Heavy lifting: Armoured recovery vehicles on the modern battlefield

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Armoured recovery vehicles play a vital battlefield role for any armour force, but countries take widely different approaches to buying and fielding these platforms. Christopher F Foss reports on recent developments

Armoured recovery vehicles (ARVs) in the past were often surplus main battle tanks (MBTs) with their turrets removed, and were limited to towing damaged or disabled heavy armoured fighting vehicles (AFVs). However, the latest-generation ARVs are purpose-built systems capable of not only recovering damaged or disabled AFVs, but also conducting repair operations as far forward on the battlefield as possible.

Although purpose-built, these ARVs have many components in common with the vehicles they are designed to support. Aside from the powerpack and suspension, they also have a high level of protection as they could be required to operate on the frontline.

Equipment normally fitted to ARVs includes a front-mounted stabiliser blade that can be used as a dozer blade to clear obstacles and prepare firing positions.

Two hydraulically operated winches normally lead out through the front of the hull. These are used to pull out disabled or damaged vehicles and sometimes for self-recovery operations. A crane with a telescopic jib is usually fitted and this can be used to change AFV powerpacks and other sub-assemblies, and also lift lighter vehicles.

The winches, crane, and stabiliser/dozer blade can be operated by the driver and in most cases by remote control.

A full range of specialised tools and other equipment is normally carried - with some vehicles having cutting and welding equipment, an air compressor, and vehicle defuelling equipment. They generally carry a full range of night-vision equipment, NBC systems, 7.62 mm or 12.7 mm machine guns (MGs), and banks of electrically operated smoke grenade launchers. For operations in Asia and the Middle East, an increasing number of vehicles are now being fitted with air-conditioning systems.

Some ARVs are furnished with an auxiliary power unit (APU) to allow key sub-systems to run with the main engine switched off.

It would be preferable for militaries to introduce a new ARV at the same time as the latest-generation MBT enters service, but normally this is not the case. Export customers often procure MBTs first and the more specialised versions later, which usually means the full potential of the MBT cannot be exploited.

Some ARVs, such as those developed in Russia, have a cargo area in which spare parts can be carried, while others can carry a spare MBT powerpack. The BAE Systems Challenger Armoured
Repair and Recovery Vehicle (ARRV), for example, can tow a trailer that carries a complete Challenger 2 MBT powerpack.

Heavy ARVs

Early Chinese ARVs were based on a turretless Type 59 MBT, but the country has since developed ARVs more comparable to their Western counterparts, and to account for its heavier MBTs. China North Industries Corporation (NORINCO) is currently marketing the VS21 ARRV, which uses automotive components from the export MBT-2000 and has a full range of recovery equipment.

The VS21 has also been referred to as Type 654 ARRV and is the follow-on to the older NORINCO Type 653 ARV, which, in addition to being used by the People's Liberation Army (PLA), is known to have been exported to Bangladesh, Kuwait, Pakistan, Sri Lanka, and Thailand.

In France, Nexter Systems' Leclerc ARV was developed to support the Leclerc MBT, and 20 were delivered to the French Army and 46 to the United Arab Emirates (UAE).

A Nexter Systems Leclerc ARV shown in travelling configuration, with its front-mounted stabiliser blade in raised position. (Nexter Systems) 0011639

The Leclerc ARV has a longer hull than the MBT, a new protected crew compartment at the front, a total of seven road wheels on either side (rather than six), winches, a crane with a telescopic jib, and a stabiliser blade at the front.
All the French Army Leclerc ARVs are fitted with the same German powerpack as the Leclerc MBTs deployed by the UAE. This consists of an MTU 883 V-12 turbocharged diesel developing 1,500 hp coupled with a Renk HLSW 295 TM automatic transmission.

The Leclerc ARV is generally referred to as the Dépanneur Nouvelle Génération (DNG), and Nexter Systems has been awarded a contract to "renovate" 200 Leclerc MBTs and 18 ARVs.

Germany's Buffel ARV, meanwhile, is one of the most widely used heavy ARVs and is based on components of the Leopard 2 MBT. Its development was jointly funded by Germany and the Netherlands, with an initial contract for 100 units (of which 75 were for Germany and 25 for the Netherlands).

Rheinmetall Landsysteme is currently the prime contractor for the Buffel ARV, and additional sales have been made to Canada, Greece, Indonesia, Singapore, Spain, Sweden, and Switzerland. For deployment to Afghanistan, Rheinmetall Landsysteme upgraded a small number of Buffel ARVs for Canada (to support its Leopard 2 MBTs) and Germany (to support its PzH 2000 155 mm self-propelled artillery systems).

The German Buffel ARV was designed to recover the Leopard 2 MBT, which it is shown here towing. (Rheinmetall)

The upgraded German Buffel ARV features electronic devices to counter improvised explosive devices (IEDs), a battle management system, improved driver's night-vision equipment, an underbelly mine protection package, and additional passive armour including bar/slat armour for protection against rocket-propelled grenades (RPGs).
The Republic of Korea (RoK), to support the K1/K1M MBT deployed by the army, had Hyundai Rotem develop an ARV based upon the K1’s running gear and powerpack. Following trials with prototypes, first production vehicles were delivered from 1993 and a total of 200 are understood to have been handed over to the RoK Army.

Rheinmetall Landsysteme (at that time MaK) played a leading role in the development of the K1 ARV and originally supplied the crane, winch system, dozer system, electrics, and hydraulics, which are the same as those used in the German Buffel and French Leclerc ARVs. While Rheinmetall Landsysteme assisted the RoK in developing the K1 ARV, the then Vickers Defence Systems (now BAE Systems) assisted in the development and production of the K1 AVLB that is also now in service.

The last version of the K1 to enter service is the CEV, which has a hull similar to that of the ARV, but is optimised for its specialised role, and fitted with front-end equipment from Pearson Engineering.

Poland built 1,620 T-72 series MBTs through to 1994 and developed the WZT-3 and more recent WZT-4 ARV to support these.

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**Russian ARVs**

Russia, to support its latest T-14 Armata MBT and T-15 heavy infantry fighting vehicle (HIFV), is testing a new heavy ARV based on those platforms. This is designated the T-16 (Object 152) but it has yet to enter production; in appearance and capability it is similar to Western ARVs such as the Buffel and Leclerc.
Russia's BREM-1M ARV is based on components from the T-90 MBT and has a similar level of mobility. (Christopher F Foss)

The latest Russian ARV to enter production is the BREM-1M, which is based on components of the T-90 MBT manufactured by UralVagonZavod in Nizhny Tagil. BREM-1M is a follow-on to the original BREM-1 ARV, which was based on components of the T-72 tank that entered service with the Russian Army in 1994, a year after production began.

In addition to the normal recovery equipment - consisting of a front-mounted dozer/stabiliser blade, crane with telescopic jib, and winches - the latest BREM-1M has electric welding equipment, special tow bars, and a snorkel. The latter is carried at the rear of the hull on the right and allows the vehicle to ford to a depth of 5 m, compared with the standard fording depth of 1.2 m.

Like most Russian MBTs, the BREM-1M has additional drum-type diesel fuel tanks at the rear of the hull to extend its operating range, and it can lay a smoke screen by injecting diesel fuel into the exhaust outlet at the rear of the hull on the left.

Russia also developed an ARV based on the hull of the T-80 MBT. A small batch of these were built at Omsk and have been offered on the export market under the designation BREM-80U.

While the T-72 MBT was released for export and production was undertaken in the former Czechoslovakia and Poland, the T-80 was the Russian Army's high-value MBT and was not released for export for many years.

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UK and US ARVs

The British Army received 81 Vickers Defence Systems (now BAE Systems) Challenger ARRVs, with four being sold to Oman to support its fleet of Challenger 2 MBTs.

Aside from the Challenger 2 tank, the Challenger ARRVs supports the Trojan breacher, Titan AVLB, and the AS90 155 mm/39-calibre self-propelled artillery system.

Like other ARVs, the Challenger ARRV has a full range of recovery equipment including stabiliser/dozer blade, winches, crane, an NBC system, and space for the crew being recovered.

It was originally intended that the Challenger ARRV would carry a replacement powerpack on the rear, but instead Reynolds Boughton was contracted to supply 24 trailers to carry the spare engines.

Under urgent operational requirement (UOR) funding, a batch of Challenger ARRVs were upgraded for deployment to Afghanistan. This included installation of explosive reactive armour and bar/slat armour to provide better protection against RPGs, wire cutters, a modified air-conditioning system, an enhanced night-vision device for the driver, and electronic counter-IED devices.

The M88 is the US Army's standard heavy ARV, the origins of which can be traced back to the late 1950s with the first production vehicles completed by BMY in 1960. This had a petrol engine and
was followed by the M88A1 with a more fuel-efficient diesel. The M88A1 could recover the M60-series MBT, but not the heavier M1/M1A1/M1A2 MBTs, so the M88A2 was developed and fielded.

The US Army’s standard ARV is the M88A2, which has been fielded to recover the heavier M1A1/M1A2 Abrams MBTs. (BAE Systems)

The M88A2 is also referred to as the HERCULES (Heavy Equipment Recovery Combat Utility Lift and Evacuation System). It features additional passive armour, a more powerful diesel engine, two winches, a frame pivoted at the front of the vehicle, an APU, and the capability to refuel and defuel other vehicles.

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**Lighter ARVs**

For most MBTs there is a comparable ARV based on a similar platform or at least one that uses some of the same components, but this is not the case for most medium and lighter tracked and wheeled AFVs.

The German Army's Rheinmetall Marder 1A3/4/5 infantry fighting vehicle (IFV) has now started to be supplemented by the Puma AIFV, but there was never a Marder ARV so the vehicle is recovered by a Leopard 1 ARV.

The Russian Kurganmashzavod BMP-3 IFV has been built in large numbers for the export market and is supported by the BREM-L ARV. The BREM-L has been exported to countries including Cyprus, Indonesia, the UAE, Venezuela, and possibly more. It is fitted with a front-mounted dozer/stabiliser blade, winch, crane, and platform to carry spare powerpacks and, like other members of the family, is fully amphibious.
General Dynamics European Land Systems' Pizarro IFV is now in service with the Spanish Army and a small batch of ARVs based on the same platform has been fielded.

The German FFG Wisent 2 Support Vehicle is based on the lower half of a Leopard MBT and is unusual in that it can be deployed as an ARV or a breacher. (FFG)

BAE Systems Hägglunds' CV90 IFV was originally developed for the Swedish Army, which also received a number of specialist versions including 26 ARVs. The CV90 IFV has been supplied to Denmark, Estonia, Finland, the Netherlands, Norway, and Switzerland, but none of these have purchased the CV90 ARV and use existing ARVs for this role.

The British Army received 789 BAE Systems Land UK Warrior IFVs and variants, including 67 Mechanised Recovery Vehicle (Repair) and 103 Mechanised Combat Repair Vehicle, and some of these will be upgraded under the Warrior Capability Sustainment Programme.

The British Army has ordered a total of 589 General Dynamics Land Systems UK Specialist Vehicles, with the Ajax reconnaissance vehicle being the first of these to enter service.

To support Ajax and other members of the family, the company has developed the Apollo Equipment Support Repair (50 to be supplied) and the Atlas Equipment Support Recovery (38 to be supplied). Apollo has a crane, a stabilisation system, and an APU, and can tow a high-mobility trailer carrying a spare powerpack. Atlas has a similar hull but is fitted with an earth anchor and two winches, and is optimised for the recovery role. Apollo and Atlas have a remote weapon system, electronic architecture, and a modular armour package.
The first photograph released of the British Army’s Atlas ARV shows it fitted with a Kongsberg Protector RWS. (General Dynamics Land Systems - UK)

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**Wheeled ARVs**

Most contractors that have developed 8x8 and 6x6 vehicles have also produced dedicated ARVs, or a combined repair and recovery vehicle, as there is a trend towards purchasing a complete fleet of vehicles using the same baseline platform.

SABIEX’s Heavy Armoured Recovery Tank (HART) is based on a surplus Leopard 1 MBT hull. (SABIEX)

A good example is the Kuwait National Guard, which received a fleet of General Dynamics European Land Systems - Steyr Pandur 6x6 AFVs. Variants included 90 mm, 25 mm, 81 mm mortar, and an ARRV fitted with winch, crane with telescopic jib, and stabilisers.
Many countries have adopted the General Dynamics European Land Systems - MOWAG Piranha 8x8 family and an ARV is sometimes involved in the package. The Belgian Army selected the Piranha III 8x8 and ordered an initial batch of 138 in eight variants, including nine in the ARV configuration. The platform is fitted with a front-mounted stabiliser blade and a winch that leads out through the front of the hull.

One of the more recent wheeled ARVs is Iveco - Oto Melara Consortium's Centauro 8x8 ARV, which was developed using internal research and development funding.

So far the Italian Army has received 400 Centauro 105 mm 8x8 Mobile Gun Systems (MGSs) and Spain 84. A number of surplus 105 mm MGSs have been supplied by the Italian government to Jordan and the Royal Guard of Oman has received nine Centauro 120 mm 8x8 MGSs.

To support the Centauro 105 mm and 120 mm MGS and the expanding Freccia 8x8 IFV family of vehicles, the Centauro 8x8 ARV was developed but so far only Spain has placed an order (for four vehicles in two batches of two).
The Italian Centauro 8x8 ARV shown in travelling configuration with its crane and dozer blade stowed. (CIO)

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