhaust coolers reduce the thermal signature, whilst the smooth hull and special coatings do the same for its radar signature.

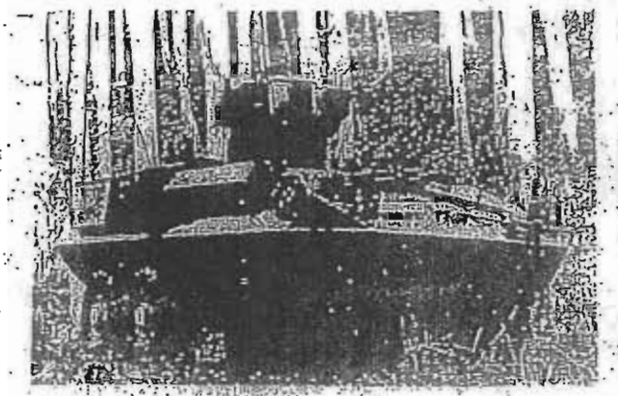
operation, reporting faults to a diagnosis system combined with an integrated control system. The vehicle uses subsystems and components already in series production and proven in non-military vehicles, thereby ensuring a high degree of reliability and reduced maintenance.

TH 495 armoured vehicle family

Construction is progressing on a second prototype with a hull 750mm shorter, and five instead of six road wheels. Roll-out is scheduled for February 1993. The main features of the suspension (torsion bars, three return rollers, hydraulic shock absorbers on the two front and rear wheel stations of each side, Diehl double-pin track) remain unchanged. Depending upon vehicle configuration, the weight can be reduced to under 15t. A potentially interesting variant would be an armoured cavalry vehicle fitted with a 90 to 120mm anti-tank gun. The rest of the family is more conventional, comprising:

- TOW-based tank destroyer,
- Stinger anti-aircraft vehicle,
- radar carrier,
- APC,
- armoured ambulance,
- supply carrier,
- maintenance vehicle,
- and a command and communications vehicle.

Though this Thyssen Henschel private initiative has involved considerable financial investment, the risk has been reduced by developing a promising AFV family which could be adapted to meet the needs of many potential customers. Compared with similar light AFVs, the TH 495 to some extent represents a "full-scale" fighting system with good growth potential. Nonetheless, competition is fierce and the attractions of buying alternative, cheaper, off-the-shelf vehicles such as the French VAB or the Swiss Piranha are self-evident.



MOWAG Piranha (6 x 6) vehicle fitted with Norwegian Kvaerner Eureka turret for launching TOW ATGWs

Piranha (6 x 6) Anti-tank Vehicle

After extensive trials of three MOWAG Piranha (6 x 6) AFVs fitted with the Norwegian Kvaerner Eureka A/S (previously Thune-Eureka) Armoured Launching Turret and three vehicles fitted with a pedestal-mounted TOW launcher which retracted under armour protection when not required, the former was selected by the Swiss Army.

The Swiss 1989 Armament Programme proposed SFr941 million for the procurement of 310 MOWAG Piranha (6 x 6) anti-tank vehicles fitted with the Armoured Launching Turret (ALT) to be issued to 31 anti-tank companies at present equipped with the 105 mm 58 (US designation M40) recoilless anti-tank gun. Each company will consist of a command platoon and three anti-tank platoons. Companies operating in the mountain divisions will also be allocated a repair platoon.

In addition to the two missiles in the ready to launch position a further eight are carried internally for manual reloading. A standard TOW launcher is also carried.

The 310 vehicles will be delivered between 1989 and 1992 with MOWAG building the Piranha (6 x 6) vehicle and installing the ALT which will be manufactured under partial licence by the Ateliers Federaux, Thoune, the total Swiss share being 70 per cent.

The Federal Aircraft Factory at Emmen will build about 49 per cent of the aiming system, including day and night sights, and almost 55 per cent of the TOW-2 guided missile, and simulators.

Of the total of SFr 941 million, some 400 million will be for the vehicles, 310 million for the missiles and the remainder for spare parts and maintenance equipment. Of the grand total of SFr 941 million, the Swiss element will represent 617 million, or 66 per cent.

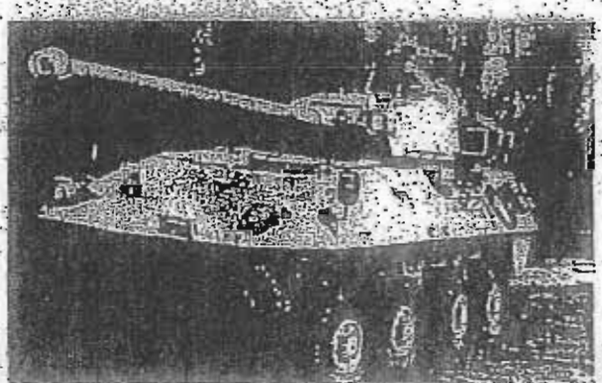
Piranha (8 x 8) Anti-tank Vehicle

MOWAG has completed the prototype of an anti-tank version of the Piranha (8 x 8) vehicle fitted with the Euromissile Mephisto system which consists of a retractable launcher with four Euromissile 4000 m range HOT ATGWs with additional missiles being carried in reserve. This system is also used by the French Army on an SMS VAB (4 x 4) APC.

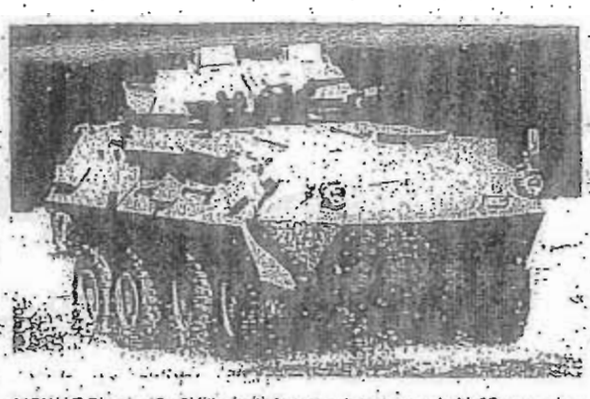
This version has a combat weight of 12 600 kg and is 6.4 m long, 2.5 m wide and 2.8 m high with the Mephisto sight raised. Four HOT missiles are ready to launch and a further eight rounds are in reserve.

Piranha (8 x 8)

A variety of armament installations can be fitted including all those of the 6 x 6 model plus twin 20 or 30 mm anti-aircraft guns, multiple rocket-launcher with two banks of 15 94 mm launcher tubes, and radar tracker locking a 120 mm



MOWAG Piranha (8 x 8) fitted with Giat Industries TS-90 90 mm turret



MOWAG Piranha (8 x 8) fitted with two-man turret armed with 25 mm cannon and 7.62 mm machine gun

mortar. Late in 1990 an 8 x 8 Piranha was shown in the United States fitted with an AAI-developed turret armed with a 75 mm ARES cannon.

90 mm Assault Gun Vehicle

Late in 1989 MOWAG demonstrated the AGV-90 in Switzerland and France. This is essentially an improved MOWAG 8 x 8 Piranha fitted with the Giat TS-90 Weapons Station. This is armed with the 90 mm gun with a coaxial 7.62 mm machine gun.

The 90 mm gun fires APFSDS-T, HEAT-T, HE, smoke and canister rounds with 18 ready rounds carried in the turret; a further 25 rounds are in the hull.

Optional equipment includes a Smiths land navigation system. Other improvements include a fuel tank with increased fuel capacity which increases operational range to 1000 km, a small access hatch in the left side of the hull, a winch with direct pulling capacity of 6.8 tonnes.

Combat weight of the AFV-90 is 13 000 kg, length with gun forwards 7.28 m, width 2.5 m and height 2.7 m.

SPECIFICATIONS			
Model	6 x 6	6 x 6	8 x 8
CREW (max)	10	14	15
COMBAT WEIGHT	7800 kg	10 500 kg	12 300 kg
UNLOADED WEIGHT	6700 kg	9000 kg	6600 kg
POWER-TO-WEIGHT RATIO (diesel engine)	25 hp/tonne	28.5 hp/tonne	24.4 hp/tonne
LENGTH	5.32 m	5.97 m	6.365 m
WIDTH	2.5 m	2.5 m	2.5 m
HEIGHT (without armament)	1.85 m	1.85 m	1.85 m
GROUND CLEARANCE	0.5 m	0.5 m	0.5 m
TRACK			
front	2.18 m	2.18 m	2.18 m
rear	2.2 m	2.2 m	2.2 m
WHEELBASE	2.42 m	2.04 m + 1.04 m	1.1 m + 1.135 m + 1.04 m
ANGLE OF APPROACH/ DEPARTURE	40°/45°	40°/45°	40°/45°
MAX SPEED			
road	100 km/h	100 km/h	100 km/h
water	9.5 km/h	10.5 km/h	10.5 km/h
FUEL CAPACITY	200 l	200 l	300 l
MAX ROAD RANGE	700 km	600 km	780 km
FORDING	amphibious	amphibious	amphibious
GRADIENT	70%	70%	70%
SIDE SLOPE	35%	35%	35%
VERTICAL OBSTACLE	0.5 m	0.5 m	0.5 m
TURNING RADIUS	6.3 m	7.3 m	7.7 m
ENGINE	Cummins 6 BTA 5.9 diesel developing 195 hp at 2800 rpm	Detroit Diesel 6V-53T developing 300 hp at 2800 rpm	Detroit Diesel 6V-53T developing 300 hp at 2800 rpm
TRANSMISSION (Allison Transmission Division of General Motors)	AT-545 automatic, 4 forward/1 reverse gears	MT-653 automatic, 5 forward/1 reverse gears	MT-653 automatic, 5 forward/1 reverse gears
SUSPENSION	independent	independent	independent
TYRES	11.00 x 16	11.00 x 16 (dual circuit)	11.00 x 16 - on all vehicles
BRAKES (main)	air hydraulic		
ELECTRICAL SYSTEM	24 V	24 V	24 V
ARMAMENT	depends on role	depends on role	depends on role

* Dependant on role

Renault VAB Armoured Personnel Carrier

Development

In the late 1960s the French Army decided to equip its infantry units with both tracked and wheeled vehicles. The mechanised units would be issued with the tracked AMX-10P ICV, then already under development, and the remaining units with wheeled APCs as the tracked AMX-10P was considered too expensive and sophisticated for many of the roles it was expected to undertake.

In 1970 the French Army issued a requirement for a Forward Area Armoured Vehicle (VAB or Véhicule de l'Avant Blindé) which would meet the requirements of the remaining infantry units and would be capable of undertaking a wide range of roles including use as an APC, cargo carrier and mortar towing vehicle.

To meet this requirement Panhard and Saviem/Renault Group built prototypes of both 4 × 4 and 6 × 6 vehicles between 1972 and 1973. These were tested by the Section Technique de l'Armée de Terre between May 1973 and early 1974 and in May 1974 the 4 × 4 version of the Saviem/Renault Group entry was selected for service.

No pre-production vehicles were built and first production vehicles were delivered to the French Army in 1976. The French Army has a requirement for 4050 VAB vehicles for delivery by the early 1990s. At present the French Army is ordering the 4 × 4 version only but it is expected that the 6 × 6 version, which is already in production for export, may be ordered in the future.

Prime contractor for the VAB is Renault Véhicules Industriels which supplies automotive components to Mecanique Creusot-Loire at Usine de Saint-Chamond for final assembly.

Some 50 VABs in both 4 × 4 and 6 × 6 configurations can be built every month (for the French Army and for export). The largest export order so far is for 384 units from Morocco, including APCs command vehicles.

At the Satory defence equipment exhibition held in June 1990, prototypes of the VAB New Generation (VAB NG) were shown for the first time. This has been developed and funded by Renault VI and Mecanique Creusot-Loire in co-operation with the French Army and will become the updated successor of the VAB for the next two decades and also allow the rebuilding of older first generation VABs to the VAB NG standard.

All existing VAB variants will be available on the VAB NG basic chassis.

The main improvements of the VAB NG cover the areas of armour protection, mobility and ergonomics with the full list of improvements being as follows:

(1) Driver and commander have high protection bullet-proof windscreen
(2) Front of vehicle hull now has protection against armour-piercing ammunition
(3) Headlamps and direction indicators at the front of the hull are now recessed low in the hull
(4) Hydraulically powered front-mounted winch
(5) Car type driver's dashboard and steering wheel
(6) Integrated air-conditioning system with controls on driver's dashboard (option)
(7) Pinion drive down transmission
(8) Five speed automatic transmission with lock up device
(9) Integrated NBC system
(10) 250 hp twin turbocharged 6-cylinder diesel engine
(11) Reinforced suspension
(12) Remote-controlled tyre inflation/deflation system (option)
(13) 2 × 6 DREC grenade launchers mounted either side of turret-firing forwards
(14) Troop compartment floor is now flat and washable
(15) Troops now have individual fold-up seats
(16) Water-jet drive system is more compact
(17) New engine cooling system
(18) Optional add-on armour to sides of troop compartment
(19) Splinter absorbent liner for crew compartment (option)
(20) Troop compartment windows are bullet-proof with armoured shutters being an option
(21) The engine compartment roof has a Molotov cocktail protection system
(22) Ballistic protection of air intake
(23) Driver's and commander's compartment has more room
(24) Driver's and commander's shutters are of composite armour (option).

In October 1988 two agreements were concluded with the Hughes Aircraft Corporation of the USA. One by Renault Véhicules Industriels for technical co-operation in TOW Under Armour systems on the VAB, and one with SMS for co-operation in the promotion and sale of these systems.

The VAB was used by France and Qatar during Operation Desert Storm, the recapture of Kuwait, early in 1991. The VAB with the HOT ATGWs successfully engaged Iraqi AFVs during this conflict.

By mid-1992, just over 5000 VAB in 4 × 4 and 6 × 6 configurations had been built for the home and export markets with production for the French Army expected to be completed in February 1992 after 4050 had been built.

Two production standard VAB New Generation have been built, one in the 4 × 4 configuration and one in the 6 × 6 configuration. It has been adopted by the French Army but as of mid-1992 no firm orders had been placed for the vehicle although it was expected that early build French Army VABs would be returned to the manufacturer to be upgraded to the new standard.

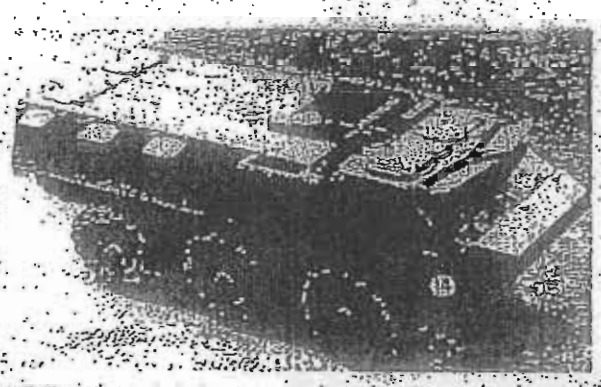
Description

The basic model used by the French Army is the 4 × 4 VAB VTT (Véhicule Transport de Troupe) which has a crew of two (commander/machine gunner and driver) and carries 10 fully equipped infantrymen. The following description relates to this vehicle.

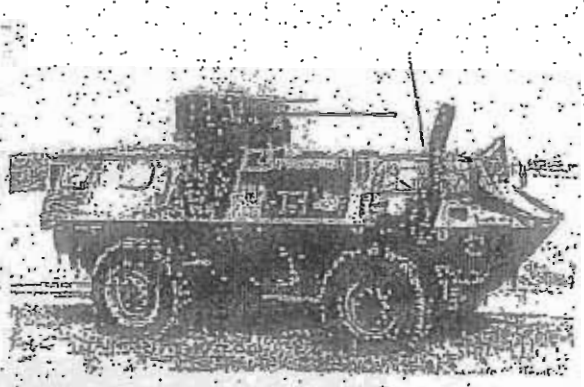
The all-welded steel hull of the VAB provides the crew with protection from small arms fire and shell splinters. The driver sits at the front of the vehicle on the left with the commander/machine gunner to his right. Both crew members have a side door that opens to the front, with a bullet-proof window in its upper part that is hinged at the top and opens outwards and can be covered by a shutter. In front of them is a heated bullet-proof windscreen that can be covered by a flap hinged at the top. Over the driver's position is a single piece hatch cover that opens to the front. A similar hatch is mounted over the commander's position but vehicles issued to the French Army have a Mecanique Creusot-Loire rotating gun mount type CB 52 armed with a 7.62 mm machine gun with an elevation of from −15 to +45° with the shield in the normal position and from −20 to +80° in the anti-aircraft position; in both cases traverse is a full 360°. Other armament installations available include the Mecanique Creusot-Loire TU 52 A. Current production French Army VABs are fitted with the Mecanique Creusot-Loire CB 127 gun ring shield for a 12.7 mm M2 HB machine gun.

The engine compartment, which is fitted with a fire-extinguishing system, is immediately behind the driver with the air-inlet and air-outlet louvres in the roof and the exhaust pipe running along the top of the hull on the right side. Power is transmitted from the engine to the wheels by a hydraulic torque converter and a gearbox with five forward and one reverse gears. Gears are shifted using a small electrically operated lever which also operates the clutch. On the VAB New Generation, the transmission is fully automatic. The axles have differential reduction gears with double reduction and differential locking. The wheels are independently suspended by torsion bars and hydraulic shock absorbers. Steering is hydraulically assisted on the front wheels, or, in the case of the 6 × 6 model, on the front four wheels. The tyres are Michelin run-flat radials, the pressure of which can be adjusted to suit the type of ground being crossed. A remotely controlled tyre inflation/deflation device is now available as an option on the VAB family.

There is a passageway on the right side of the hull which connects the crew compartment at the front with the personnel compartment at the rear. The infantrymen enter and leave the VAB via a double door without a central pillar in the rear of the hull which open outwards. Each door has a window which can be opened to the outside and is covered by an armoured shutter.



VAB (6 × 6) from above without armament installed. The driver's and commander's armoured windscreen shutters are in the raised position, as are the troop compartment shutters (T J Gander)



VAB (4 × 4) of the French Army fitted with one-man turret armed with 20 mm cannon and 7.62 mm machine gun. This is used for close defence of Roland SAM units (Pierre Touzin)

OFFICE OF THE UNDER SECRETARY OF DEFENSE

WASHINGTON, DC 20301-3000

ACQUISITION

MG Lehowicz
Combat Developments
TRADOC
Ft. Monroe, VA 23651

Dear General Lehowicz:

The Light Contingency Vehicle (LCV) as envisioned within Thrust 3 of the DoD Research and Development program continues to be of great personal interest to me. The overall need to enhance the survivability, mobility and combat effectiveness of our rapidly deployable forces is a widely accepted lesson learned from Desert Shield. The detailed understanding of the types of combat systems that best serve to satisfy the needs of early entry forces must be developed through the Battle Labs process that TRADOC has chartered. There is also the potential need to work closely with our NATO allies as their concepts for out-of-area rapid reaction forces begin to emerge. The need to configure rapid response forces for peacekeeping and peacemaking missions is reinforced by the rapidly expanding United Nations need for security forces.

During a recent trip to Germany, I had the opportunity to observe and examine the new 495 family of vehicles at Thyssen Henschel. The design goals are: 1) air transportable by C-130 (with some removal of armor panels), 2) a reconfigurable armor suite, and 3) reduced observables. The tracked vehicle engine bay is designed to accept a Detroit Diesel engine. The contractor has tried to save time and money by using an existing turret in the infantry fighting vehicle version of the system, but there is broad flexibility for accepting other turrets. It struck me that this vehicle could be useful for "tinkering" and this may help in defining the LCV requirement. I understand the vehicle could be leased for initial trials and be made available through existing testing agreements between the U.S. and Germany. I have included a contractor brochure in order to better describe the vehicle characteristics.

Please let me know if I can be of any assistance.

Sincerely yours,

Andrus Viilu
Deputy Director
Land Systems

Ø KHS

From: Major-General A C P Stone
DIRECTOR-GENERAL LAND FIGHTING SYSTEMS
PROCUREMENT EXECUTIVE, MINISTRY OF DEFENCE
St. Christopher House, Southwark Street, London SE1 0TD
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Herr Jürgen Massman
Director
Thyssen Henschel
Henschelplatz 1
D 3500 Kassel
GERMANY

21 May 1993

Dear Herr Massman,

Many thanks for hosting my excellent visit to your Kassel production facility on 18 May and also for an interesting discussion the evening before during dinner at the Pfeffermühle. I wish I had had more time to continue with our dialogue - perhaps another time.

Even though my programme limited the time I could spend with you, I came away with the impression of a dynamic company offering a diversified product range. Your strategy for future business development was most impressive, as was the new training wing which we were able to visit. All in all, a most positive preparation for the difficult times ahead.

Please extend my thanks to all your team for providing a very thorough briefing of your products and in particular to Dr Piasecki and his staff, who demonstrated the company's wide range of vehicles on your test track which I very much appreciated. The TH 495 ICV family was particularly interesting and such features as air portability, clip-on armour, varying road wheel numbers, fibre optic highway, power pack options and variable turret templates all showed a market orientated approach which I applaud. I hope Alvis, with whom you mentioned your connections, are fully aware of your work.

Thank you again for a most useful visit and good luck for the future with your new TH495.

Yours Sincerely,