

Germany's Big Guns

*Leopard Family Becomes
A European Standard
In Various Versions*

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Ever since World War II, the German defense industry has shown that it is among the best in the world. When the Tiger tanks appeared on the European battlefield, the Allied forces had nothing that could defeat them. Now, more than fifty years later, the Germans have developed two weapon systems that will prove more than a match to the other side, whomever that may be.

Leopard 2A5

The Leopard 2 tanks in use with Germany, Netherlands, Switzerland, Austria, Sweden, and Spain are, like many Western tanks, based on '70s technology and are vulnerable to modern missiles and rockets. To compensate, new solutions and technologies have been developed all over the world to protect crewmen and vehicles. Israel came up with "Blazer" explosive reactive armor, the UK with Chobham armor, and the U.S. with depleted uranium armor. But the development of normal armor is also taking great leaps ahead. In 1989, three Leopard 2 user countries — Germany, the Netherlands, and Switzerland — signed a memorandum of understanding (MoU) for a study into the possibilities of upgrading their Leopard 2A4s. The study came up with a three-phase program. Phase 1 improves firepower with new kinetic energy (KE) ammunition like Rheinmetall's LKE II and a new 120mm smoothbore barrel which is 55 calibers long, 130cm longer than the current 42 caliber barrel. Phase 2 improves ballistic protection and fire control. Phase 3 consists of the Integrated Command and Information System (IFIS) and a 140mm cannon with autoloader.¹ In 1991, the three countries agreed to what has been called the "Mannheim configuration," consisting only of Phase 2. In operational service, this upgraded version is called the Leopard 2A5. Germany started upgrading 225 Leopards, while the Dutch started upgrading 180 tanks with an option for the other 150 A4s in service. Switzerland will not start upgrading before 2003.²



The most noticeable changes are the new add-on armor modules on the turret front and side. Made of laminated armor, these modules can be easily removed and replaced, either because they are damaged or if a new and better armor is developed.

The side modules are hinged at the front and the space behind them is used to store deep-wading equipment and

gun-cleaning rods. Armor sections of the original turret frontal-arc underneath the new modules are cut out and replaced by fixed pieces of new "third generation" composite armor.³

In addition, new, heavy side skirts are fitted over the idler and front two roadwheels. The old rubber sections of the side skirts are replaced by armor plates. The roadwheel hubs are also replaced by



ones made from armor. All the extra weight brings the vehicle into MLC 70 but will not decrease the performance of the tanks in the field.

The inside of the turret is also fitted with a 1-inch thick ballistic spall liner to reduce the amount of shrapnel in case of a hit.⁴

To enhance control, a 360-degree, fully stabilized periscope replaces the commander's periscope. It has its own independent Thermal Imaging Module (TIM), and the TC can switch to the gunner's image if need be. For navigation, the crew can rely on a hybrid system combining GPS and inertial navigation equipment.

To aid the driver during retrograde maneuvers, a small video camera is fitted on the rear hull, transmitting to a monitor inside the driver's compartment.

Removing all hydraulic systems from inside the tank and replacing them with electric drives further enhances crew safety by eliminating the possibility of a hydraulic fluid fire while also reducing noise considerably.

STRV122 (Leopard 2S)

The Swedish army recently purchased 120 brand new Leopard 2s, next to a batch of ex-German army Leopard

2A4s. The new vehicles will have the same protection and control functions as the A5s and then some. The STRV122 can best be described as the most heavily armored and sophisticated Leopard to date. In addition to everything mentioned above, the STRV122 has add-on armor on the turret roof, new add-on armor on the frontal arc of the hull, and a ballistic spall liner on the inside of the driver and engine compartments. Also installed is the Swedish version of IFIS, called TCCS (Tank Command and Control System).⁵

PzH2000

You might not expect to find information on an artillery system in the pages of *ARMOR*. Wegmann's PanzerHaubitze 2000 is, however, a bit different from all the others. It is meant to replace the existing self-propelled guns (SPGs), like the M109 series, that were introduced in the '60s.

It was developed by a consortium of German defense firms over the last six years, with battlefield survivability the big priority. For that reason, this SPG is built more like a tank. The hull and turret are made of welded armor, able to withstand 14.5mm AP-rounds and 155mm shrapnel. Most of the running gear uses parts from the Leopard 2-series

MBT mentioned above, meaning it can keep up with the front-line forces with a maximum speed of 60 km/h on roads and 45 km/h in terrain. It also means the beast weighs as much as a tank at MLC 60.

To further enhance crew protection, the turret top and driver's compartments take add-on armor plates. All movement of the turret and gun is done by electric motors instead of the conventional hydraulics. But that is not all; the system's automation almost allows it to fire from the hip. Within two minutes, it can stop, fire an eight-round burst, and drive off, so the crew does not have to worry about counter-battery fire. The crew can stay under armor during the whole sequence.

This compares with the 12 minutes that it takes for the latest model M109A3G in German service to accomplish the same thing. An on-board computer keeps track of the type and position of 60 combat-ready rounds in the gun system's magazine. The fuses are already fitted and set by an inductive fuse-setter when loaded into the tube. The autoloader brings the rounds to a pneumatic flick rammer under the breech. After the projectile is loaded, the flesh-and-blood loader loads the propellant charges needed. These are Rheinmetall's new Modular Propelling Charge System

The Swedish Leopard 2S, at left, is the most heavily armored version, with added roof armor, thicker hull armor, and a heavier armor on the turret mantlet, compared to the German Leopard 2A5 version at right.

(MTLS), which replace the old bag charges. MTLS consists of individual charges that look like cans. Up to six can be clicked together for maximum range. The turret magazine carries 288 MTLS charges. With its new 52 caliber barrel, developed by Rheinmetall, the gun system can fire conventional ammunition 30 kilometers and assisted projectiles up to 40 kilometers, compared with 18 and 24 respectively for the M109 and 24 and 30 for the new British AS90.

While the loading is in progress, the on-board computer receives the firing mission directly by radio link or from direct input by the crew. The computer, linked to a hybrid navigation system that combines inertial navigation with GPS, then automatically lays the gun on target.

Reloading does not require the gun tube to depress; the system can load while the turret is traversing and the tube is being elevated. This is an advantage when engaging moving targets. During testing at Ravlunda, Sweden for the Swedish coastal artillery, the PzH2000 showed that it could successfully engage targets moving at an angle from the gun. Multiple Rounds Simultaneous Impact (MRSI) would require only different software for the onboard MICMOS computer. All systems have semiautomatic and full manual backup, although

the rate of fire will be lower without automation.

Of particular importance to the U.S. Army is the possibility of firing 12 rounds per minute. Fitted with a 48-volt system instead of the normal 24-volt, the PzH2000 showed it could do this during trials held in October 1997 at Meppen proving grounds in Germany, proving it can fulfill the Crusader program requirements that will be introduced in 2005.⁶ Fitted with the usual 24-volt system, as it will be delivered to the German Army, the PzH2000 can fire eight rounds per minute.

Reloading the gun with 60 rounds and 288 charges is done within 11 minutes by two crewmembers.⁷

Overall, it is estimated that the complete system will reduce operating costs by as much as fifty percent.⁸

The manufacturers have been trying to interest the U.S. in the PzH2000 system. Performance data from the initial testing by the German Ministry of Defense were handed over in 1996 to the Crusader program managers to be compared with the Crusader requirements.⁹

The German Army will take delivery of the first of 180 PzH2000s in 1998 and will equip the battalions of the Rapid Reaction Forces.

Notes

¹Owi. R. de Vos, *De Onderofficier*, an official Dutch army publication aimed at the NCO corps.

²Rainer Glass, "Euro-Leopard 2," brochure published by Report Verlag, Germany.

³Ibid.

⁴Ibid.

⁵Information supplied to the author by LTC Wahlgren, system manager MBT121/122, Swedish Armed Forces HQ.

⁶Wegmann press release, "PzH2000 News," 11/97.

⁷This and other performance data was taken from various Wegmann brochures and verified by LTC Arps, German DoD Armaments Division, in the brochure, "Panzerhaubitze PzH2000," published by Report Verlag, Germany.

⁸LTG Willmann, Chief of Staff of the German Army, in the brochure, "Panzerhaubitze PzH2000," published by Report Verlag, Germany.

⁹Wegmann press release, "PzH2000 News," 9/96.

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