SHEPHARD

# ISSUE 8
## HANDBOOK


PUBLISHED MAY 2018

THE CONCISE GLOBAL INDUSTRY GUIDE

# ARMOURED VEHICLES

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Published May 2018
ISBN 978-1-9996538-4-2
Printed by Buxton Press, Derbyshire, UK

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| Europe | €110 |
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**COVER:** Soldiers manoeuvre a Stryker armoured vehicle to enter a range for live-fire gunnery during Operation *Punch Bowl* at Joint Base Elmendorf-Richardson, Alaska, on 16 February 2018. (Photo: USAF)
**ABOVE:** Viking All-Terrain Vehicles move through deep snow around Bardufoss exercise areas during Exercise *Cold Enabler 2018* in Norway on 21 February 2018. (Photo: UK MoD)

## SPECIFICATIONS

# RECONNAISSANCE AND PATROL VEHICLES

This section provides a guide to reconnaissance and patrol vehicles, both wheeled and tracked, that are under development or in production, and older vehicles that are being substantially modernised to extend their service lives.

The specifications listed here are intended to provide a handy reference source for the basic parameters that describe the vehicle's performance. Most data has been supplied by the manufacturers, who can give more detailed information on request.

Entries are listed alphabetically by company.

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**ABOVE: An Australian Army CH-47F Chinook hovers into position while conducting external lift trials with the Hawkei Protected Mobility Vehicle. (Photo: Commonwealth of Australia)**

## Achleitner Fahrzeugbau ▸ HMV Survivor I

Achleitner developed the High Mobility Vehicle (HMV) Survivor I to meet the requirements of military, paramilitary and law enforcement agencies for a high-mobility, modular 4x4 armoured vehicle with protection against ballistic threats (up to STANAG 4569 Level 2), mines (up to STANAG 4569 Level 2) and IEDs. It is based on a chassis with a GVW of up to 12,000kg, three 100% differential locks and permanent four-wheel drive. It is equipped with a fully automatic transmission. Survivor I is available in various configurations, including reconnaissance, border patrol, command, communications and ambulance. The cabin is designed as a monocoque cell, which makes it possible to upgrade the protection level in the future. The Survivor I can be carried by tactical transport aircraft such as the C-160. **Type:** 4x4 **Variants:** reconnaissance, border patrol, command, communications, ambulance, other **Length:** ~5.55m **Width:** ~2.35m **Height:** ~2.35m to top of roof **Weight:** 12t **Payload:** ~2,000kg **Ground clearance:** 420mm **Max speed:** 100km/h on road **Range:** ~600km on road **Gradient:** ~60% **Side slope:** ~35% **Fording:** 0.85m without preparation **Powerplant:** 185kW diesel **Crew:** 2 (driver, commander) **Passengers:** 8 **Armament:** various pintle-mounted weapons or RWS **Ballistic protection levels:** STANAG 4569 Level 3

## Achleitner Fahrzeugbau ▸ RCV Survivor

The Reconnaissance and Command Vehicle (RCV) Survivor is an 8t-class all-terrain, high-mobility, lightweight, 4x4 modular armoured vehicle developed for military customers. RCV Survivor 4x4 features STANAG 4569 Level 1. It is available in several configurations: communication, border patrol, reconnaissance, command vehicle and ambulance. Two RCV Survivor vehicles can be airlifted by a C-130 or C-160 transport aircraft. **Type:** 4x4 **Length:** 5.4m **Width:** 2.3m **Height:** 2.2m **Weight:** 8t max **Payload:** 2,500kg **Wheelbase:** 3.2m **Max speed:** 100km/h on road **Range:** 800km on road **Gradient:** 80% **Side slope:** 45% **Fording:** 700mm **Powerplant:** 286hp diesel engine **Crew:** 2 (driver, commander) **Passengers:** 4 **Armament:** various RWS, protected weapon stations or pintle-mounted weapons **Ballistic protection levels:** STANAG 4569 Level 1

## AM General ▸ HMMWV

AM General designed the High-Mobility Multipurpose Wheeled Vehicle (HMMWV) to meet US Army requirements for a durable, mobile and reliable light utility vehicle and in 1983 the design was selected over competitors. Since then, continuous improvements and modifications to meet evolving military needs have transformed the original 1.3t-payload truck into an armoured, Expanded Capacity Vehicle (ECV) for payloads up to 3.2t. The first armoured HMMWVs date back to the mid-1990s. To meet the need for increasing numbers of armoured HMMWVs for use by US forces in the global war on terrorism, AM General responded with production line-installed armour for the M1100 series beginning in 2005. The modular design of HMMWV armour facilitates modifications and upgrades. To offset the weight of armour and enhance performance, payload, reliability and vehicle life cycle, AM General has applied combat experience and new technologies in the development of expanded-capacity and enhanced-reliability HMMWVs. Among the improvements are a turbocharged 6.5l V8 diesel engine; geared fan drive and new cooling pack and shroud for better engine cooling; new three-piece frame rails and cross-members; redesigned reduced-effort steering geometry and linkage; re-engineered geared hub assembly; and new 24-bolt wheels with increased load rating. These and other advancements are incorporated in the M1151, M1152, M1165 and M1167 (TOW) models. In 2011, AM General introduced a new right-hand drive for the sixth-generation HMMWV for export customers. The sixth generation HMMWV is known as the Multi-Role Light Tactical Vehicle (MLTV). The company continues to develop improvements as the HMMWV is expected to remain in US military service beyond 2035 and sales continue to US FMS customers. On 19 December 2014, Congress was notified of a possible FMS sale to Iraq of 1,000 M1151A1s and on 23 December 2014, the US Army awarded the company a $246 million FMS contract to build 2,200 M1152s for Mexico. On 29 August 2017, the US Army awarded AM General a $2.206 billion firm fixed-price contract for the production of up to 11,560 HMMWV ECVs for FMS customers through February 2023 with the first order being for Afghanistan. **Type:** 4x4 **Weight:** 6.1t gross **Payload:** up to 3.2t **Track:** 1.8m **Ground clearance:** 400mm **Wheelbase:** 3.3m **Max speed:** 113km/h **Range:** 400km (cruise) **Gradient:** 60% **Side slope:** 40% **Fording:** 1.5m with kit **Powerplant:** 6.5l V8 turbo diesel **Crew:** 4 standard **Armament:** various RWS, protected weapon stations or pintle-mounted weapons

## Avibras Indústria Aeroespacial ▸ Guará WS

Avibras is marketing the 4x4 Guará WS light armoured vehicle, a further development of its 4x4 AV-VB4 RE Guará prototype. Developed in cooperation with the IPD (Institute for Research and Development of the Army), the original Guará prototype was first displayed at the LAAD 2003 defence exhibition and was used by the Brazilian contingent serving with the UN Stabilization Mission in Haiti. Avibras offered the Guará for the Brazilian Army's VBMT-LR (Viatura Blindada Multitarefa, Leve de Rodas) lightweight wheeled multirole armoured vehicle project but the service selected the Iveco LMV (see separate entry). The company is proposing to develop the Guará WS to meet emerging defence and law enforcement requirements. With a GVW of 10t and a payload capacity of 2.5t, it can be configured for various roles including reconnaissance, C2, personnel and cargo carrier, ambulance, and weapon carrier. A prototype displayed at LAAD 2017 featured two doors on either side of the cabin and an unprotected rear cargo area. Four smoke grenade launchers were mounted on either side of the vehicle's roof. Various weapon fits are possible. **Type:** 4x4 multipurpose **Length:** 5.6m **Width:** 2.4m **Height:** 2.2m **Weight:** 10t GVW **Payload:** 1.5t **Powerplant:** 250hp Cummins diesel **Crew:** 2 (driver, commander) **Passengers:** up to 8 depending on configuration **Armament:** various pintle-mounted weapons, light turrets, RWS possible **Ballistic protection levels:** STANAG 4569 Level 3, Level 2b blast protection

## BAE Systems ▸ CVR(T) Scimitar 2

The Combat Vehicle Reconnaissance (Tracked) (CVR(T)) family of lightweight armoured vehicles has been in continuous use with the British Army since its introduction in 1972. More than 4,000 vehicles, satisfying various operational requirements, have been manufactured for the UK and export customers. Scimitar 2 is the latest configuration and was developed to satisfy a UOR in 2011 to provide the UK with a number of upgraded CVR(T)s for operation in Afghanistan. The platform consists of a newly fabricated Spartan hull, modified to accept a legacy Scimitar turret, additional mine blast protection and smaller rear door for crew egress. Driveline performance has been enhanced by the introduction of an engine upgrade, providing 20% increased power and a 30% increase in peak torque. Upgrades have also been introduced on transmission and final drives to provide increased reliability and improved component durability. Scimitar 2 has been equipped with newly developed stiffened torsion bar suspension and rotary damper arrangements to improve cross-country mobility and maintain consistent ground clearance at increased battle weight. Further modular enhancements are available such as: eyesafe laser rangefinder; GPS and navigation systems; driver night vision; ballistic and bar armour. The CVR(T) is expected to remain in service with British armoured cavalry regiments until replaced by the General Dynamics UK Scout SV vehicle from 2020. The last CVR(T) is scheduled to be withdrawn in 2024.In May 2014, Latvia signed a letter of intent to acquire CVR(T)s from the UK MoD, and the first vehicles were delivered in September 2015, with all scheduled for delivery by 2020. **Type:** tracked **Length:** 5.7m including bar armour **Width:** 2.8m including bar armour **Height:** 2.2m to top of turret (standard configuration) **Weight:** 12.5t **Max speed:** 80km/h on road **Range:** 400km over mixed

terrain **Powerplant:** 173kW 5.9l Cummins B Series turbo diesel **Crew:** 3 **Armament:** 30mm L21 Rarden Cannon, co-axial 7.62mm L43A1 GPMG

## Beijing Zhongzi Yanjing Automobile Co ▸ YJ2081B/YJ2080B

The YJ2081B and YJ2080B are part of Yanjing's YJ series of armoured vehicles. They are designed as protective reconnaissance vehicles with Level 1/2 NATO bullet protection and Level 2 NATO blast protection and optional NBC protection system. **Length:** 5,700mm **Width:** 2,300mm **Height:** 2,300mm **Payload:** 2,000kg (YJ2081B), 1,800kg (YJ280B) **Ground clearance:** 400mm **Wheelbase:** 1,840mm **Max speed:** 135km/h (YJ2081B), 125km/h (YJ280B) **Range:** 900km (YJ2081B), 850km (YJ280B) **Crew:** 6 persons **Ballistic protection levels:** Level 2 (6kg TNT equivalent)

## SPECIFICATIONS

# TANKS

This section provides a guide to tanks that are under development, in production or being substantially modernised. It also includes vehicles, both wheeled and tracked, that are armed with tank guns.

The specifications listed here are intended to provide a handy reference source for the basic parameters that describe the vehicle's performance. Most data has been supplied by the respective manufacturers, who can give more detailed information on request.

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**ABOVE: Soldiers inspect an M1A2 Abrams tank during a *Bright Star 2017* field training exercise at the Mohamed Naguib military base in Egypt. (Photo: US Army)**

## BAE Systems ▸ Challenger 2

The Challenger 2 MBT was introduced into British Army service in 1993 as a replacement for the Challenger 1, which was successfully employed in the 1990-1991 Gulf War. Delivery of 386 tanks to the UK customer was completed in 2002, and 38 were built for Oman. The production line is now closed. The Challenger 2 retains the hull, albeit much improved, of its predecessor and has a new turret armed with the high-pressure rifled 120mm L30 gun. The integrated FCS provides commander (360° traverse) and gunner (limited traverse) with independently gyro-stabilised optical/thermal sights, each equipped with a laser rangefinder. BAE Systems supplied upgrade kits for 137 tanks for the 2003 invasion of Iraq and further improvements were made to Challenger 2s employed during the subsequent stabilisation operation, including installation of the Selex ES Enforcer RWS. Following the UK's 2010 defence review, the British fleet was cut to 227 tanks, sufficient to equip three Type 58 armoured regiments. However, the December 2015 defence review reduced the number of armoured infantry brigades from three to two and in December 2016 the MoD confirmed that only two regiments will be equipped with Challenger 2s. The King's Royal Hussars will continue to operate the Challenger 2 until 2021 when the regiment is scheduled to convert to the new Ajax (see separate entry). The MoD is planning a Life Extension Programme (LEP) to keep the remaining tanks in service until 2035. Although a Challenger 2 was fitted with a Rheinmetall 120mm L/55 smoothbore gun for trials in 2005-6, the aspiration to replace the rifled gun was abandoned because of a lack of funding. The LEP will focus primarily on obsolescence management. Several companies submitted proposals and in December 2016 the MoD awarded contracts, each worth £23 million, for the

assessment phase to Rheinmetall and Team Challenger 2, led by BAE Systems which also includes GDLS-UK, General Dynamics Mission Systems-International, Leonardo, Moog, QinetiQ and Safran Electronics. **Type:** tracked MBT **Length:** 11.6m including gun **Width:** 3.5m **Height:** 2.5m to turret roof **Weight:** 62.5t **Max speed:** 56km/h on road **Range:** 450km on road **Gradient:** 60% **Fording:** 1.1m **Powerplant:** 890kW Perkins CV12 diesel **Crew:** 4 **Armament:** 120mm L30A1 rifled gun, 7.62mm coaxial L94A1 chain gun, 7.62mm L37A2 MG at commander's cupola **Ammunition:** 52x 120mm, 4,000x 7.62mm rounds

## BUMAR Łabędy ▸ PT-91Ex

The PT-91Ex is the latest model of PT-91 Twardy tank, a derivative of the Soviet T-72M1 produced under licence in Poland by Zaklady Mechaniczne Bumar Łabedy, now part of Polish Defence Holding. The prototype PT-91 was completed in 1992 and the first of 233 production examples entered Polish Army service in 1995. Bumar Łabedy supplied 48 PT-91M export models to Malaysia from 2007 which equip a single armoured regiment. The tank is armed with a 125mm smoothbore gun fed by an automatic loader. The PT-91Ex builds on the PT-91M, with improvements including air conditioning, an additional APU to power electronic systems and improved external stowage around the rear of the turret. The PT-91 series is equipped with Polish-developed ERA on the hull and turret. The PT-91Ex is equipped with a dozer blade. In 2015, the Malaysian Army confirmed that it would like to order more PT-91s to equip a second regiment, which would be grouped with the first to form an armoured brigade. At the April 2016 Defence Services Asia exhibition, Renk France proposed upgrading Malaysia's PT-91s with a new powerpack and transmission that would boost the tank's maximum speed to 70km/h and increased the top reverse speed from the present 4km/h to 33km/h. **Type:** tracked MBT **Length:** 10m with gun forward **Width:** 3.7m **Height:** 2.6m **Weight:** 47.5t **Ground clearance:** 400mm **Max speed:** 65km/h on road **Range:** 650km **Fording:** 5m with preparation **Trench:** 2.8m **Powerplant:** 735kW PZL-Wola S-1000R diesel **Crew:** 3 **Armament:** 125mm smoothbore gun, 7.62mm coaxial MG, .50cal heavy MG

## FNSS Savunma Sistemleri/PT Pindad (Persero) ▸ Kaplan MT

FNSS and PT Pindad unveiled the first prototype of the Kaplan MT Modern Medium Weight Tank (MMWT) at the May 2017 IDEF exhibition in Turkey. The vehicle is under joint development under the terms of a February 2014 agreement between the two companies to meet the potential requirement of the Indonesian Army for a tracked direct fire support vehicle. The army plans to operate the 35t MMWT in terrain that is inaccessible to heavier MBTs so it is not intended to engage MBTs. Two prototypes are being built and an additional hull for ballistic and mine testing. The Kaplan MT is of conventional layout with the driver at the front, the turret in the middle and powerpack at the rear. The Kaplan MT features a Cockerill 3105 turret from CMI Defence that is armed with a 105mm gun. The Kaplan is also available as an IFV with either a remotely-controlled 30mm or 20mm cannon in an unmanned turret. A computerised FCS provides both the commander and the gunner with a stabilised day/thermal sighting system incorporating a laser rangefinder. The vehicle is equipped with a battle management system and a 360º situational awareness system. The Kaplan MT features an all welded steel hull to which appliqué armour can be mounted. Mounted on either side of the turret are banks of electrically operated smoke grenade launchers which are coupled to a laser warning system. It is equipped with a CBRN protection system. The Kaplan MT features an electronic architecture to facilitate easier upgrades. The powerpack comprises a diesel engine, automatic transmission and a cooling system, producing a power-to-weight ratio of 20hp/t enabling the Kaplan MT to achieve a maximum road speed of 70km/h and a road range of up to 450km. The vehicle is equipped with an air conditioning system and an APU enables the crew to operate subsystems with the main diesel engine switched off. The Kaplan MT is set to undergo qualification tests in Indonesia, officials said at the DSA 2018 exhibition in Kuala Lumpur. Upon their conclusion, negotiations with Indonesia for series production are expected to commence in 2019. By April 2018 only one Kaplan MT prototype existed, after being completed in early 2017, but a second Kaplan was being assembled by PT Pindad in Indonesia. FNSS will transfer all relevant technology to allow future production to occur in Indonesia. **Type:** tracked 105mm-armed medium tank **Length:** 7m **Width:** 3.2m **Height:** 2.6m **Weight:** 35t **Max speed:** 70km/h on roads **Range:** 450km on roads **Gradient:** 60% **Side slope:** 30% **Trench:** 2m **Trench:** 2m **Powerplant:** diesel engine **Crew:** 3 (driver, commander, gunner) **Armament:** Cockerill 105mm rifled gun, 7.62mm coaxial MG

## General Dynamics Land Systems ▸ M1 Abrams

The M1 Abrams was introduced into US Army service in 1980 as a replacement for the M60. More than 8,800 were built for the army in various models (M1, M1A1, M1A2), while 403 M1A1s were supplied to the USMC. The M1 has benefited from continuous product improvements funded by the US Army, resulting in numerous service models, the latest being the M1A2 System Enhancement Package (SEP), which includes the Force XXI Battle Command Brigade and Below system and improved cooling. The Tank Urban Survival Kit (TUSK), a series of improvements to enhance the M1's ability to operate in built-up environments, has been developed as a result of experience since 2003. The US Army expects the M1 to remain in service with its armour brigade combat teams until about 2050. About 1,600 of the US Army's 2,400 M1s had been upgraded to the SEP v2 standard by the end of 2013. The M1A2 SEP v3 was displayed for the first time at the October 2015 AUSA exhibition. GDLS is proposing installing an MTU 883 diesel engine and Allison transmission to replace the current Honeywell turbine which, according to GDLS, would reduce running costs by 14%. These improvements could form part of an M1A2 SEP v3 or a more comprehensive M1A3 upgrade. In September 2017, the US Army received the first six M1A2 SEP v3 tanks. The service plans to upgrade some 1,500 tanks to the new standard which will be followed by the v4 from 2023. The USMC is testing the Rafael Trophy active protection system as a possible upgrade for its M1s and in September 2017, the US Army awarded GDLS a $9.9 million contract to integrate the Trophy in an unspecified number of tanks. The M1 has been exported to Australia (59 ex-US Army M1A1 AIMs), Egypt (M1A1), Iraq (140 M1A1Ms), Kuwait (218 M1A2s) and Saudi Arabia (315 M1A2s). In September 2013, GDLS was awarded a $187.5 FMS million contract for conversion of 44 M1A1 and 40 M1A2 tanks to the Saudi M1A2 (M1A2S) configuration for Saudi Arabia. Egypt signed a $395 million contract in 2011 for GDLS to supply a further 125 M1 kits for assembly at the Egyptian Tank Plant to boost the Egyptian Army's fleet to 1,130 tanks. In December 2016, the US approved a possible $1.7 billion FMS o upgrade 218 M1A2s for Kuwait. **Type:** tracked MBT **Length:** 9.8m including gun **Width:** 3.7m **Height:** 2.4m to turret roof **Weight:** 63t **Max speed:** 68km/h on road **Range:** 426km on road **Gradient:** 60% **Fording:** 1.2m, 2m with preparation **Powerplant:** 1,120kW Honeywell AGT1500C multi-fuel turbine **Crew:** 4 **Armament:** 120mm M256 smoothbore gun, one pintle-mounted and one coaxial 7.62mm M240 MG, .50cal M2HB HMG **Ammunition:** 42 120mm rounds, 1,000 .50cal, 12,400 7.62mm

## Hanwha Defense ▸ Medium Tank

At IDEX 2013, Doosan and CMI Defence presented a new Medium Tank concept which integrates the Cockerill XC-8 turret on the Doosan K21 IFV chassis. The K21 was developed by Doosan to meet the requirements of the Republic of Korea Army. The new Medium Tank has been developed as a private venture. The Cockerill XC-8 concept draws on the modular technology of the company's CT-CV 105HP turret. One of two low-recoil force guns may be fitted in the XC-8: a Cockerill 105mm high-pressure gun, which fires all NATO-standard 105mm types and the Falarick 105 Gun Launched Anti-Tank Guided Missile (GLATGM); or a Cockerill 120mm high-pressure gun, which fires all NATO-standard 120mm smoothbore ammunition and the Falarick 120 GLATGM. The use of a bustle-mounted autoloader eliminates the need for a loader so the vehicle crew can be reduced to three. The Medium Tank was displayed at IDEX 2013 and ADEX 2013 armed with the 105mm gun. At the February 2015 IDEX, Doosan and CMI signed an MoU to collaborate on turret manufacturing in South Korea, development of a K21-105 tank and the upgrade of in-service Korean armoured vehicles. **Type:** tracked light/medium tank **Weight:** 25t (combat) **Ground clearance:** 460mm **Max speed:** 70km/h on road, 40km/h cross-country, 7km/h in water **Range:** 450km on road **Gradient:** 60% **Side slope:** 30% **Trench:** 2.5m **Powerplant:** Doosan D2840LXE turbodiesel **Crew:** 3 **Armament:** 105mm or 120mm high-pressure gun, coaxial 7.62mm MG

## SPECIFICATIONS

# APCs AND IFVs

This section provides a guide to tracked and wheeled armoured personnel carriers (APCs) and infantry fighting vehicles (IFVs) that are under development, in production or being substantially modernised. The primary variant of each vehicle is described.

The specifications listed here are intended to provide a handy reference source for the basic parameters that describe the vehicle's performance. Most data has been supplied by the manufacturers, who can give more detailed information on request.

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**ABOVE: A convoy of Bradley Fighting Vehicles gets into position during Exercise *Combined Resolve 10* at the Hohenfels Training Area, Germany, on 1 May 2018. (Photo: US Army)**

## BAE Systems Platforms & Services ▸ AAV7A1

Fielded in 1972, the tracked AAV7 is the only Assault Amphibious Vehicle (AAV) in USMC service. The vehicles were upgraded to the A1 standard in the mid-1980s and later enhanced with an Up Gunned Weapons Station, add-on armour and a reliability, availability and maintainability package. The USMC plans to replace the AAV7 during the second phase of the new Amphibious Combat Vehicle project, but the AAV7 is not expected to be retired until 2035. The USMC is now funding a survivability upgrade for up to 392 AAV7A1s, which includes blast-mitigating seats, belly/sponson armour, spall liner, deck liner and external fuel tanks. In May 2014, BAE Systems and SAIC received contracts to develop upgrade proposals and in March 2015 the SAIC proposal was selected. In March 2016, SAIC delivered the first of ten AAV Survivability Upgrade (see separate entry) vehicles for testing. As well as survivability improvements, the AAV SU includes a rebuilt VT 903 engine that boosts horsepower, along with a new transmission. The AAV7 has been exported to Argentina, Brazil, Chile, Indonesia, Italy, the Philippines, South Korea, Spain, Taiwan, Thailand and Venezuela. In November 2015, Taiwan requested an FMS purchase of 36 new vehicles. In December 2015, BAE Systems received an $82 million contract to upgrade 23 Brazilian vehicles to the latest Reliability, Availability, and Maintainability/Rebuild to Standard (RAM/RS) configuration and the first two vehicles were delivered at the end of May 2017. The AAV7A1 RAM/RS variant includes a more powerful engine and drive train, as well as an upgraded suspension system, allowing the new vehicles to meet or exceed original AAV7A1 performance. In April 2016, the company received a contract from Japan to supply 30 AAV7A1 RAM/RS vehicles with deliveries planned for the last half of 2017. The Japan Ground Self-Defence Force performed a mobility demonstration of one of its new BAE

Systems AAV7A1 amphibious assault vehicles for the first time, at the Fuji Firepower demonstration on 27 August 2017. On 18 October 2017, it was announced that Kinetics Drive Solutions' transmissions have been selected by SAIC for the Amphibious Assault Vehicle (AAV) Survivability Upgrade programme. SAIC is delivering upgraded AAV SU vehicles to the USMC, and the vehicles will be equipped with Kinetics' MD500 marine drive power-take-off and InfiniDrive HMX3000 transmission systems. **Type:** tracked amphibious assault vehicle **Variants:** APC, command, recovery **Length:** 8.16m **Width:** 3.27m **Height:** 3.31m **Weight:** 25t (combat weight) **Ground clearance:** 406mm **Max speed:** 72km/h on road, 13km/h in water **Range:** 482km **Gradient:** 60% **Side slope:** 40% **Fording:** amphibious **Vertical step:** 914mm **Trench:** 2.44m **Powerplant:** Cummins VT400 turbocharged diesel **Crew:** 3 (driver, commander, gunner) **Passengers:** 25 dismounts **Armament:** .50cal HMG and 40mm MK19 AGL

## BAE Systems Platforms & Services ▸ ACV 1.1 Prototype

BAE Systems teamed with Iveco Defence to offer a version of Iveco's SuperAV for the USMC's Armored Combat Vehicle Phase 1 Increment 1 (ACV 1.1) requirement. On 24 November 2015, BAE Systems received one of two engineering, manufacturing and development contracts, worth $103.771 million, to deliver 13 prototypes. There is also one option for three additional EMD vehicles. The contract includes options for 60 low-rate initial production vehicles and 148 full-rate production vehicles. The corps is expected to order 208 vehicles for the ACV 1.1 phase with derivatives to follow in the ACV 1.2 phase, bringing the total requirement to 579 vehicles. Designed as an amphibious vehicle with open ocean ship launch and recovery capability, the ACV 1.1 is able to carry 13 marines in the rear troop compartment plus a crew of three. On 13 December 2016, BAE Systems announced that it rolled out the first of 16 Amphibious Combat Vehicle 1.1 prototypes to the US Marine Corp at the company's York, Pennsylvania facility and by 30 June 2017 all had been delivered. The vehicle's blast-resistant hull provides mine, IED, KE and overhead protection. Survivability is further improved by blast-resistant seats and an automatic fire suppression system. The vehicle has Iveco's H-Drive System to provide full-time all-wheel traction on land and in the surf zone, and it is equipped with the same 16R20 tyres as the USMC's MTVR logistics vehicle fleet. **Type:** 8x8 amphibious APC **Length:** 8.6m **Width:** 3m **Height:** 2.7m to top of hull **Weight:** 28.636t **Payload:** up to 2.721t **Max speed:** >105km/h on paved road, >6kt in water **Range:** 563km at 72km/h on road, up to 10nmi followed by 200km+ on land **Gradient:** >60% **Side slope:** >30% **Crew:** 3 (commander, gunner, driver) **Passengers:** 13

## BAE Systems Platforms & Services ▸ Bradley Fighting Vehicle

The battle-proven Bradley Fighting Vehicle has been at the forefront of US Army operations since the first unit was equipped in 1983. The M2 IFV equips mechanised infantry battalions, while the M3 Cavalry Fighting Vehicle is used by reconnaissance units within armoured brigade combat teams (ABCTs). The latest Bradley A3 has proven itself in both urban operations and open warfare scenarios in Iraq. The A3 includes digitised electronics for optimum situation awareness, network connectivity and communication within the ABCTs. BAE Systems also provides the Bradley A2 ODS, intended as a capable solution with fewer technological enhancements. The Bradley A2 ODS-SA incorporates not only the enhancements out of Operation *Desert Storm*, but digitises the vehicle with some of the same capabilities as the A3, including an eye-safe laser rangefinder, GPS and navigation systems. It is equipped with the TOW II missile system, the same 447kW engine as the Bradley A3, and provision for add-on armour tiles and spall liners. More than 6,400 Bradleys are in US Army service, and 400 were delivered to Saudi Arabia in 1989-1993. In December 2014, the army awarded BAE Systems a contract to develop an Armored Multi-Purpose Vehicle based on the Bradley to replace M113 variants in the ABCTs. The US Army is funding the incremental modernisation of the Bradley through a serious of engineering change proposals (ECP). The first ECP is designed to restore space, weight and power, and add a new suspension and lighter track. The second ECP will include a powerful engine, a new transmission and new electrical systems. BAE Systems unveiled the Next-Generation Bradley, with suspension upgrades, an upgraded turret, new targeting sensors and network connectivity, on 4 October 2016 at the AUSA exhibition. **Type:** tracked **Variants:** IFV, reconnaissance **Length:** 6.5m **Width:** 3.2m **Height:** 3.3m **Weight:** 25-29.4t without tiles, depending on variant **Max speed:** 61km/h max on roads **Range:** 400km max on roads **Powerplant:** 447kW Cummins VTA-903T 8-cylinder diesel **Crew:** 3 (driver, commander, gunner) **Passengers:** 7 dismounts in IFV **Armament:** M242 Bushmaster 25mm cannon, co-axial M240C 7.62mm MG, twin TOW missile launcher in IFV **Ammunition:** 300 25mm rounds ready, 600 stowed; 800 7.62mm ready, 3,600 stowed; two TOW missiles in launcher, five stowed in IFV

## BAE Systems Platforms & Services ▸ M113

Since entering production for the US Army in 1960, the M113 APC has become the largest family of tracked AFVs in the world, with more than 80,000 vehicles produced in over 40 variants for use by the armed forces of at least 44 countries. The M113 became popular because of its high interior volume, simple construction and ease of use. With current and ongoing improvements in power train technology, armour developments, active and passive protection and suspension enhancements, the M113 is expected to continue to play a significant role for the next three to four decades. The recent M113A3 programme has extended the M113's life in various support roles in US Army service until 2020 or beyond, when it is expected to be replaced by the proposed Armored Multi-Purpose Vehicle family. The configuration provides a 205kW DDC 6V53T turbocharged diesel engine, Allison X200-4B transmission, automotive driver controls, external fuel tanks, spall liners, mine armour kit, T150 double pin track, NBC system and Driver's Viewer Enhanced. Customers who prefer to upgrade their existing fleets can choose a variety of options including the M113A3. Other products include: BAE Systems' M113A2 Mk 1 with a 198kW engine; the M113E3 with a 246kW commercial engine and transmission; and the Mobile Tactical Light Vehicle with an extended chassis for more volume. In October 2012, BAE Systems Australia completed the Land 106 project to upgrade 431 Australian Army M113s to AS3 and stretched AS4 standard. In late 2014, the Hellenic Army received 460 M113-family vehicles donated by the USA from former US Army stocks. In December 2014, BAE Systems delivered the 100th of 150 Brazilian Army M113B vehicles upgraded to the M113A2 Mk1 configuration. In June 2014, the Brazilian government requested a $131 million US FMS of 434

M113A2MK1 upgrade kits. **Type:** tracked APC **Variants:** more than 40 variants **Length:** 5.3m **Width:** 2.7m **Height:** 2.5m **Weight:** 12.3t **Max speed:** 66km/h on road **Range:** 480km on road **Powerplant:** Detroit Diesel 6V53T turbo diesel **Crew:** 2 (driver, commander) **Passengers:** up to 11 in APC configuration **Armament:** various pintle-mounted weapons, RWS and light turrets.

## Beijing Zhongzi Yanjing Automobile Co ▸ Yanjing YJ2080C2

Yanjing's Sabre-ER protective homing multipurpose missile launching vehicle (YJ2080C2) is a launching vehicle capable of assault missions against tank, field fortifications, small warships and armed helicopters. The launching vehicle utilises missiles which adopt a new type of warhead designed to be operated against armoured tanks. The vehicle utilises a China-made high-mobility, cross-country chassis and is equipped with an omni-directional traversable turret, observation-aiming, fire control and data-link devices. Eight rounds of missiles can be loaded simultaneously. **Length:** 5980mm **Width:** 2300mm **Height:** 2300mm **Weight:** 8000kg **Max speed:** 135km/h **Ammunition:** 360mm series armour penetrating warhead

## SPECIFICATIONS

# MINE-PROTECTED AND MRAP VEHICLES

This section provides a guide to mine-protected and Mine Resistant Ambush Protected (MRAP) vehicles that are under development, in production or being substantially modernised.

The specifications listed here are intended to provide a handy reference source for the basic parameters that describe the vehicle's performance. Most data has been supplied by the manufacturers, who can give more detailed information on request.

Entries are listed alphabetically by company.

If you think your vehicle should be listed, please contact the team at reference@shephardmedia.com to ensure it appears in the Shephard Plus online database (shephardplus.com) and is included in the next print edition.

**ABOVE: A USAF airman guides a Navistar MaxxPro MRAP vehicle onto a C-17 for transportation to Southwest Asia. (Photo: USAF)**

## Achleitner Fahrzeugbau ▸ PMV Survivor II

Achleitner developed the 4x4 Protected Mission Vehicle (PMV) Survivor II to meet the needs of military, paramilitary and law enforcement customers. The crew cabin is designed as a monocoque cell to which additional modular add-on armour kits can be added to boost protection levels to STANAG 4569 Level 3 ballistic and Level 4a/3b mine/IED blast. The Survivor I is based on a truck chassis with three 100% differential locks and permanent four-wheel drive. A fully automatic transmission is available. Two Survivor IIs can be carried by C-160 or C-130 aircraft. The vehicle has been bought by Austria and Turkmenistan. **Type:** 4x4 **Variants:** personnel carrier, command, patrol/reconnaissance, communications, ambulance **Length:** ~6.4m **Width:** ~2.4m **Height:** ~2.7m **Weight:** 15t gross **Payload:** up to 4,000kg **Max speed:** 100km/h on road **Range:** 1,000km **Gradient:** 60% on road **Side slope:** 35% **Fording:** up to 1.1m without preparation **Powerplant:** 240kW diesel **Crew:** 2 (driver, commander) **Passengers:** 10 (troop transport) **Armament:** various RCWS, pintle-mounted weapons **Ballistic protection levels:** up to STANAG 4569 Level 3

## BAE Systems Platforms & Services ▸ Caiman MTV

BAE Systems produced more than 2,800 Caimans – a V-hull design based on the company's Family of Medium Tactical Vehicles (FMTV) chassis and Low Signature Armored Cab (LSAC) – for the US MRAP programme between 2007 and 2009.The Caiman Multi-Terrain Vehicle (MTV) is an upgraded Caiman MRAP that provides greater levels of survivability and mobility. The vehicle integrates a refurbished and improved armoured capsule from the MRAP, with a new high-power automotive train, chassis and independent suspension. The usable interior volume under-armour is suitable for a variety of missions, including troop transport, ambulance and 'C2-on-the-move' operations. The vehicle provides a combination of interior capacity, tactical mobility, operator comfort and survivability, according to BAE Systems. The vehicle's mobility level is achieved with a greater track width, strong independent suspension and upgraded power train. The upgraded interior includes an HVAC temperature control system. The UAE submitted a request to buy 4,569 surplus US MRAPs, including 1,150 Caiman MTVs, the US Defense Security Cooperation Agency (DSCA) announced on 26 September 2014; deliveries began in 2015. An undisclosed number of Caimans were among the approximately 250 MRAPs which the US government transferred to Iraq in January 2015, and in May 2016 the US began shipping 762 surplus MRAPs, including 400 Caimans, to the Egyptian government. **Type:** 6x6 **Length:** 7.4m without step **Width:** 2.6m **Height:** 3m **Weight:** 31.3t gross **Payload:** 3.75t **Max speed:** 105km/h on road **Gradient:** 60% **Side slope:** 30% **Fording:** 0.9m without preparation **Powerplant:** 336kW Caterpillar C9 6-cylinder turbo diesel **Passengers:** 10 (troop transport), 4 litters plus attendant (ambulance) **Armament:** various RCWS or pintle-mounted weapons **Ballistic protection levels:** enhanced monolithic floor, strengthened chassis frame, blast-absorbing seats

## BMC Otomotiv Sanayi ve Ticaret ▸ 350-16 Z Kirpi

Turkish Land Forces Command selected BMC's 350-16 Z Kirpi (Hedgehog) 4x4 MRAP vehicle to meet its requirements following a competitive evaluation and ordered 468 vehicles in 2009. However, BMC went bankrupt in 2011 after delivering 278 vehicles. Production was re-started in November 2013 and 25 vehicles were delivered the following March. Turkey's Gendarmerie has bought 200 vehicles and another 100 have been purchased by the Tunisian Army. The Kirpi is based on a BMC 4x4 truck chassis. The V-shaped hull is made of steel armour which provides ballistic protection. There are four bulletproof windows and five firing ports in each side of the rear troop compartment. In Turkish service, the Kirpi has a cupola for the gunner who is protected by four folding armour plates when operating the pintle-mounted machine gun. In 2015, Kazakh agricultural equipment manufacturer Kaz Kioti Bakhtiar Mamatov and state-owned Kazakhstan Engineering were discussing arrangements to locally assemble the Kirpi. **Type:** 4x4 **Length:** 7.07m **Width:** 2.51m **Height:** 2.86m **Weight:** 16t **Max speed:** 100km/h on road **Range:** 800km on road **Powerplant:** Cummins ISLe+ 350 **Crew:** 3 (driver, commander, gunner) **Passengers:** 10 **Armament:** various RWS, protected weapon stations or pintle-mounted weapons **Ballistic protection levels:** STANAG 4569 Level 3

## Carmor Integrated Vehicle Solutions ▸ Navigator

The Navigator is an all-terrain 4x4 monocoque-based, mine-protected vehicle that can carry up to 13 personnel. An optional add-on armour kit can be mounted to increase ballistic protection and an add-on kit is available to increase protection against IED and RPG attack. Three ballistic glass windows with firing ports are mounted on each side of the rear cabin in APC configuration. **Type:** 4x4 **Variants:** APC, command, logistics, utility **Length:** 7.08m **Width:** 2.51m **Height:** 2.86m **Weight:** 18.5t gross **Ground clearance:** 410mm **Wheelbase:** 3.86m **Max speed:** 110km/h on road **Range:** 700km on road **Gradient:** 60% **Side slope:** 33% **Fording:** 1.2m without preparation **Powerplant:** Cummins ISLE 350 diesel **Crew:** 3 in front cabin **Passengers:** 6-10 in rear cabin **Armament:** various RWS, protected weapon stations or pintle-mounted weapons **Ballistic protection levels:** up to STANAG 4569 Level 4

## Chaiseri Metal & Rubber Co ▸ First Win/Lipanbara

The 4x4 First Win multipurpose vehicle was developed in 2009-2010, and has since entered service with the Royal Thai Army (RTA). The platform has been designed to operate in both urban areas and difficult terrain. Crew enter and leave the vehicle via two doors on each side of the cabin and a rear door. A gun port is provided in each door and another three beneath individual ballistic glass windows on each side of the troop compartment. Standard equipment includes power steering, independent suspension and run-flat tyres. The First Win can be carried by the C-130 aircraft. The RTA bought 21 First Win vehicles and a further 18 were purchased by the Thai Ministry of Justice's Department of Special Investigation. Chaiseri is expecting the RTA to order at least another 50 vehicles. Chaiseri and Malaysia's DRB-Hicom Defence Technologies (Deftech) are collaborating to supply 20 First Win vehicles to the Malaysian Army under a July 2015 contract. At the DSA exhibition in April 2016, Deftech displayed the first vehicle dubbed the Lipanbara High Mobility Armoured Vehicle. It is armed with a Dillon Aero M134D-H 7.62mm Gatling gun mounted in a protected weapon station. **Type:** 4x4 **Variants:** APC, command, reconnaissance, ambulance, logistics transport **Length:** 6.5m **Width:** 2.45m **Height:** 2.7m **Weight:** 11t **Payload:** 1t **Ground clearance:** 570mm at hull **Max speed:** 110km/h **Gradient:** 60% **Side slope:** 40% **Fording:** 0.9m **Powerplant:** 147-160kW Cummins diesel **Crew:** 1 (driver) **Passengers:** 10 **Armament:** various pintle-mounted weapons, protected weapon stations or RCWS **Ballistic protection levels:** V-shaped monocoque steel hull with add-on composite armour provides STANAG 4569 Level 1-3

## DCD Protected Mobility ▸ Mountain Lion

The Mountain Lion, first shown publicly in 2011, combines proven technologies, such as a monocoque V-shaped hull and COTS drive train components, with advances in suspension and steering design, according to the company. Combined with an integrated independent suspension system and large capacity dampers, the Mountain Lion is designed for both urban environments and rough off-road terrain. A low centre of gravity increases cornering speeds and reduces the possibility of roll-over during emergency manoeuvres. The Mountain Lion can be configured for a variety of roles and is suitable for use in climates and theatres all over the world. Its high rated power train provides growth potential, allowing for future increase in armour or additional mission-related equipment. The crew accesses the cabin through two side doors and a rear door, and roof hatches are provided for observation as well as a means of escape during an emergency. The vehicle has ballistic glass windows in the troop compartment. The roof is provisioned for a manned weapon ring mount or an RWS. The Mountain Lion can be air-transported by C-130 aircraft. **Type:** 4x4 **Length:** 6.2m **Width:** 2.5m **Height:** 2.7m **Weight:** 10.9t (kerb) **Max speed:** 110km/h **Gradient:** 70% **Side slope:** 30% **Powerplant:** 270kW/632Nm diesel engine with a 6-speed automatic transmission **Crew:** 2 (driver, commander) **Passengers:** 4-8 **Armament:** various RWS, protected weapon stations or pintle-mounted weapons **Ballistic protection levels:** STANAG 4569 Level 4a/3b and STANAG 4569 Level 3

## SPECIFICATIONS

# ARMOURED ENGINEER VEHICLES

This section provides a guide to armoured engineer vehicles that are under development, in production or being substantially modernised.

The specifications listed are intended to provide a handy reference source for the basic parameters that describe the vehicle's performance. Most data has been supplied by the manufacturers, who can give more detailed information on request.

Entries are listed alphabetically by company.

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**ABOVE: US marines engage in an exercise on an M88 Tank Recovery Vehicle at Marine Corps Base Camp Pendleton, to help enhance combat readiness and proficiency. (Photo: USMC)**

## Anniston Army Depot ▸ ABV

The Assault Breacher Vehicle (ABV) project, launched by the USMC in 2002, is a joint programme to meet the requirements of both the US Army and USMC for an AEV to breach minefields and clear obstacles. Anniston Army Depot, Alabama, converts surplus US Army M1 Abrams MBTs into ABVs. The tank's turret is replaced by an all-welded aluminium structure fitted with ERA. Pearson Engineering supplies combat dozer blades, full-width mine ploughs, surface mine ploughs, rapid ordnance removal systems and lane marking systems. Mounted on the rear of the ABV turret structure are two linear demolition charge systems and two launchers used to rapidly clear a path through minefields. The ABV was formally rolled out in May 2009 and used in combat for the first time by the USMC in Afghanistan in December 2009. The US Army's original acquisition objective of 171 ABVs was reduced to 129, of which 116 had been built or ordered through FY2015. **Type:** tracked **Length:** 7.9m **Width:** 3.6m **Height:** 2.4m **Weight:** 50t (combat) **Max speed:** 70km/h on road **Range:** 500km on road **Powerplant:** 1,100kW Honeywell AGT 1500 gas turbine **Crew:** 2 **Armament:** .50cal HMG

## BAE Systems ▸ M88A2 HERCULES

The M88A2 Heavy Equipment Recovery Combat Utility Lift and Evacuation System (HERCULES) improved Recovery Vehicle is the recovery system for 70t combat vehicles. With the lowest acquisition, operational and maintenance cost of any 70t capable recovery system, HERCULES answers the need for cost-effective, self-supporting heavy recovery performance, says the company. The HERCULES was the primary 70t recovery system during Operation Iraqi Freedom. US troops found a few other creative uses for its capabilities when they used it to pull down the Saddam Hussein statue in Baghdad on 9 April 2003. HERCULES utilises a hull designed for the recovery mission and is thoroughly proven by US Army testing. Stability and performance are unmatched by any alternate tank-based design, claims the company. HERCULES offers operational and logistics commonality with the existing M88A1 fleet, simplifying training and parts availability. Key upgrades include improved power-assisted braking, improved steering, improved electrical system and increased engine horsepower, says the company. The vehicle features overlay armour protection, ballistic skirts, a longer 35t boom, a 63,504kg constant pull main winch with 280ft of cable, and an auxiliary 3t winch to aid main winch cable deployment. In July 2015, BAE Systems was awarded a contract to upgrade a further 36 of the US Army's M88A1s to the newer HERCULES configuration. Deliveries took place in Q1-Q3 of 2017. **Type:** MRV **Variants:** M88 (basic), M88A1 **Length:** 8.58m **Width:** 3.6m **Height:** 3.1m **Weight:** 63.5t **Max speed:** 48km/h on road **Range:** 483km **Side slope:** 60% **Trench:** 2.6m **Powerplant:** 1,050hp AVDS-1790-8CR diesel engine **Transmission:** Allison XT-1410-5A transmission **Crew:** 3 **Passengers:** 4 **Armament:** one 12.7mm machine gun

## BAE Systems ▸ Terrier

BAE Systems received a £350 million UK MoD contract in July 2002 to develop the Terrier armoured combat engineer vehicle to replace the FV180 Combat Engineer Tractor in service with the Royal Engineers. The prototype was unveiled in May 2005 and was followed by four demonstrators. Work on 60 production vehicles began in 2010, with the last vehicle delivered in December 2014. This marked the end of production at Newcastle-upon-Tyne, the company's last AFV production plant in the UK. The Terrier contract also includes a complete training package, including the Terrier Mission Crew Trainer, and integrated logistics support. The Terrier is equipped with a front-mounted hydraulic clamshell loader and side-mounted excavator arm. The loader system can lift up to 5t and is able to move 300t of earth in an hour. Using cameras which provide 360° vision both by day and night, the crew are able to operate under full armour protection and during especially hazardous operations the Terrier can be operated by remote control from up to 1km away. The Terrier is air-trans-portable by A400M.BAE Systems is marketing the Terrier to various countries, including Australia, France, India and Indonesia, and is stressing the vehicle's recently developed capabilities, such as a rock hammer, ripper and earth augur. An updated wading kit allows the vehicle to withstand up to 2m wave surges, making the vehicle better able to support amphibious and disaster relief operations. The excavator arm can be fitted with a new telescopic investigation arm that extends over 8m from the vehicle. In place of the front-mount-ed bucket, the Terrier can be fitted with Pearson Engineering's track width plough mine-clearing system which can be operated at speeds of up to 15km/h. The Terrier can also employ the Python rocket-propelled explosive hose, used with

the British Army's Trojan Engineer Tank System, to rapidly clear a path through minefields. Depending upon the size of the order, BAE Systems is offering to assist potential customers establish a local production line. **Type:** tracked AEV **Applications:** excavator, mine clearance, tow, trackway deployment **Weight:** 30t **Max speed:** 70km/h on road **Powerplant:** Caterpillar C18 diesel **Crew:** 2 **Armament:** 7.62mm MG **Tow weight:** 18t engineer trailer

## BAE Systems ▸ Titan

In 2001, Vickers Defence Systems (now part of BAE Systems) received a £250 million MoD contract to build 66 Engineer Tank Systems (ETS), consisting of 33 Titan Armoured Bridge Layers and 33 Trojan Armoured Vehicle Royal Engineers, to equip the British Army's Royal Engineers. The last Titan was delivered in 2014.The ETS is the first purpose-designed heavy armoured engineer vehicle to be developed for the British Army. Both vehicles are based on the chassis of the Challenger 2 MBT. The Titan carries and lays the army's current range of close support bridges, which are part of the BR90 Modular Bridging System. The Titan can carry one 26m or two 12m bridges. It can also lay multiple combination bridges. A 26m bridge can be launched in less than two minutes, while 12m bridges are laid in 90s. The Titan can also be fitted with a front-mounted dozer blade or mine plough. **Type:** tracked AVLB **Variants:** bridge, dozer, mine plough **Length:** ~11.5m with bridge **Width:** ~4m with bridge **Height:** ~4m to top of bridge **Weight:** ~62.5t with bridge **Max speed:** 59km/h on road **Range:** 450km on road **Powerplant:** 890kW Perkins CV-12 diesel **Crew:** 3 (driver, commander, operator) **Armament:** none

## SPECIFICATIONS

# TURRETS

This section provides a guide to manned and unmanned turrets that are under development, in production or mounted on in-service vehicles.

The specifications listed here are intended to provide a handy reference source for the basic parameters that describe the system's performance. Most data has been supplied by the respective manufacturers, who can give more detailed information on request.

Entries are listed alphabetically by company.

If you think your turret should be listed, please contact the team at reference@shephardmedia.com to ensure it appears in the Shephard Plus online database (shephardplus.com) and is included in the next print edition.

**ABOVE: A US marine fires a .50cal machine gun from the turret on an HMMWV to provide suppressing fire for an assault team at Camp Lejeune, North Carolina. (Photo: USMC)**

## FNSS Savunma Sistemleri ▸ Saber-25

The Saber-25 is a medium-calibre one-man turret that can be integrated on wheeled and tracked AFVs. It builds on the experience of FNSS producing the Sharpshooter Mk 1 and Mk 2 turrets which equip 46 of the AV8 AFVs (see separate entry) which DefTech, with the assistance of FNSS, is producing for the Malaysian Army. The main armament is an Orbital ATK M242 Bushmaster 25mm dual-feed automatic cannon with 240 ready rounds and the secondary armament is a 7.62mm coaxial MG with 600 ready rounds. The digital fire control and sighting system includes a longwave or midwave thermal imager, a day optical channel and an eyesafe laser rangefinder. The gun turret drive system is electrical and fully digital with two-axis stabilisation. The all-welded aluminium armour turret is fitted with an appliqué composite and steel armour package which provides STANAG 4569 Level 4 ballistic protection, as well as spall liners. The Saber-25 is in production for an export customer. **Type:** manned 25mm turret **Elevation:** -8/+48° **Traverse:** 360° **Stabilisation:** yes **Primary weapon:** M242 25mm cannon **Secondary weapon:** 7.62mm coaxial MG **Smoke grenades:** 6 x 76 or 80mm **Reload under armour:** yes **Crew:** 1

**Protection:** STANAG 4569 Level 4 **Ammunition:** 150x HE and 90x AP 25mm ready rounds, 600x 7.62mm ready rounds

## FNSS Savunma Sistemleri ▸ Teber-30 Two-Man Turret

At IDEF 2015 FNSS displayed a mock-up of the Teber-30 Modular Medium Calibre Turret which it has since developed as the Teber-30 Two Man Turret and the Teber-30/35 RT (see separate entry). Prototypes of both were displayed at the May 2017 IDEF exhibition. Teber-30's main armament is an Orbital ATK 30/40mm Mk44 dual-feed cannon with 300 ready rounds. The L3 Wescam MX-GCS stabilised sighting system includes a longwave or midwave thermal imager, a day CCD camera, and an eyesafe laser rangefinder. An automatic target tracker is fitted. The commander's sight has full 360° traverse to enable hunter/killer target engagements. The turret is configured with gunner on the left and commander on the right, both entering through large roof hatches. Each is provided with five roof-mounted periscopes. A modular appliqué composite and steel armour package can be fitted to the Teber-30's all welded aluminium armour to boost ballistic protection up to STANAG 4569 Level 5. Banks of 76 or 80mm smoke grenade launchers can be mounted on either side to the turret to meet customer requirements. FNSS expects to complete qualification of the Teber-30 in 2018. **Type:** 30mm 2-person turret **Weight:** <3.850t **Elevation:** -10/+45° **Traverse:** 360°


**Stabilisation:** yes **Primary weapon:** 30/40mm Mk44 cannon **Secondary weapon:** 7.62mm Mk52 Chain Gun or 7.62mm MG **Smoke grenades:** 8 x 76 or 80mm **Crew:** 2 (commander, gunner) **Protection:** STANAG 4569 Level 5 **Ammunition:** 300x 30mm and 1,000x 7.62mm ready rounds

## FNSS Savunma Sistemleri ▸ Teber-30/35 RT

At IDEF 2015 FNSS displayed a mock-up of the Teber-30 Modular Medium Calibre Turret which it has since developed as the Teber-30 Two Man Turret and the Teber-30/35 RT (Remote Turret) unmanned turret. Prototypes of both were displayed at the May 2017 IDEF exhibition. The Teber-30/35 RT, developed for use on wheeled or tracked AFVs, does not penetrate the hull roof. The turret can be configured for Orbital ATK 30/40mm or 35mm main armament.. Both main and secondary armaments can be reloaded under full armour protection. The commander and gunner have consoles inside the hull which provide a hunter-killer capability. The dual-axis stabilised sight system includes a longwave or midwave thermal imager, a day camera with wide and narrow fields of view, and a laser rangefinder. An automatic target tracking system is also fitted. The turret shell is made of all-welded aluminium armour to which add-on composite armour modules can be mounted. **Type:** unmanned 30/35mm turret **Elevation:** -8/45° **Traverse:** 360° **Stabilisation:** yes **Primary weapon:** 30/40mm Mk44 or 35mm cannon such as Bushmaster III **Secondary weapon:** 7.62mm Mk52 Chain Gun

or 7.62mm MG **Smoke grenades:** 8x 76mm or 80mm **Reload under armour:** yes **Crew:** 2 (commander, gunner) **Protection:** STANAG 4569 Level 4 **Ammunition:** 250x 30mm or 100x 35mm, and 750x 7.62mm ready rounds

## KBP Instrument Design Bureau ▸ Bakhcha

The Bakhcha is the latest version of the two-man turret originally developed for the BMP-3 tracked IFV, which entered Soviet Army service in 1987. It is armed with a 100mm 2A70 main gun, which is capable of firing the Arkan ATGM, a coaxial 30mm 2A72 cannon and a coaxial 7.62mm PKT MG. The Bakhcha includes a new fire-control system that allows the vehicle to engage targets in both the direct and indirect fire modes. The Bakhcha has two stabilised roof-mounted sights for the commander and gunner. The gunner's sight has day and thermal channels, a laser rangefinder, and a missile guidance channel, while the commander's panoramic sight has day/thermal and range finding channels. The Bakhcha can be fitted on the chassis of various Russian vehicles such as the BMP-2, BMP-3, BMD, and Rostok as well as foreign vehicles. In March 2015, the Russian Army's airborne forces received its first BMD-4M IFV (see separate entry) equipped with Bakhcha. **Type:** manned turret **Weight:** 3.98t **Traverse:** 360° **Primary weapon:** 100mm 2A70 **Secondary weapon:** 30mm 2A72 cannon, 7.62mm PKTM coaxial MG **AT missile:** cannon-launched Arkan

ATGM **Smoke grenades:** 3x launchers on either side of turret **Reload under armour:** yes **Crew:** commander, gunner **Ammunition:** 4x guided missiles, 34x 100mm, 500x 30mm, 2,000x 7.62mm rounds

## SPECIFICATIONS

# REMOTE WEAPON STATIONS

This section a provides a guide to small-calibre remote weapon stations (RWS) – armed with 5.56mm, 7.62mm, 12.7mm and 14.5mm machine guns (MGs), and/or 40mm automatic grenade launchers (AGLs) – that are in production or development.

The specifications listed are intended to provide a handy reference source for the basic parameters that describe the performance of the RWS. Most data has been supplied by the manufacturers, who can give more detailed information on request.

Entries are listed alphabetically by company.

If you think your product should be listed, please contact the team at reference@shephardmedia.com to ensure it appears in the Shephard Plus online database (shephardplus.com) and is included in the next print edition.

**ABOVE: A US Army reservist poses with a CROWS RWS at Fort Chaffee, Arkansas. (Photo: US Army)**

## Ares Aerospacial e Defesa ▸ REMAX

Ares, a Brazilian subsidiary of Elbit, developed the REMAX (REparo de Metralhadora Automatizado X) RWS for the Brazilian Army's Iveco VBTP-MR Guarani project (see separate entry). The REMAX features dual-axis stabilisation, and is equipped with day and thermal cameras and a laser rangefinder. No deck penetration is required to mount the REMAX. In December 2016, Ares received a contract, worth approximately $100 million over a five-year period, to supply REMAXs. An initial $7.5 million delivery order is for 215 systems. This follows delivery of a pilot tranche of 81 REMAX systems. **Type:** single weapon RWS **Weight:** 217kg above roof, 42kg below roof **Elevation:** -20/+60° **Traverse:** 360° **Stabilisation:** yes **Primary weapon:** .50cal M2HB HMG or 7.62mm MAG **Smoke grenades:** 4x 76mm launchers **Reload under armour:** no **Crew:** 1

## Aselsan ▸ SARP

Aselsan's Stabilised Advanced Remote Weapon Platform (SARP) is designed as a primary or secondary weapon system for wheeled or tracked AFVs and can also be mounted on fixed installations. It is fitted to the new Otokar Altay MBT under development for Turkish Land Forces Command. **Type:** single-weapon RWS **Weight:** 165kg w/o ammunition, gun or armour **Elevation:** -30/+60° **Traverse:** 360° **Stabilisation:** yes **Primary weapon:** 7.62mm MG, 12.7mm MG or 40mm AGL **Smoke grenades:** no **Reload under armour:** no **Crew:** 1 **Ammunition:** 1,000x 7.62mm, 400x 12.7mm or 96x 40mm

## Aselsan ▸ STAMP 2

Remotely operated stabilised weapon station for small-calibre guns. Configurations incorporate remote operation, a built-in EO sensor, day/night operation, automatic target tracking and stabilised turret and ballistic computation. Capable of ballistic calculation and automatically tracking targets. Possible to integrate range of MGs, including 12.7mm NSV. Display system is a 48cm screen on which day TV and thermal camera images can be displayed for gunner. High Accuracy Stabilised Gimbal is integrated and provides the gunner with independent surveillance capability and increases engagement capability at long distances. Applications include asymmetric warfare, counter-terrorism, anti-smuggling, coastal defence, base protection and air defence. **Weight:** 270kg **Elevation:** -20/+60° (gun) **Stabilisation:** yes **Primary weapon:** 7.62mm MG, 12.7mm MG, 12.7mm NSV **Secondary weapon:** 40mm AGL **Smoke grenades:** no **Reload under armour:** below-deck reloading **Crew:** 1

## BAE Systems Bofors ▸ Lemur

The Bofors Lemur system has high performance stabilisation, an integrated fire control system and high sighting/firing accuracy – it has a high first round hit probability. The accuracy and low dispersion minimize collateral damage and the use of ammunition. The system is designed for both land and naval applications and for all climate zones, operational in the temperature range of -40 to +71°C with the sensor configuration dependent on the intended use and customer's requirements. The Bofors Lemur system is designed to carry missiles, weapons up to 30mm, and 40mm AGL with optional launchers for countermeasures.

## Burevestnik ▸ 6S21

Burevestnik produces the modular 6S21 RWS in three versions. Version 01 (V1) is the base model, with two subsequent variants – Versions 02 and 03 (V2, V3) – offering different weapons, ammunition and the option of reloading under armour. All versions can be equipped with either the CAM surveillance and sighting suite, which consisted of a day TV camera and laser rangefinder, or the CAM1 that has also offers an infrared imaging capability. The 6S21 RWS does not include weapons stabilisation as a standard feature, although this is available as an option. The gunner has a flat-panel display with twin hand controller. **Type:** single weapon RWS **Weight:** 230kg (V1), 200kg (V2), 185kg (V3) without ammunition **Elevation:** -5/+75°; -15/+75° as an option **Traverse:** 360° **Stabilisation:** optional **Primary weapon:** 12.7x108mm Kord HMG (V1); 7.62x54mm PKTM MMG (V2, V3) **Smoke grenades:** no **Reload under armour:** V3 only **Crew:** 1 **Ammunition:** 200 rounds (V1), 500 rounds (V2), 320 rounds (V3)

## Denel Vehicle Systems ▸ SD-ROW

Denel Vehicle Systems developed the Self Defence – Remotely Operated Weapon (SD-ROW) as a primary or secondary weapon for tracked and wheeled AFVs. **Type:** single-weapon RWS **Weight:** 75kg w/o weapon or ammunition **Elevation:** -20/+85° **Traverse:** 360° **Stabilisation:** yes **Primary weapon:** 5.56mm MG or 7.62mm MG **Smoke grenades:** no **Reload under armour:** no **Crew:** 1 **Ammunition:** 200 rounds

## Display Design Office ▸ Adunok-W

Design Display Office announced at Indo Defence in November 2016 that it had completed development of the Adunok-W. This can be mounted on tracked and wheeled AFVs, support vehicles, UGVs and patrol boats. Unlike the original single-weapon Adunok, this variant is armed with a Russian-designed 12.7mm NSVT HMG on the right and a 30mm AG-17A AGL on the left. There is ready supply of 100 rounds for the HMG and 50 rounds for the AGL. Company officials said that standard NATO calibre weapons can be mounted to meet customer requirements. A protected surveillance and target acquisition unit is mounted on the right. The stabilised system is equipped with an automatic target tracker. **Weight:** 261kg (w/o weapon and ammunition) **Elevation:** -10/60° **Traverse:** 360° **Stabilisation:** yes **Primary weapon:** 30mm AG-17A AGL **Secondary weapon:** NSVT 12.7mm HMG **Reload under armour:** no **Crew:** 1 Protection: yes **Ammunition:** 100x 12.7mm, 50x 30mm rounds

## Dynamit Nobel Defence ▸ Dual FeWAS

The Dual FeWaS is designed for use on medium and heavy AFVs. The primary weapon is a heavy MG, such as the RMG 12.7, which can be reloaded under armour. The secondary weapon is the ASL-90 twin launcher for DND's RGW 90-HH and RGW 90-AS rockets, although other weapons can be fitted in place of the ASL-90. **Type:** dual weapon RWS **Weight:** ~390kg depending on weapon fit **Elevation:** -20/+60° **Traverse:** 360° **Stabilisation:** yes **Primary weapon:** HMG **Secondary weapon:** ASL-90 twin launcher for RGW 90-HH or RGW 90-AS **Smoke grenades:** no **Reload under armour:** for primary weapon **Crew:** 1

## Dynamit Nobel Defence ▸ FeWAS 120

The FeWAS 120 is designed to meet technical and military requirements of today's armed forces, and can be equipped with sighting systems or laser rangefinders as per the customer's needs. **Type:** single-weapon RWS **Weight:** <200kg w/o weapon or ammunition **Elevation:** -20/+60° **Traverse:** 360° **Stabilisation:** yes **Primary weapon:** 7.62mm MG, 12.7mm MG or 40mm AGL **Smoke grenades:** no **Reload under armour:** no **Crew:** 1 **Ammunition:** 1,000x 7.62mm, 400x 12.7mm or 96x 40mm

## Elbit Systems ▸ DRWS

Elbit's Dual Remote Weapon Station (DRWS) is designed to be armed with a 40mm AGL and a 7.62mm MG. **Type:** dual-weapon RWS **Elevation:** -20/+60° **Traverse:** 360° **Stabilisation:** yes **Primary weapon:** 40mm AGL **Secondary weapon:** 7.62mm MG AT missile: optional **Smoke grenades:** no **Reload under armour:** no **Crew:** 1

## Elbit Systems ▸ ORCWS

Fully overhead with no deck penetration, the dual-axis stabilised Overhead Remote Controlled Weapon Station (ORCWS) provides on-the-move accuracy while minimising operator risk exposure. Options include a laser rangefinder, smoke grenade launchers, modular armour protection as well as high-performance long-range day and night cameras. **Type:** single-weapon RWS **Weight:** 150kg w/o weapon or ammunition **Elevation:** -20/+60° **Traverse:** 360° **Stabilisation:** yes **Primary weapon:** 7.62mm MG, 12.7mm MG or 40mm AGL **Smoke grenades:** yes **Reload under armour:** no **Crew:** 1 **Ammunition:** 300x 12.7mm rounds

## Elbit Systems ▸ ORCWS 7.62

Fully overhead with no deck penetration, the dual-axis stabilised Overhead Remote Controlled Weapon Station (ORCWS) provides on-the-move accuracy while minimising operator risk exposure. Options include a laser rangefinder, smoke grenade launchers, modular armour protection as well as high-performance long-range day and night cameras. **Type:** single-weapon RWS **Weight:** 150kg w/o weapon or ammunition **Elevation:** -20/+60° **Traverse:** 360° **Stabilisation:** yes **Primary weapon:** 7.62mm MG **Smoke grenades:** yes **Reload under armour:** no **Crew:** 1 **Ammunition:** 460x 7.62mm rounds

## PRODUCTS

# GUIDE TO SUPPLIERS

This section lists key companies supplying goods, services and equipment to the armoured vehicles industry worldwide.

The section is separated into two listings, by product then by supplier.

Products are listed alphabetically with suppliers and their location under each.

Supplier listings from p203 are shown alphabetically and include:

- Company address
- Email and website addresses
- Telephone and fax numbers
- Contact names

Highlighted listings also include the company's logo and a summary of activity.

To update a listing or submit new information, please contact the team at reference@shephardmedia.com.

**ABOVE: A 45 Commando Viking Armoured Personnel Vehicle carries out training during Exercise *Sabre Strike*, which involved the Royal Marines and the Latvian Army. (Photo: UK MoD)**

General Dynamics European Land Systems – Mowag (SWITZERLAND)
General Dynamics UK (UK)
Hanwha Defense (SOUTH KOREA)
Ibersystems de Defensa (SPAIN)
IMI Systems (ISRAEL)
Kurganmashzavod (RUSSIA)
Minotor-Service (BELARUS)
Nexter Systems (FRANCE)
Osprea Logistics (UK)
Patria Land (FINLAND)
Pindad (Persero) (INDONESIA)
PSM Projekt System & Management (GERMANY)
R-PAD Technology (UK)
Rheinmetall Landsysteme GmbH (GERMANY)
Romtehnica (ROMANIA)
Rosoboronexport (RUSSIA)
Rosomak (POLAND)
RUAG Defence (SWITZERLAND)
Santa Barbara Infrared (USA)
Singapore Technologies Kinetics (ST Kinetics) (SINGAPORE)
Textron Systems Marine & Land Systems (USA)
Yugoimport-SDPR J.P (SERBIA)
Zetor Engineering (CZECH REPUBLIC)

## Insulation/ vibration/acoustic

ACOEM Group (FRANCE)
Bose (USA)
Hübner (GERMANY)
Hutchinson Aeroservices (FRANCE)
National Products (USA)
Race-Tec Sealing (UK)
Rafael Advanced Defense Systems (ISRAEL)
Sacatec (FRANCE)
Sika Services (SWITZERLAND)
Sil-Mid (UK)
Vitavox (UK)

## Integration/engineering

Airbus Defence & Space (UK) (UK)
Antares TDC (UK)
Battelle Memorial Institute (USA)
Beagle Technology Group (UK)
DRS Sustainment Systems (USA)
EKA (UK)
ESW (GERMANY)
EXPAL (SPAIN)
General Dynamics Land Systems – Canada (CANADA)
Hanwha Defense (SOUTH KOREA)
L3 Communications Magnet-Motor (GERMANY)
Norinco (CHINA)
Pearson Engineering (UK)
Penman Engineering (UK)
Ricardo UK (UK)
Singapore Technologies Kinetics (ST Kinetics) (SINGAPORE)
Thales UK (UK)
Đuro Đaković Specijalna vozila (CROATIA)

## Lights

Aeromaoz (ISRAEL)
Aerospace & Defence Products (AUSTRALIA)
Allmakes 4x4 (UK)
BG NOR (NORWAY)
Excalibur Army (CZECH REPUBLIC)
Federal-Mogul (USA)
Fireco (ITALY)
Grote Industries (USA)
IMCO Industries (ISRAEL)
International Armored Group (UAE)
KTK Kommunikationstechnik (GERMANY)
Mafelec (FRANCE)
Oshino Lamps (UK)
Oxley Group (UK)
Petercem (FRANCE)
SCHOTT Government Services (USA)
Thomas Jacks (UK)
Ultra Electronics Precision Air & Land Systems (UK)
Vimpex (UK)
Wamco (USA)
Warn Industries (USA)

## Main battle tanks

BAE Systems (UK)
BAE Systems Platforms & Services (USA)
BUMAR Łabędy (POLAND)
China Xinshidai Co (CHINA)
CIO Consorzio Iveco-Oto Melara (ITALY)
Excalibur Army (CZECH REPUBLIC)
General Dynamics European Land Systems (SPAIN)
General Dynamics European Land Systems – Santa Bárbara Sistemas (SPAIN)
General Dynamics Land Systems – Australia (AUSTRALIA)
General Dynamics UK (UK)
Heavy Industries Taxila (PAKISTAN)
Heavy Vehicle Factory (INDIA)
Hellenic Vehicle Industry – ELVO (GREECE)
Hyundai Rotem (SOUTH KOREA)
IMI Systems (ISRAEL)
International Golden Group (UAE)
Kharkiv Morozov Machine Building Design Bureau (UKRAINE)
Mitsubishi Heavy Industries (JAPAN)
Nexter Systems (FRANCE)
Norinco (CHINA)
OBRUM (POLAND)
Ordnance Factory Board (INDIA)
Otokar (TURKEY)
R-PAD Technology (UK)
Romarm (ROMANIA)
Romtehnica (ROMANIA)
RUAG Defence (SWITZERLAND)
Ukrspecexport (UKRAINE)
UralVagonZavod (RUSSIA)
Yugoimport-SDPR J.P (SERBIA)
Đuro Đaković Specijalna vozila (CROATIA)

## Mine protection

3d-Radar (NORWAY)
Åkers Krutbruk Protection (SWEDEN)
Allen-Vanguard UK (UK)
ARTEC (GERMANY)
BAE Systems Platforms & Services (USA)
Carmor Integrated Vehicle Solutions (ISRAEL)
Composhield (DENMARK)
Critical Solutions International (USA)
DCD Protected Mobility (SOUTH AFRICA)
Defence Land Systems India (INDIA)
Denel Land Systems (SOUTH AFRICA)
Denel Vehicle Systems (SOUTH AFRICA)
DEW Engineering & Development (CANADA)
DOK-ING (CROATIA)
Drakensberg Truck Manufacturers (SOUTH AFRICA)
General Dynamics Land Systems – Canada (CANADA)
International Armored Group (UAE)
Kamaz (RUSSIA)
Konštrukta – Defence (SLOVAKIA)
Mahindra Defence Systems (INDIA)
Navistar Defense (USA)
Nexter Systems (FRANCE)
Omnitech Robotics (USA)
Paramount Group (SOUTH AFRICA)
Pearson Engineering (UK)
Rafael Advanced Defense Systems (ISRAEL)
Romtehnica (ROMANIA)
Rotar International (NETHERLANDS)
RUAG Defence (SWITZERLAND)
Saab (SWEDEN)
Saudi Groups (SAUDI ARABIA)
Singapore Technologies Kinetics (ST Kinetics) (SINGAPORE)
Tata Motors (INDIA)
UralVagonZavod (RUSSIA)
Đuro Đaković Specijalna vozila (CROATIA)

## MRO/support

AM General (USA)
AMDAC (MALAYSIA)
Barum & Dewar (UK)
Beagle Technology Group (UK)
CDS Defence Support (UK)
DCD Protected Mobility (SOUTH AFRICA)
Diehl Defence Land Systems (GERMANY)
DynCorp International (USA)
Excalibur Army (CZECH REPUBLIC)
Falck Schmidt Defence Systems (DENMARK)
Federal-Mogul (USA)
FFG Flensburger Fahrzeugbau Gesellschaft (GERMANY)
FNH UK (UK)
General Dynamics Land Systems – Australia (AUSTRALIA)
Hanwha Techwin (SOUTH KOREA)
Hobson Industries (UK)
HSW- Huta Stalowa Wola (POLAND)
Hydromechanical Engineering (ISRAEL)
Hyundai Rotem (SOUTH KOREA)
Lockheed Martin UK (UK)
Marshall Aerospace and Defence Group (UK)
MTU (GERMANY)
Nexter Systems (FRANCE)
OBRUM (POLAND)
Osprea Logistics (UK)
Patria Land (FINLAND)
Renault Trucks Defense (FRANCE)
Rosomak (POLAND)
Rotar International (NETHERLANDS)
RUAG Defence (SWITZERLAND)
Saab (SWEDEN)

Schleifring und Apparatebau (GERMANY)
Singapore Technologies Kinetics (ST Kinetics) (SINGAPORE)
SooSung Defense Industries (SOUTH KOREA)
Textron Systems Marine & Land Systems (USA)

## Navigation

Airbus Defence & Space (UK) (UK)
Bharat Electronics (INDIA)
Daco Scientific (UK)
Hensoldt Optronics (Pty) Ltd (SOUTH AFRICA)
iXBlue (UK)
Kearfott Corporation (USA)
KVH Industries (USA)
Leonardo (ITALY)
Motec (GERMANY)
Nexter Systems (FRANCE)
Rosoboronexport (RUSSIA)
Safran Electronics & Defense (FRANCE)

## Optical systems/night vision/periscopes

Advanced Defense Systems, Inc (ADS) (USA)
Artemis Optical (UK)
Battelle Memorial Institute (USA)
Defence Vision Systems (UK)
Elbit Systems (ISRAEL)
Elbit Systems Intelligence and Electro-optics – Elop (ISRAEL)
Elbit Systems – ITL (ISRAEL)
ESW (GERMANY)
FLIR Systems (USA)
GuS (GERMANY)
IRDAM SA (SWITZERLAND)
iXBlue (UK)
iXBlue SAS (FRANCE)
Kent Periscopes (UK)
KTK Kommunikationstechnik (GERMANY)
Kurganmashzavod (RUSSIA)
L3 KEO (USA)
Leonardo (ITALY)
Lockheed Martin UK (UK)
Norinco (CHINA)
Novosibirsk Instrument-Making Plant (RUSSIA)
OIP Sensor Systems (BELGIUM)
Opgal Optronic Industries (ISRAEL)
Ordnance Factory Board (INDIA)
Oxley Group (UK)
Rafael Advanced Defense Systems (ISRAEL)
Safran Electronics & Defense (FRANCE)
SCHROTH Safety Products (GERMANY)
Sekai Electronics (USA)
Thales UK (UK)
Thales Underwater Systems (FRANCE)
Theon Sensors (GREECE)
Thermoteknix Systems (UK)
Wamco (USA)

## Parts/components

3M Peltor (UK)
4C Strategies (UK)
AccuTrex Products (USA)
ACOEM Group (FRANCE)
Advanced Interconnect Manufacturing (USA)
AFV Sim (UK)
Aish Technologies (UK)
Akzo Nobel Aerospace Coatings (USA)
Allmakes 4x4 (UK)
AM General (USA)
Ametek Vehicular Instrumentation Systems (USA)
ATI Defense (USA)
Australian Ultimate Suspension (AUSTRALIA)
AxleTech International (USA)
BAE Systems Platforms & Services (USA)
Barum & Dewar (UK)
Beagle Technology Group (UK)
Bental Motion Systems (ISRAEL)
BG NOR (NORWAY)
Bioquell UK (UK)
Cook Defence Systems (UK)
Daco Scientific (UK)
DHAPSA Military & Defense (MEXICO)
Drallim Industries (UK)
Excalibur Army (CZECH REPUBLIC)
Federal-Mogul (USA)
FFG Flensburger Fahrzeugbau Gesellschaft (GERMANY)
FNH UK (UK)
FNSS Savunma Sistemleri (TURKEY)
General Dynamics Land Systems – Canada (CANADA)
GKN Land Systems (UK)
Harmonic Drive (USA)
Hemscheidt Fahrwerktechnik (GERMANY)
Hobson Industries (UK)
Honeywell International (USA)
Hübner (GERMANY)
Ibex Marina Ropes (UK)
igus (UK)
Interface Displays & Controls (USA)
Istec Services (UK)
Kaller (SWEDEN)
Mafelec (FRANCE)
MilDef (SWEDEN)
Mile Marker International (USA)
Moog Components Group (USA)
MTU (GERMANY)
Musthane (FRANCE)
National Products (USA)
Navistar Defense (USA)
Nexter Systems (FRANCE)
NorcaTec (USA)
Orbital ATK Armament Systems (USA)
OVIK Special Vehicles (UK)
Petercem (FRANCE)
Pleora Technologies (CANADA)
Polamco (UK)
R-PAD Technology (UK)
Renault Trucks Defense (FRANCE)
RENK (GERMANY)
Rheinmetall Landsysteme GmbH (GERMANY)
Romtehnica (ROMANIA)
Rotzler (GERMANY)
Sabiex International (BELGIUM)
Sacatec (FRANCE)
Schleifring und Apparatebau (GERMANY)
SCHOTT Government Services (USA)
Sepson (SWEDEN)
Soucy International (CANADA)
Spartan Chassis (USA)
Systems Sunlight (GREECE)
Technicae (BRAZIL)
Texelis (FRANCE)
Timoney Technology (IRELAND)
TriMark (USA)

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Jeremy Close, Dir Comms & PR

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Styckebruk, SWEDEN
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www.akerskrutbruk.se
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Peter Servin, CEO

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customer.service@akzonobel.com
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**Aleris Rolled Products Germany**
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www.aleris.com
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**Allen-Vanguard UK**
Allen House – Unit 100 A &
B, Alexandra Way, Ashchurch
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Gloucestershire GL20 8TD, UK
es.sales@allenvanguard.com
www.allenvanguard.com
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www.allmakes4x4.com
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**Altran**
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92200 Neuilly-sur-Seine, FRANCE
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Tel: +33 1 46 41 70 00 Fax: 41 70 01
Olivier Aldrin, Exec VP/CFO

**AM General**
105 N. Niles Ave., PO Box 7025,
South Bend, IN 46634, USA
jeff.adams@amgeneral.com
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Jeff Adams, Exec Dir Glob Mktg/Comms

**AMDAC**
No 6, Jalan TIAJ 2/1,
Timan Industri Alam Jaya, 42300
Bandar Puncek Alam, MALAYSIA
Tel: +603 6038 8191 Fax: 6038 9195

**Amerex Defense**
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Trussville, AL 35173, USA
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Ed Ruggles, VP Sales

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Tel: +1 866 446 8878 x100

**Ametek Aerospace & Defense**
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Wilmington, MA 01887, USA
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www.ameteksensors.com
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287 27 Road, Grand Junction,
CO 81503, USA
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www.ametekvis.com
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Dave Merrill, Dir Sales/Mktg

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Tel: +48 24 357 9900 Fax: 357 9901

**Anniston Army Depot**
7 Frankford Avenue,
Anniston, AL 36201, USA
www.anad.army.mil
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Graham Young, GM

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Fax: +46 8 761 2925
Linda Ahnström, Marketing & Sales

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marketing@ares.ind.br
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Fax: 2676 1223

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Tel: +61 2 9521 1901
Fax: 9521 1941
Hugh Oldfield, CEO

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