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## 30 YEARS BERGEPANZER 3 BÜFFEL (BUFFALO) ARMOURED RECOVERY VEHICLE 1992 – 2022

# 30 YEARS BERGEPANZER BÜFFEL

## ARMoured RECOVERY VEHICLE

### SUPPORT FOR THE ARMED FORCES



Source: © Ralph Zwilling – Tank-Masters.de

Armoured recovery vehicles offer support to increase the mobility and endurance of armoured combat vehicles. For example, they secure combat vehicles during water crossings, tow damaged vehicles from the battlefield or support repair work with their spare parts and tools. Based on the chassis of the Leopard 2 main battle tank, the Bergepanzer 3 Büffel armoured recovery vehicle is one of the most outstanding vehicles of its kind over the last three decades.

On August 4<sup>th</sup> 1992, Krupp MaK – Rheinmetall Landsysteme GmbH since 2000 – handed over the first vehicles to the German and Dutch armed forces. Numerous user nations have been added over the years. Since then, more than 200 series production vehicles as well as a similar number of recovery kits (i.e. recovery equipment for chassis of other types of battle tanks) have proven themselves in Germany and abroad in combat support missions as well as in disaster relief.

This brochure provides a technical overview of the three decades of use of the Bergepanzer 3 Büffel and its history of development, which began as early as 1977.

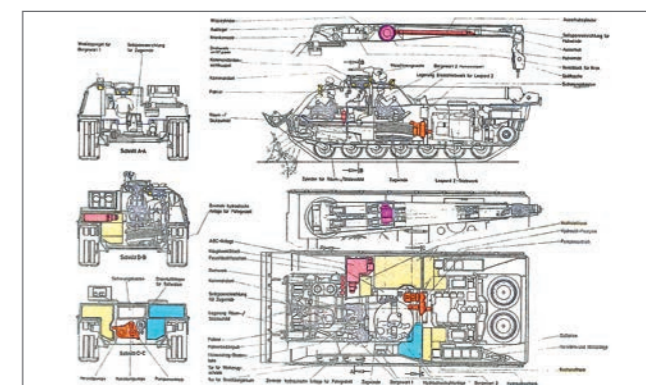
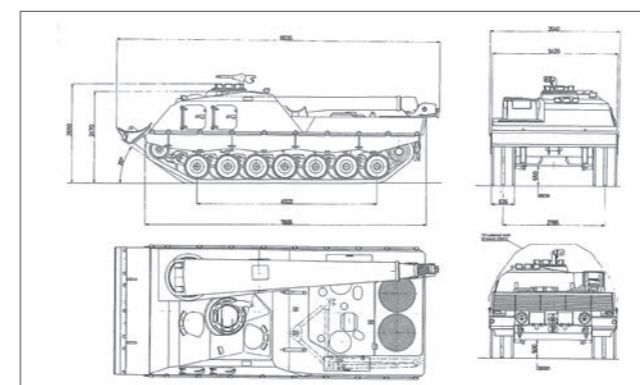
## THE DEVELOPMENT

With the introduction of the Leopard 2 main battle tank in 1979, it was already foreseeable that a suitable recovery vehicle would also be needed. At that time, the Leopard 2 had a combat weight of 55 tonnes, which was more than ten tonnes heavier than the Leopard 1 main battle tank with its approximately 42 tonnes. It was thus clear that the performance of the previous Bergepanzer 2 armoured recovery vehicle (standard), even in the performance-enhanced A2 version, would not be sufficient to support the future Leopard 2 battle tank fleet.

As early as 1977, Krupp MaK – a member of the Rheinmetall family since 1990 and Rheinmetall Landsysteme GmbH since 2000, see box on page 5 – began working with Porsche on a BPz MLC60 concept based on the Leopard 2 chassis. The aim was to be able to move loads up to MLC (Military Load Classification) 60. During this period until 1980, the new main winch and its control system were also launched, with significant involvement from Rotzler. In addition, due to advances in electrics, electronics and hydraulics, fundamental investigations were carried out on rotatory and translatory hydraulic consumers as well as their control systems. The main development objective was to design the new armoured recovery vehicle to match the operational profile of the Leopard 2 main battle tank. In this regard, special attention had to be paid to family formation with the Leopard 2 and to maintaining the tried-and-tested basic technical concept of the Bergepanzer 2, which was introduced into the Bundeswehr in 1966. According to official plans at that time, the first vehicles were to be added to the forces in 1991. After submission of the tactical requirements for the Bergepanzer 3 armoured recovery vehicle, Krupp MAK was awarded the contract for the work in the concept phase of the BPz 3 in 1982. Thanks to the results being worked out in advance, it was possible to complete this on schedule by the end of 1983.

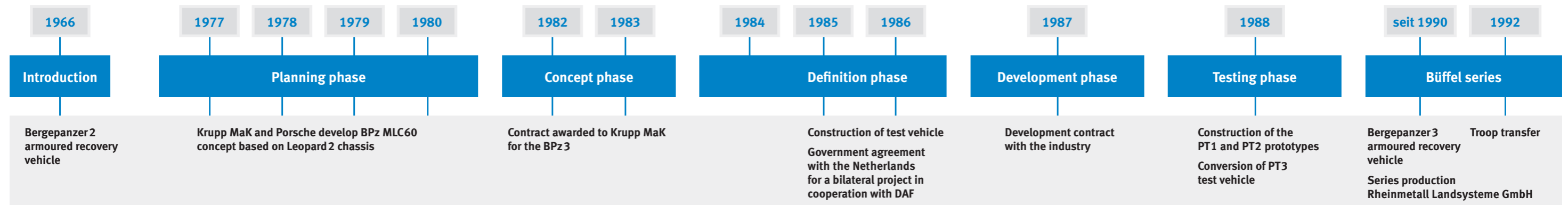
The definition phase immediately followed in 1984. In this phase, in addition to the definition study, a test vehicle was also created that included all the recovery-specific assemblies known up to that time that corresponded to the state of development. This was assessed in detail until the end of the definition phase in the third quarter of 1986. An inter-governmental agreement was also concluded with the Kingdom of the Netherlands in 1984. Thus, the upcoming development of the Bergepanzer 3 armoured recovery vehicle became a bilateral project with the German Federal Office of Defence Technology and Procurement as the main customer and Krupp MaK as the main contractor. As the main sub-contractor, DAF Special Products contracted and managed the Dutch industry. The development phase began as early as the end of 1986. In close coordination with the Netherlands, the development contract with industry was concluded in 1987. As part of the contract, specific criteria had to be adhered to over a 14-month development period, including technical testing and troop trials, as well as the provision of the development services at fixed price conditions.

A follow-up order for two additional prototypes and the conversion of a test vehicle was signed in 1987. In less than two years, the PT1 and PT2 prototypes were built and the test vehicle was converted into the third prototype (PT3). From 1988 onwards, technical, tactical and logistical tests were carried out with the three prototypes. Among other things, the PT1 was converted to meet Dutch-specific requirements and tested in the Netherlands. After successful completion of these tests and the evaluation of the data obtained, Krupp MaK Maschinenbau GmbH was awarded the contract in 1990 as the main contractor for the series production of the Bergepanzer 3 Büffel armoured recovery vehicle for the Bundeswehr and the Royal Dutch Army.



These two drawings show the vehicle, which was then still called the MLC60 armoured recovery vehicle. (Dr. Ing. h.c. F. Porsche AG)

## THE DEVELOPMENT OF THE PROTOTYPES



Overview of the development of the BPz 3 in the period 1977 – 2022. Source: Rheinmetall AG

### PT1 PROTOTYPE

An early prototype of the Bergepanzer 3 Büffel armoured recovery vehicle. When the Leopard 2 main battle tank was introduced, the armoured forces only had the Bergepanzer 2 or 2A2 armoured recovery vehicles based on the Leopard 1 at its disposal. Since both the total and partial weights of the turret and engine of the Leopard 2 were considerably higher than those of the Leopard 1, this could only be a temporary solution.



Source: Krauss-Maffei Wegmann

### PT2 PROTOTYPE

In the case of the Bergepanzer 3 Büffel armoured recovery vehicle, the tried-and-tested basic design of the armoured recovery vehicle was adopted for the Leopard 1. This photograph shows a late prototype of the BPz 3 in the accessible Wehrtechnische Studiensammlung in Koblenz, where it is also used as an armoured recovery vehicle.



Source: © Frank Baunach

### PT3 PROTOTYPE

In 1991, this picture was taken of a prototype lifting the rear of a Leopard 2A4 main battle tank. The vehicle does not yet have a 76mm smoke grenade launcher at the front of the hull.



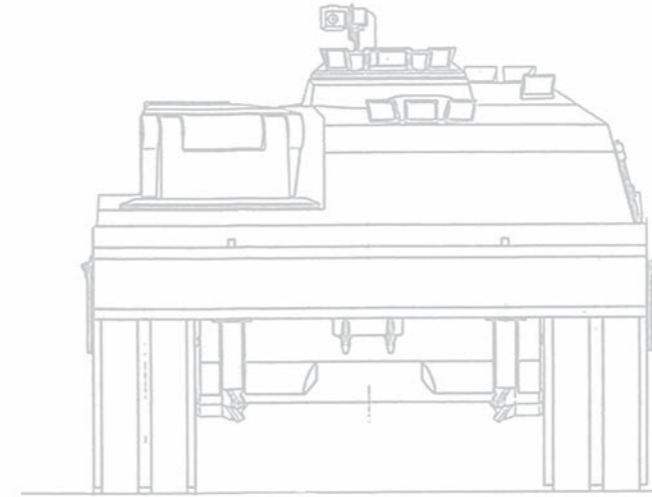
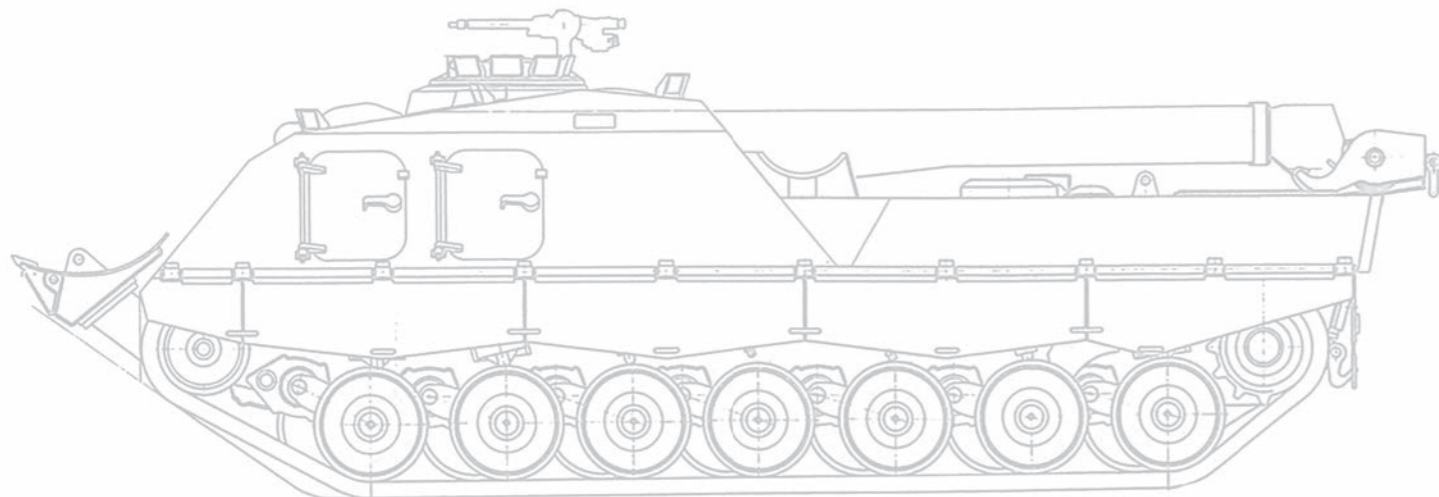
Source: MaK

### FROM MASCHINENBAU KIEL AG TO RHEINMETALL LANDSYSTEME GMBH

Maschinenbau Kiel AG was founded in 1948. Originally dating back to a Royal Prussian artillery depot in Friedrichsort near Kiel in 1866, its activities were in the locomotive and engine construction industry.

The Stinnes and Flick groups – together MaK – took over in 1954. In 1958, it joined a consortium for the development of the Leopard 1 main battle tank. MaK, which was converted into a GmbH (German limited liability company), was acquired by Krupp in 1964. The first Bergepanzer 2 armoured recovery vehicle, developed jointly with Porsche and Jung, was handed over to the Bundeswehr in 1966. Final assembly of the first Marder infantry fighting vehicles began in 1970, followed by the assembly of Leopard 1 main battle tanks in 1974 and series production of the Leopard 2 in 1976.

MaK has produced the Wiesel armoured transport vehicle since 1980. In 1981 the development of the German-Dutch joint project Bergepanzer 3 armoured recovery vehicle began, in 1983 the Keiler mine-clearing tank, and in 1990 the Panzerhaubitze 2000 howitzer. In 1990, Rheinmetall acquired the defence technology section of MaK, the specially spun-off MaK System Gesellschaft, and merged it with KUKA and Henschel to form Rheinmetall Landsysteme GmbH in 2000. Major projects since 1990 have included the GTK Boxer and the Puma infantry fighting vehicle, which was developed, produced and marketed jointly with Kraus-Maffei Wegmann.



## PROCUREMENT

In 1990, the procurement order was placed for 100 Bergepanzer 3 armoured recovery vehicles for the Dutch and German Armed Forces. A contractually agreed option for a further 75 vehicles was never triggered. The main contractor was Krupp MaK (as it was called at the time). The Dutch industry was given a corresponding share of the total order volume for armoured recovery vehicles. From 1992 to 1994, the Bundeswehr procured a total of 75 Bergepanzer 3 Büffel armoured recovery vehicles for use by armoured, self-propelled artillery and logistics battalions. In contrast, the Dutch army ordered 25 vehicles. Production was shared between MaK System-Gesellschaft in Kiel with 55 vehicles and Krauss-Maffei Wegmann GmbH in Munich with 45 vehicles. On August 4<sup>th</sup> 1992, the first three serial-production vehicles were handed over at a ceremony at MaK in Kiel, two as 600 kN recovery vehicle to the Netherlands Armed Forces and one as a Bergepanzer 3 Büffel armoured recovery vehicle to the Bundeswehr. Symbolically, then Vice President of the

Federal Office of Defence Technology and Procurement (BWB), Elmar Göbel, accepted the armoured recovery vehicles and handed them over to the representatives of both armies: Lieutenant General Ernst Klaffus, the Head of the Army Office on the German side and Major General E.I.L.D.G. Margherita, the Directeur Materieel of the Koninklijke Landmacht. The first German Bergepanzer 3 Büffel armoured recovery vehicles were delivered to Panzerlehrbataillon 93 from Munster. In his address to numerous guests of honour from Germany and abroad, the Chairman of the MaK Management Board, Dipl.-Ing. Gert Winkler, praised the exceptional cooperation between Dutch and German industry. Furthermore, he emphasised that the continued development of armoured vehicles by MaK System-Gesellschaft has supported the army's evolving requirements. These include evolution of design shown in vehicles such as the Bergepanzer 3 Büffel, Bergepanzer 2, Pionierpanzer 1 and 2 as well as the Brückenlegepanzer 1.



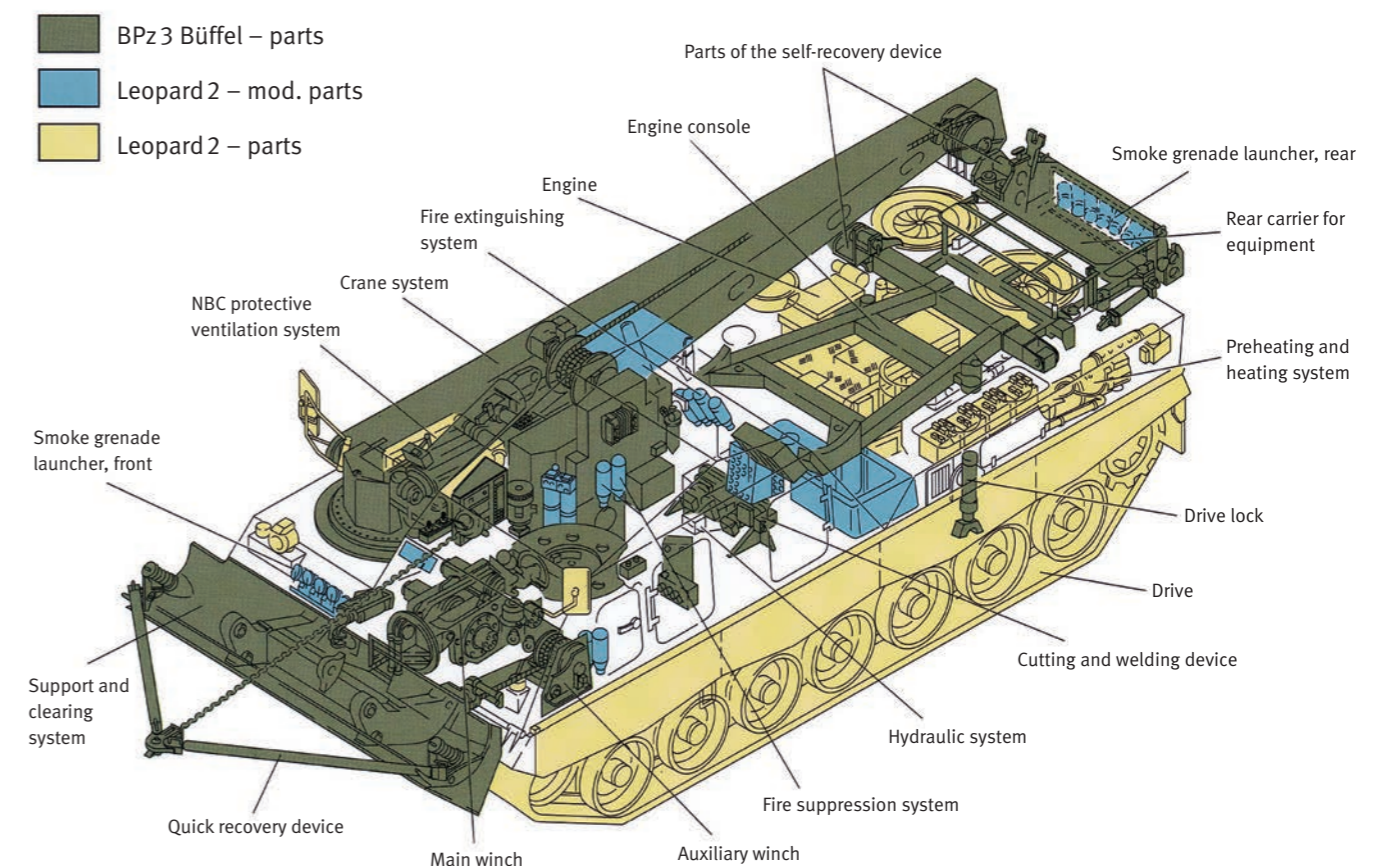
Source: © Ralph Zwilling – Tank-Masters.de

## SYSTEM DESCRIPTION

The Bergepanzer 3 Büffel armoured recovery vehicle is based on the Leopard 2's familiar chassis and has a winch system, a crane boom that can be swivelled through 270° and a support and clearing blade. The hydraulically operated jib crane on the right side of the hull, and its lifting winch is directly integrated into the crane boom. It has a maximum hook load of 30 tonnes with a crane outreach of 90 centimetres from the front edge of the support and clearing blade. The Rotzler Treibmatic TR 650/3 main winch is located in the operating compartment under the intermediate floor. It has a maximum pulling force of 35 tonnes. Loads of 70 to 105 tonnes can be moved in the double and triple pull. The left hull front housed the auxiliary winch, a HZ 010 Rotzler drum winch with a pulling force of 7 to 8.3 kN when the first Bergepanzer 3 Büffel armoured recovery vehicles were delivered. A more powerful version of this winch is used in current Bergepanzer 3 armoured recovery vehicles.

The self-supporting hull housing of the Bergepanzer 3 Büffel armoured recovery vehicle is made of welded armoured steel plates and accommodates the recovery equipment as well as the assemblies of the drive, the electrical system, the hydraulic system and the chassis. The outer shape is designed to deflect incoming projectiles by slanted armoured plates. A transverse partition divides the hull housing into the control and the engine compartments. The control compartment offers space for the 3-person crew consisting of the driver, commander and mechanic. The engine compartment at the rear of the hull is closed from above by a removable, two-part access cover. The rear end of the engine room is formed by the rear wall, the upper part of which is designed as a grating for the cooling air outlet.

The support and clearing blade at the front of the vehicle, in conjunction with a rapid recovery device (only on the Bergepanzer 3 Büffel armoured recovery vehicle), allows the recovery of damaged vehicles under armoured protection.



The Bergepanzer 3 Büffel armoured recovery vehicle owes its outstanding mobility to the tried-and-tested torsion bar-suspended support roller drive known from the Leopard 2 main battle tank with slat dampers as well as hydraulic end stop dampers and fixed end stops above the swinging arms of the roller pairs. In order to prevent the running gear from deflecting during crane work, it can be blocked hydraulically. The drive is provided by the drive block, consisting of a motor and gearbox, in conjunction with the two side countershafts and the sprockets on the two end connector tracks. As with the Leopard 1-based armoured recovery vehicle, the Bergepanzer 3 Büffel armoured recovery vehicle's engine is designed as a complete engine block. Installation and removal is therefore possible within a few minutes even under military conditions, as there are only a few supply lines between the vehicle and the engine block, which are to be disconnected or connected by means of quick-disconnect couplings and plugs. The liquid-cooled 47.6-litre MTU MB 873 Ka 501 12-cylinder pre-chamber multi-fuel diesel engine with twin exhaust turbochargers and charge air cooling produces 1,100 kW (1,500 hp) at a drive speed of 2,600 rpm. The semi-automatic and fully automatic shiftable hydromechanical Renk HSWL 354 shift, reversing and steering gear with combined hydrodynamic-mechanical service brake is used for power transmission to the end connector track. The gearbox, flanged to the engine via quick-release clamps, consists of a torque converter with mechanical lock-up clutch, reversing gear for forward/reverse, powershift 4-speed automatic transmission, hydrostatic/hydrodynamic steering gear,



Source: © Ralph Zwilling – Tank-Masters.de

retarder brake and friction brake, as well as the electronic transmission control.

The support and clearing blade is primarily used to support the armoured recovery vehicle when working with the crane system and the main winch system. It is also used as a tool for earthworks, for manoeuvring as well as for holding a vice. In addition, the stop lugs on the clearing blade of the German Bergepanzer 3 Büffel armoured recovery vehicle are used to accommodate the quick recovery device.



Source: © Ralph Zwilling – Tank-Masters.de

The Bergepanzer 3 Büffel armoured recovery vehicle's crane system is mounted on the hull at the front right. It is used for lifting, lowering and swivelling loads of up to 30 tonnes. The crane system consists of the pivot bearing, the pivot engine, the crane console, the crane boom, the crane boom cylinder, the lifting winch, the pulley block and the load hook. The crane system is controlled by a unit that is stowed to the right of the driver's seat. For crane operation, it can also be removed from the holder and placed on the hull next to the driver's hatch. The load display in the control panel to the right of the driver's seat continuously shows the maximum load resulting from the respective position of the vehicle and the crane boom as well as the actual hook load, thus giving the operator the possibility to estimate the available load reserves.



Source: © Ralph Zwilling – Tank-Masters.de



Source: © Ralph Zwilling – Tank-Masters.de

A load torque limiter permanently monitors the load torque applied by the load, ensures the stability of the BPz 3 and prevents safety-critical conditions when working with the crane system.

The main winch system consists of the Rotzler Treibmatic TR 650/3 capstan winch, the swivel pulley block and the cable reel drum (storage drum). The main winch is installed in the operating area below the driver's seat behind the swivel pulley block. Directly behind the main winch in the hull base is the large cable reel drum. The swivel pulley block aligns itself according to the respective cable pull force direction and ensures short main winch cable guidance from the bow with low friction losses. The hydraulically

driven main winch generates a pressure-dependent tractive force according to the traction sheave principle. The power is transmitted to the main winch cable with a diameter of 33 mm by means of a pre-tensioning force and the resulting frictional force connection. This functional principle ensures a constant tractive force and cable speed over the existing main winch rope length. The 160 m long main winch cable is stored without tension in the cable reel drum, whereby the usable cable length is 140 m. The main winch is controlled via the left-hand control lever on the control unit, which is located to the right of the driver's seat. In first gear, the main winch has a pulling force of 343 kN at a cable speed of 16 m/min. In second gear, the tractive force is 47 kN at a cable speed of 83 m/min.

The auxiliary winch, a Rotzler HZ 010 drum winch, has a pulling force of 13.5 to 15.5 kN. It is located in the front left hull area and is controlled via the operating lever to the left of the driver's steering wheel. It is used to feed the main winch cable or recovery material to the anchor point. The cable speed varies between 50 and 59 m/min. The auxiliary winch driven by the flange-mounted hydraulic motor consists of a cable reel drum with single-stage planetary gear, the drive shaft and the spooling device driven by sprockets and chains. The 230 m long cable of the auxiliary winch has a diameter of 7.2 mm.



Source: © Ralph Zwilling – Tank-Masters.de

The vehicle also has an electric cutting and welding device that works without an additional power generator. The fire suppression system with the DeuGen-N (FE36) extinguishing agent protects the crew as well as the various assemblies in the control room in the event of a fire and is designed in such a way that an automatic extinguishing process starts at the latest 50 ms after a fire is detected. The preheating and heating system located in the rear left hull area is used to preheat the engine block at low temperatures and to heat the driver and operator compartment. The compact NBC protective ventilation system is located on the right-hand side of the hull behind the crane console, above the second and third pair of wheels and accessible from the outside. This ensures, the three-man crew is protected from the

effects of attacks with nuclear, biological and chemical warfare agents. A manually operated 2350 weapon system is inserted into the roof of the control room. This serves to hold a 7.62 x 51 mm MG3A1T machine gun, which can be fired by the vehicle commander in the interior under armoured protection. Reloading is done from the outside through the open commander's hatch. Smoke grenades can be fired using the 76 mm smoke grenade launcher of the Bergepanzer 3 Büffel armoured recovery vehicle, whereby the firing is carried out electrically.

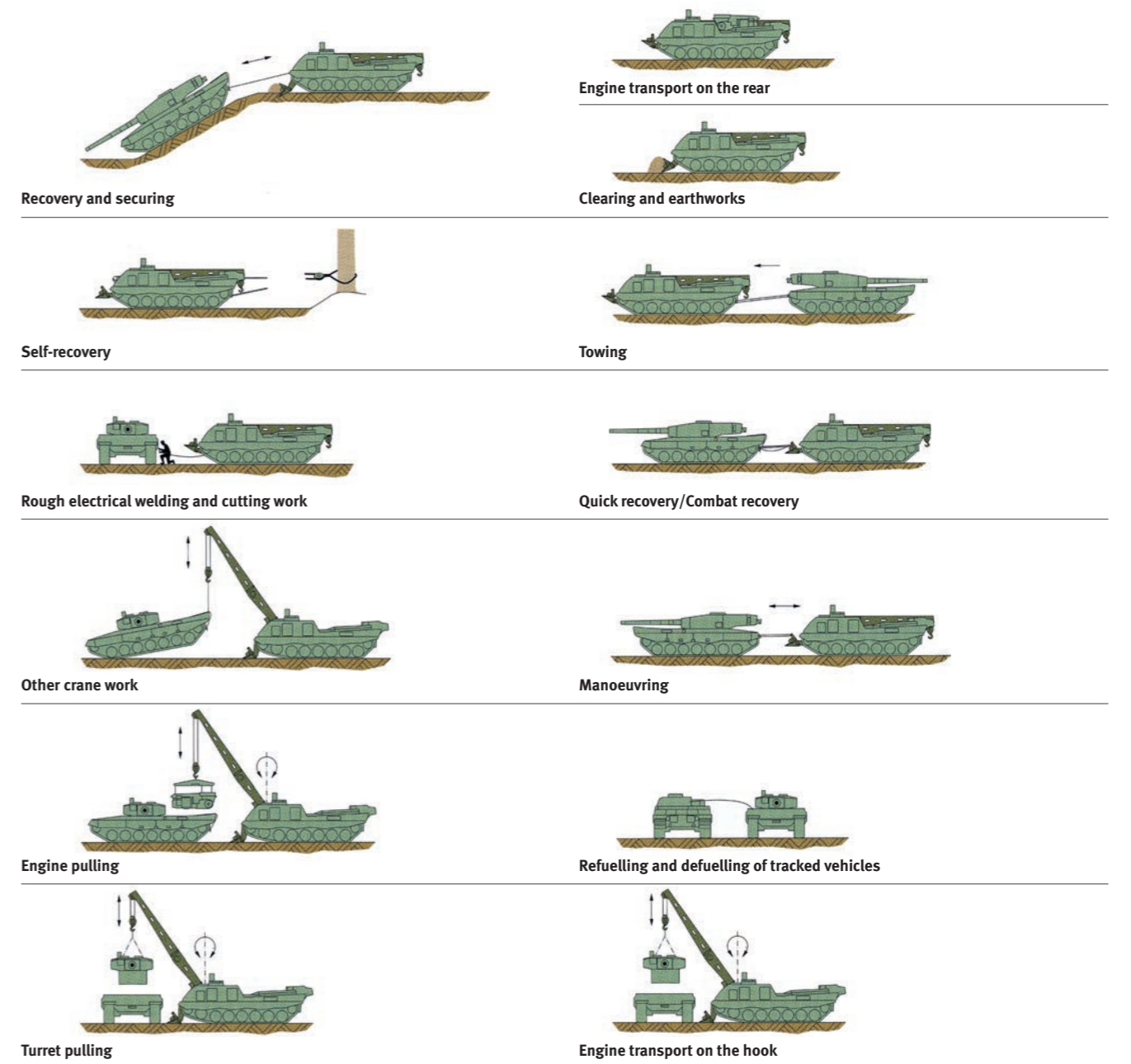


Source: © Ralph Zwilling – Tank-Masters.de

**RANGE OF APPLICATIONS**

The mechanised units still form the major part of the German army's armoured forces. Their ability to survive depends not only on being armed in a way that is appropriate to the threat, but also on an extraordinarily high degree of mobility. This in turn can be negated by sections of terrain that are difficult to navigate. A tank getting stuck or bogged down can very quickly lead to a premature loss of the vehicle and thus decisively weaken the combat power of a unit or tie up too many people to recover the tank. In addition, battle-related damage to the chassis of a tracked vehicle caused by enemy weapons, mines or improvised explosive devices (IEDs) can also lead to its premature loss.

Based on these specifications, the main tasks of the Bergepanzer 3 Büffel armoured recovery vehicle are recovering tracked vehicles up to MLC80, in difficult terrain and also from bodies of water, towing heavy tracked vehicles off-road and on roads, securing tracked vehicles when crossing bodies of water, support for maintenance work, transporting engines and refuelling and defuelling tracked vehicles. The chart below shows an example of the Bergepanzer 3 main tasks.



## THE SERIES

**As a result of very extensive investigations and intensive troop tests, a number of functional improvements resulted from user suggestions in the years following the introduction of the first Bergepanzer 3 Büffel armoured recovery vehicles in 1992. In addition, the combat capabilities were also adjusted to the prevailing threat situations.**

### 2006 – 2012

#### Bergepanzer 3A1 Büffel armoured recovery vehicle

Due to the very tense security situation in the Afghanistan mission, Canada made the decision in 2006 to deploy Leopard 1 main battle tanks in the Hindu Kush. A year later, Canada applied to the Federal Republic of Germany to borrow 20 Leopard 2A6M main battle tanks from Bundeswehr stocks at short notice for use in the International Security Assistance Force (ISAF). In order to be able to recover these vehicles if necessary, two Bergepanzer 3 Büffel armoured recovery vehicles were also included in this loan package. These vehicles were designated Armoured Recovery Vehicle (ARV) 3 CAN Buffalo. Due to the short preparation time until the deployment of the armoured recovery vehicles to Afghanistan, only the most essential modifications could be realised, such as additional mine protection and protection against hollow charge grenade fire (primarily by RPG-7 anti-tank weapons). After other nations expressed interest in an improved version of the Bergepanzer 3 armoured recovery vehicle over the following years, Rheinmetall Landsysteme GmbH pushed ahead with the further development of this recovery vehicle.

Due to the Bundeswehr's decision in 2010 to bring the Panzerhaubitze 2000 howitzer to the ISAF mission in Afghanistan, the German contingent's Bergepanzer 2 LS EHS armoured recovery vehicles had to be supplemented by the more powerful Bergepanzer 3 Büffel armoured recovery vehicle. Since the self-propelled artilleries were only intended for stationary operation in military camps, the unmodified version of the Bergepanzer 3 Büffel armoured recovery vehicle was sufficient at the time. However, as the vehicles were increasingly used outside the military camps, the decision was made to convert four vehicles. They were given the designation Bergepanzer 3A1 Büffel and were handed over to the Bundeswehr in spring 2012. The original vehicles were subsequently designated as Bergepanzer 3A0 "Büffel" armoured recovery vehicles.

In the course of the conversion, the Bergepanzer 3A1 armoured recovery vehicle received, among other things, add-on armour modules in the area of the crew compartment for protection against RPG-7 anti-tank weapons.

The areas that could not be provided with protection through add-on armour modules were protected by a lattice spacer armouring (SLAT). In addition, the Bergepanzer 3A1 armoured recovery vehicles were fitted with a mine protection plate underneath the hull floor and IED protection modules in the lower hull area. The IED protection modules provide protection against the threats posed by improvised explosive devices (e.g. based on artillery shells). The gaps between the support arm fixings were closed by individual armoured steel plates. The light track skirts from the first generation of the Bergepanzer 3A0 Büffel armoured recovery vehicle were exchanged for more highly protected track skirts from the third generation, which are now also used on the Bundeswehr's Leopard 2 main battle tanks.

The control room and parts of the hull floor below the intermediate floor were lined from the inside with spall liner panels to improve protection against splinters caused in particular by spalling effects. The critical examination of the interior from the point of view of mine protection also required that, where necessary, assemblies and mountings were modified to minimise the risk of injury to the crew in the event of a blast. The built-in CG-12 protective equipment is used for protection against radio controlled improvised explosive devices (RCIEDs). To ensure that the vehicle crew can keep a "cool head" even during operations in hot climatic zones, a PLCU600 cooling unit from Allen Vanguard Corporation (today MED-ENG) was installed in the front left area of the control room, which is connected to the crew's cooling vests by means of coolant lines. The cooling vests are designed to be worn under existing combat suits and body armour to cool the body. For operations at night or with limited visibility, the driver now has the multi-spectral driver's sight system SPECTUS (Spectral Technology for Unlimited Sight) at their disposal. The installation of the army command and information system (FüInfoSysH) has significantly improved the vehicle's command capability on the battlefield.

Due to the additional armour elements at the front of the vehicle, the quick recovery device originally attached to the support and clearing blade has now been moved to the rear of the vehicle. The system was fitted with two cameras so that damaged vehicles can also be recovered under armoured protection. The camera mounted on the battlefield recovery device is used to monitor the coupling process. There is also a rear-view camera at the rear of the vehicle. Due to the installation of the add-on armour modules, the vehicle's lighting system also had to be adapted accordingly. In the course of the new stowage concept, the console for transporting a spare engine was omitted. Transport of the spare engine is now made possible by corresponding adaptations to the new universal transport platform (UTP). If no spare engine is being transported, the flat surface of the UTP, on which loads weighing up to four tonnes can in principle be transported in a free arrangement, is used to accommodate various add-on kits. This includes the add-on kits of drive rollers, rear box, recovery sledges and universal boxes (UTP widening). The drive roller add-on kit is used to transport

spare drive rollers (two each of drive roller, guide wheel and support roller). At the rear end of the UTP is the large rear box, which offers storage space for numerous items of equipment with its three compartments. The universal boxes (up to four) on the left side of the UTP are also used to stow different items of equipment. With the recovery slide add-on kit, the recovery slide can be stowed on the drive rollers add-on kit or directly on the UTP. Due to the add-on armour at the front of the vehicle, the third recovery eyelet also had to be adapted accordingly. The position of the launchers of the 76 mm grenade launching system was also adjusted, whereby the number remained unchanged with eight launching devices each at the front and rear, only the launching devices at the rear of the vehicle were divided into two batteries of four launching devices each at the left and right side. The aforementioned changes increased the vehicle weight to a maximum of 64.5 tonnes and the military load classification changed from MLC60 to 72. Although technically possible as described above, the BPz 3A1 is no longer certified for spare engine transport at this weight.



Source: © Ralph Zwilling – Tank-Masters.de

# 2006 – 2012

## 2015 – 2019

### Bergepanzer 3A0A1 Büffel armoured recovery vehicle

Over a period of about ten years, the multi-spectral driver's sight system SPECTUS (Spectral Technology for Unlimited Sight) has been installed since 2015, first in version I and currently in version II. After this conversion, the designation of the vehicles changed to Bergepanzer 3A0A1 Büffel. In order to directly support the driver under difficult visibility conditions, such as twilight, darkness or bad weather, the SPECTUS driver assistance system from Hensoldt AG combines residual light and thermal image components into images and displays them under real-time conditions on a visual display unit in front of the driver's seat. The system consists of a sensor head, a display terminal and two infrared illuminators. Two wash nozzles integrated into the angle mirror washing system allow the sensor head to be cleaned. The SPECTUS sensor head consists of a housing with two viewing windows and a movable cover, an uncooled thermal imager, a camera for daylight and residual light, and the associated electronics. When not in use, the sensor head is closed by a hinged cover plate to prevent damage to the sensitive optics.



Source: © Ralph Zwilling – Tank-Masters.de

# 2015 – 2019

## 2015 – 2016

### Bergepanzer 3A1 armoured recovery vehicle

After the end of the ISAF mission in Afghanistan, the Bundeswehr brought the four Bergepanzer 3A1 Büffel armoured recovery vehicles back to Germany in 2014. As part of the overhaul, a configuration status adjustment was carried out between August 2015 and October 2016 based on the experience gained in operation. In addition to the four vehicles already introduced in 2012, two further vehicles were also brought up to the same level as the Bergepanzer 3A1 Büffel armoured recovery vehicle in 2017, which had previously been borrowed by the Canadian armed forces and later returned to the Bundeswehr.

For example, the desert camouflage paint was replaced with the NATO triple camouflage scheme consisting of the colours bronze green (RAL 6031), leather brown (RAL 8027) and tar black (RAL 9021). The Comrod VHF radio antenna was relocated from the roof of the control room to the left rear side, the add-on armour modules as well as the frame protection elements were adapted and partially replaced, a ladder was mounted and the stowage concept was optimised again. A modern SOTAS-IP on-board communication system is now used in the interior, in which the originally used leather hoods with intercom sets were replaced by modern intercom hoods from BOSE.

The possibility to vary the level of protection according to the threat can be described as a significant change. Here, the side add-on armour modules are omitted and partially replaced by steel plates (light armour modules). This has a positive effect on the weight and thus on wear. If necessary, the heavy add-on armour modules can be mounted again at short notice. If they are fitted, the support and clearing blade will be fitted with appropriate widening to accommodate the altered vehicle width.



Source: © Ralph Zwilling – Tank-Masters.de

# 2015 – 2016



## 2019 – 2024

### Bergepanzer 3A0A2 Büffel armoured recovery vehicle

In the period from 2019 to 2024, 69 Bergepanzer 3A0A1 armoured recovery vehicles are to be equipped with new battlefield recovery equipment at the rear and the universal transport platform (UTP) above the engine room (as with the BPz 3A1). By relocating the battlefield recovery equipment from the front of the vehicle to the rear, it is possible to recover heavy combat vehicles, such as the Leopard 2 main battle tank or the Puma infantry fighting vehicle, from the battlefield after coupling under cover in rapid forward motion. The console used since the introduction of the BPz 3 to transport a spare engine is replaced, as with the BPz 3A1, by the universal transport platform with corresponding adaptations.

After the conversion, the vehicles will be known as the Bergepanzer 3A0A2 Büffel armoured recovery vehicles, with the first two vehicles already converted. The contract was extended in 2021 – meaning that these vehicles will now also be equipped with a mains separation device. The electrical on-board network is divided into a coarse and fine network in order to be able to supply computer-aided systems with a stabilised voltage.



Source: © Ralph Zwilling – Tank-Masters.de

# 2019 – 2024

## 2021 – 2022

### Bergepanzer 3A0A4 Büffel armoured recovery vehicle

For the Very High Readiness Joint Task Force (Land) 2023, the Bundeswehr needs 20 Bergepanzer 3 Büffel armoured recovery vehicles equipped with SEM 90 radios and the FülInfoSysH command and control system. They will be converted in 2022 and will be called Bergepanzer 3A0A4 Büffel armoured recovery vehicles.

## FROM 2023

### Bergepanzer 3A0A3 Büffel armoured recovery vehicle

In the future, a Bergepanzer 3A0 armoured recovery vehicle will be made that will have all the previously mentioned equipment features and will be called the Bergepanzer 3A0A3 Büffel armoured recovery vehicle. This version will have SEM 90 radios, the FülInfoSysH command and control system, the battlefield recovery system and the universal transport platform.



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# 2021 – 2023

## BERGEPANZER 3 ARMoured RECOVERY VEHICLE USER NATIONS

Due to the successful use of the Bergepanzer 3 Büffel armoured recovery vehicle since its introduction in 1992, it has also been possible to introduce this armoured recovery vehicle on an international scale. Like the Leopard 2 main battle tank, it gained a number of international customers in recent years. In addition to the Bundeswehr, the armies of Greece, Indonesia, Canada, the Netherlands, Poland, Sweden, Switzerland, Singapore and Spain also use the German armoured recovery vehicles today. In addition, recovery kits – essentially consisting of a winch system and crane system mounted on various chassis – were sold to France, South Korea and the United Arab Emirates.

Germany	75	vehicles
Greece	12	vehicles
Indonesia	2	vehicles
Canada	12	vehicles
Netherlands	25	vehicles
Sweden	14	vehicles
Switzerland	25	vehicles
Singapore	22	vehicles
Spain	16	vehicles
France	18	kits
South Korea	280	kits
United Arab Emirates	46	kits

Since 2019, the Dutch armed forces have been modernising their Bergepanzer 3 armoured recovery vehicle fleet. On 18 April 2019, Rheinmetall Landsysteme GmbH initially received an order for the conversion of four vehicles. In 2020,

options to modernise the other 21 vehicles as well as the fitting of a fire control system for the use of the Kongsberg weapons station were also triggered by the Dutch AEBV KODIAK. The conversion includes a complete overhaul of the individual armoured recovery vehicles as well as the conversion to a new digital operating concept, the fitting of modern means of sight, mission packages with ballistic and mine protection as well as the equipment with Bergepanzer 3A1 armoured recovery vehicles. In addition, the vehicles are being prepared for being fitted with a Kongsberg weapon station. At the time of this brochure's editorial deadline (summer 2022), the first two vehicles are in final assembly in prototype construction in Kiel. They are to be delivered to the Dutch customer by the end of 2022. Further vehicles will be converted at Rheinmetall's Kassel site by 2027.

The first Bergepanzer 3 armoured recovery vehicles for the Hungarian customer are also currently in final assembly at the Kassel plant. Rheinmetall concluded a contract with the Hungarian state in 2020 for the supply of LYNX infantry fighting vehicles. The delivery of nine Bergepanzer 3 armoured recovery vehicles as support vehicles for the LYNX infantry fighting vehicles is also included as part of the contract. This vehicle, called Leopard 2ARV 3HU, is based on the design of the Canadian Bergepanzer 3 armoured recovery vehicle, but does not come with the heavy armour packages. Adaptations for the integration of the specific on-board communication and radio system of the Hungarian armed forces, the command and control system as well as the equipment are included. The Leopard 2ARV 3HU are to be manufactured and handed over to the Hungarian customer by the end of 2023.



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## THE FUTURE

The attack by Russian forces on Ukraine, which began on 24 February 2022, shows that military confrontations can still become reality – even in Europe. A turning point is looming for German politics and the German Armed Forces. The Bundeswehr will therefore be re-enabled for credible national and alliance defence. There is no question that mechanised tank units will play an essential role in this over the coming years. The Leopard 2 main battle tank and the Puma and Marder infantry fighting vehicles will be able to rely on the Bergepanzer 3 Büffel armoured recovery vehicle as combat support.



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