EXTEND
IMPROVE
TRANSFORM
CVR(T) MODERNISATION

BAE SYSTEMS

STAY AHEAD OF THE BATTLE

THE BATTLEFIELD AND ITS DEMANDS ARE CONSTANTLY SHIFTING. VEHICLE OPERATORS NEED TO EVOLVE THEIR TACTICS AND THEIR SYSTEMS TO KEEP UP WITH THESE CHANGING NEEDS.

That's why BAE Systems offers a set of tailored modernisation packages for our CVR(T) family of vehicles.

We have a unique competence in our ability to extend, improve and transform the capabilities of vehicle systems. This is largely thanks to our significant R&D investment and the vehicle upgrade programmes we have delivered to the UK MOD. This keeps us at the leading edge of development, and provides us with the solutions we need to evolve legacy vehicle systems to meet current and future needs.

CVR(T) Spartan Mk2 on rubber band track trials 2011

CVR(T) TRACK RECORD

1969 *First prototype vehicle completed and delivered on time, within budget and at the specified weight.*

1970 *Following extensive trials, the CVR(T) family is accepted into service with the British Army. A production contract is awarded.*

1972 *Deliveries to the UK MOD begin, peaking at a rate of 40 per month.*

1982 *Service in the Falklands War: Scimitar and Scorpion play a decisive role. Transportability and low ground pressure are key.*

1986 *A total of 1,863 vehicles have been delivered to the UK MOD.*

40 YEARS OF CVR(T) DEVELOPMENT

The CVR(T) is a family of agile, mobile armoured fighting vehicles. Its variants have the ability to fulfil a wide range of scouting and combat missions, as well as a number of support and logistics tasks. Its exceptionally low ground pressure provides outstanding mobility. Combined with transportability, simple design and reliability, the vehicle provides a unique strategic and tactical advantage.

The CVR(T) family has a history of development spanning over 40 years. Since first deliveries in 1972 we have sold over 3,500 vehicles to 23 customer nations, and it now has an extensive history of successful service all over the world.

Throughout the vehicle's life, BAE Systems has supported, enhanced and upgraded the family, allowing its operators to retain the upper hand on the battlefield. Protection and firepower enhancements have seen the vehicle weight increase from 8,000 to 12,250 kg. At the same time, performance upgrades have maintained a balance with mobility as well as boosting capability in harsh environments.

Today, we're utilising all the knowledge gained over the last 40 years to offer a suite of modernisation programmes to our complete customer base. We offer three packages, each of which has been developed to meet the demanding needs of the UK MOD:

CAPABILITY SUSTAINMENT
Addressing obsolescence and reducing running costs to extend the life of the vehicle.

CAPABILITY ENHANCEMENT
Adapting the vehicle for continuous operation in tough, arid environments.

CAPABILITY SHIFT
Evolving the vehicle's protection while maintaining a balance with mobility and firepower, redefining the vehicle for the most demanding battle conditions.

Each of these programmes will see the unique strengths of the CVR(T) perpetuated for many years to come.

1991-2 *Service in the Gulf War: CVR(T) proves its capability to defeat T-55 tanks.*

1992-8 *Service in Bosnia & Herzegovina: CVR(T) is the only tracked vehicle to maintain full capability through the harsh winters.*

1996 *Over 3,500 vehicles have now been delivered to the global customer base.*

1998 *Life Extension programme: UK MOD takes delivery of upgraded vehicles following dieselisation.*

2003-9 *Service in Iraq: dieselisation upgrade reduces logistics and improves performance in the tough environment.*

2005-PRESENT *Service in Afghanistan: every aspect of the vehicle is tested to the extreme. Evolving threats prompt the initiation of the CVR(T) Mk2 programme in 2010.*

2009 *The UK MOD takes delivery of upgraded vehicles following the Environmental Mitigation programme.*

2011 *The UK MOD takes delivery of upgraded vehicles following the CVR(T) Mk2 programme.*

CAPABILITY SUSTAINMENT

The Capability Sustainment programme addresses obsolescence and reduces running costs, extending the life of the CVR(T) family for the foreseeable future.

The programme comprises two main elements: a dieselisation package and improved running gear.

DIESELISATION PACKAGE

The dieselisation package involves swapping out the original petrol engine for a Cummins BTA 5.9 litre diesel engine. This maintains the outstanding tactical mobility of the CVR(T) while creating a platform which will be practical and straightforward to support for its entire extended lifespan. The new engine is more fuel-efficient, boosting the operational range of the vehicle.

The gearbox is also upgraded to a David Brown TN15E+. David Brown also manufactures the transmission systems for vehicles including the Challenger 2, Titan and Trojan.

BAE Systems takes complete responsibility for the integration of both the engine and the gearbox.

RUNNING GEAR

We can now offer new metal tracks with guaranteed mileage, along with improved road wheels. These upgrades substantially reduce the vehicle's running costs. We also refurbish the dampers, which has a positive impact on the life of other vehicle components.

SPARES AND REPAIRS

We provide an ongoing spares and repairs service for the entire extended life of the vehicle. Our combination of scale and skill provides assurances on cost, turnaround time, reliability and quality.

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CASE STUDY: ROYAL ARMY OF OMAN

LIFE EXTENSION PROGRAMME: 2002

In 2002, we delivered a programme to extend the life of the Royal Army of Oman's fleet of CVR(T) vehicles. It addresses obsolescence, allowing them to extend the life of the vehicles.

The project was identical to the original dieselisation programme supplied to the UK MOD. It is based on the Cummins/David Brown package that remains available today.

A COMMON FAMILY

The CVR(T) family includes a range of variants. The logistics and maintenance synergies between them allow operators to gain broad mission capability with minimum footprint.

The original fleet contained:

- **FV101 - Scorpion Light Tank (76 mm armament)**
- **FV102 - Striker Missile Launcher (replaced by HVM Stormer)**
- **FV103 - Spartan Personnel Carrier**
- **FV104 - Samaritan Ambulance**
- **FV105 - Sultan Command**
- **FV106 - Samson Recovery**
- **FV107 - Scimitar Light Tank (30 mm armament)**

CAPABILITY ENHANCEMENT

The Capability Enhancement programme adapts the CVR(T), enabling continuous operation in the toughest environments.

The programme includes a suite of upgrades which mitigate environmental effects both on crew and vehicle. It was designed to withstand the climate conditions of recent and current conflicts including Iraq and Afghanistan.

The package also incorporates all relevant upgrades from the Capability Sustainment package.

ENVIRONMENTAL MITIGATION PACKAGE

The brake horsepower of the engine increases from 190 to 235, providing 33 percent extra torque.

A number of additional upgrades address power and transmission components that can be affected by harsh environments. These include:

- Gearbox and clutch: uprated for torque; anti-wear measures
- Battery monitoring: health and charge states
- Air filters: significantly improved air intake
- Cooling: all-aluminium radiators; advanced temperature gauge
- Final drives: upgrades proven at 13,000 kg

THE HUMAN FACTOR

The upgraded power pack allows the engine to power an air conditioning system which incorporates spot cooling and drivers' cooling vests.

At the same time, night vision and enhanced radio power management increase situational awareness around-the-clock.

PROTECTION

Capability Enhancement also involves a number of upgrades to the vehicle's protection, taking it to an intermediate level. These include:

- Ceramic ballistic armour: for KE threats
- Bar armour: for RPG attacks
- Mine blast protection and electronic countermeasures: for IEDs

PERFORMANCE

Additional upgrades to systems including braking and suspension, as well as the running gear upgrade, ensure that the CVR(T) retains its outstanding mobility despite its extra weight.

EXTEND IMPROVE TRANSFORM

CASE STUDY: UK MOD

ENVIRONMENTAL MITIGATION PROGRAMME: 2008-09

In 2008, the UK MOD initiated the Environmental Mitigation programme to equip over 100 vehicles from its CVR(T) fleet for continual operations in Afghanistan. BAE Systems delivered this programme in 2009.

The programme drew on the experience of operating the vehicle during UK operations in Iraq and Afghanistan.

OFF-THE-SHELF DESIGNS

Our Capability Enhancement programme is tried, tested and proven in service. For this reason, customers who embark on the programme now benefit from assurances of quality and reliability delivered to the UK MOD.

The off-the-shelf nature of these designs removes the R&D, test and evaluation burden that is often associated with vehicle development or modernisation, meaning lower risk and lower cost.

KEY SUPPLIER RELATIONSHIPS

Vehicle modernisation involves having a robust parts supply chain. To guarantee the quality of the vehicle, it's essential that each and every component is robust.

For all our modernisation programmes, we have established Key Supplier Relationships. These suppliers have many years of involvement with the CVR(T) programme. This creates common knowledge and understanding of the CVR(T) family and its components, leading to high quality, high reliability and reduced cost.

This provides our customers with assurances that other service providers cannot supply.

CAPABILITY SHIFT

The Capability Shift programme completely redefines the CVR(T) platform, focusing on stringent protection requirements while retaining a balance with mobility and firepower.

The programme involves a redesigned hull, providing superb protection at the same time as decreasing lifecycle costs. Alongside this are a number of other upgrades to boost protection as well as retaining the vehicle's other strengths.

The package also incorporates all relevant upgrades from the Capability Sustainment and Capability Enhancement packages.

NEW HULLS

The new aluminium hull is designed with mine blast protection in mind. Its design mitigates common repairs that were required to the previous model, and it incorporates an extended out-of-service date, reducing maintenance and lifecycle costs.

The new hull also features an increased space envelope, improving crew conditions.

PROTECTION AND LETHALITY

The new seating hangs from the roof of the vehicle and sits on a piston, rather than sitting on the floor. This dramatically decreases the effect of mine blasts from beneath.

In addition, the redesigned fuel tanks are protected against blasts, reducing the risk of damage and fire.

Targets of all types can be more swiftly engaged thanks to a turret powered solution.

ENHANCED POWER MANAGEMENT

Power is significantly increased thanks to a higher capability rotary-based joint and uprated alternator.

This provides ample scope for further plug-and-play applications.

RUBBER BAND TRACKS

BAE Systems offers the option of rubber band tracks which have been proven to decrease vibration and noise. This reduces fatigue, allowing crew to operate more effectively and for longer, even in the harshest environments.

Options of one-piece or segmented tracks will allow customers to tailor an optimal logistic solution.

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CASE STUDY: UK MOD

CVR(T) MK2 PROGRAMME: 2010-11

The evolving nature of threats in Afghanistan led the UK MOD to initiate the CVR(T) Mk2 programme in 2010. The programme is designed to redefine the capabilities of the CVR(T) to meet today's challenging requirements.

The project has seen the next generation of CVR(T) variants – Scimitar Mk2, Spartan Mk2, Sultan Mk2, Samaritan Mk2 and Samson Mk2 – enter service in Afghanistan in 2011.

TAILORED UPGRADES

We recognise the varying needs of our wide customer base. Where a specific competence is required outside of the offer of our three modernisation programmes, we can provide upgrades tailored to our customers' specifications.

These options could include the following:

– Replacement armament solutions with enhanced lethality

– Remote Weapon Station solutions

– Enhanced night fighting capability

– Dust mitigation

CAPABILITY PICK LIST

The matrix below demonstrates the enhancements and upgrades that are available as part of our three packages or as tailored upgrades.

■ = FITTED AS STANDARD
○ = OPTIONAL

	CAPABILITY AREA	CAPABILITY SUSTAINMENT	CAPABILITY ENHANCEMENT	CAPABILITY SHIFT	TAILORED UPGRADES
Powerpack Dieselisation Package:					
BAE Systems - Vehicle Integration Package	Mobility	■	■	■	
Diesel Engine - Cummins BTA 5.9	Mobility	■	■	■	
Gear Box - David Brown TN15E+	Mobility	■	■	■	
Improved Running Gear:					
Cook Defence Systems DST 414 Metal Track (Guaranteed to 10,000 km)	Mobility	○	○	○	
Improved Roadwheels	Mobility	○	○	○	
Refurbished Dampers	Mobility	■			
Environmental Mitigation Package:					
Uprated Engine Power 235 bhp	Environment/Mobility		■	■	
TN15 E+ Transmission	Environment		■	■	
New Clutch - Uprated for Torque; Anti-Wear Measures	Environment		■	■	
Battery Monitoring	Environment		■	■	
New Air Filters (ITAR Restriction)	Environment		■	■	
Modified Final Drives (from Stormer)	Environment		■	■	
Drivers Temperature Gauge	Environment		■	■	
New Cooling System - Aluminium Radiators	Environment		■	■	
Increased Ballistic Protection (Plasan Ceramic Solution)	Protection		■	■	
Enhanced Mine Blast Protection (MBP 1 Solution)	Protection		■		
Bar Armour (All Variants)	Protection		■	■	
Air Conditioning (Spot Cooling and Driver's Cooling Vests)	Environment		■	■	
Driver's Night Vision System (ITAR Restriction)	Environment		■	■	
Upgraded Braking System	Mobility		○	■	
Upgraded Suspension - Damper Units & Lt Weight Torsion Bars	Mobility		■	■	
Upgraded Winch (Samson Recovery Variant)	Mobility		○	■	
Anti-Corrosion Paint Scheme	Environment		■	○	
New Hulls Package:					
Enhanced Mine Blast Protection (MBP 2 Solution)	Protection			■	
Extended Out of Service Date	Reduced Cost			■	
Increased Space Envelope	Environment			■	
Designed Out Common Repairs	Reduced Cost			■	
Blast Attenuating Seating	Protection			■	
Powered Turret Solution	Lethality/Protection			○	
Rubber Band Track:					
Single Piece	Mobility			○	
Segmented	Mobility			○	
Automated Gear Box (David Brown TN15E+)	Mobility			○	
Redesigned Fuel Tank - Increased Capacity/Blast Resistance	Protection			■	
Enhanced Power Management System	Environment/Protection			■	
Electronic Counter Measure Infrastructure	Protection			○	
Remote Weapon Station Solutions	Lethality		○	○	○
Improved Electrical System	Environment		○	○	○
Replacement of Main Armament	Lethality		○	○	○
Night Fighting Sights and TI Upgrade	Environment		○	○	○

SMART SERVICES

WHEREVER YOU ARE IN THE WORLD YOU CAN TRUST AND DEPEND ON OUR SMART SERVICES.

FROM PREPARATION AND TRAINING PROGRAMMES THAT ENSURE MILITARY PERSONNEL AND EQUIPMENT ARE READY FOR DEPLOYMENT, TO MAINTENANCE AND MODERNISATION SERVICES, WE WILL BE THERE.

MODERNISATION SERVICES

We recognise that you need your assets to be capable of exceptional levels of performance throughout their lives. Whether you need to meet an urgent operational requirement, or are planning a comprehensive capability improvement programme, our track record as one of the world's leading defence and security companies means we have the skills and expertise to give you the edge.

MAINTENANCE SERVICES

You can rely on us to ensure that the best and most cost effective maintenance is delivered. Our approved repairs and maintenance personnel are trained professionals who can provide the full spectrum of maintenance services.

SUPPLY CHAIN SERVICES

End-to-end supply chain management skills are essential for the successful and cost-effective delivery of complex technical or operational solutions. We work closely with our supply chain partners to help them deliver what we need, when we need it, and at the right price. You can trust us to do the same across your operational supply chain.

TRAINING SERVICES

When our customers can train for everything, they are prepared for anything. You can trust us to design, plan and execute training programmes that give your personnel the right level of experience. We define the syllabus and the assets and products that are needed to ensure personnel receive thorough and cost-effective training.

ENGINEERING AND INFORMATION SERVICES

With a highly skilled workforce offering unrivalled experience and expertise, we provide specialist engineering and information services. Available 365 days a year, we support every phase of the engineering lifecycle.

FACILITIES AND ENERGY SERVICES

Facilities come in all shapes and sizes. We specialise in the definition, construction, operation and disposal of facilities taking into account the needs of the people who work within them and of the environment.

AVAILABILITY SERVICES

Working closely with you, we have the agility and experience to tailor our solutions to meet unique and individual requirements. You can trust us to bring one or more of our Smart Services to bear; ensuring your assets are available when and where you need them.

COMBAT VEHICLE RECONNAISSANCE (TRACKED) MODERNISATION

EXTEND. IMPROVE. TRANSFORM.

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