New Vanguard

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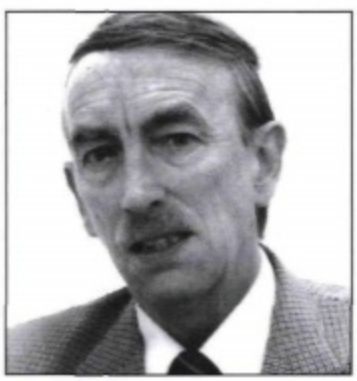
Challenger 2 Main Battle Tank 1987–2006

Simon Dunstan • Illustrated by Tony Bryan

SIMON DUNSTAN is a well-established author, filmmaker and photographer in the field of military history, with several titles already published with Osprey. He specializes in the subject of armoured warfare, a field in which he has been writing for two decades. His books have covered topics such as helicopter and armoured warfare in Vietnam, the Challenger 1 Main Battle Tank, the British Guards and armoured warfare in Korea. Simon lives and works in London.



TONY BRYAN is a freelance illustrator of many years' experience. He initially qualified in engineering and worked for a number of years in military research and development. He has a keen interest in military hardware – armour, small arms, aircraft and ships. Tony has produced many illustrations for partworks, magazines and books, including a number of titles in the New Vanguard series.

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David Rowlands is one of the most accomplished military artists specializing in the activities of the British Army, and prints such as the action at Az Zubayr on page 34 may be obtained from www.djrowlands.supanet.com.

Glossary

AEW	Airborne Early Warning
AFV	Armoured Fighting Vehicle
AOR	Area of Operations
APC	Armoured Personnel Carrier
APFSDS	Armoured Piercing Fin Stabilised Discarding Sabot
ARRC	Allied Rapid Reaction Corps
ASM	Artificer Sergeant Major
ATDU	Armoured Trials and Development Unit
ATGW	Anti Tank Guided Weapon
BATUS	British Army Training Unit Suffield
CAT	Canadian Army Trophy
CHARM	CHieftain/CHallenger ARMament programme
CHIP	Chieftain/Challenger Improvement Programme
CIP	Combat Indicator Panel
CLIP	Challenger Lethality Improvement Programme
CRARRV	Challenger Armoured Repair and Recovery Vehicle
DRAC	Director Royal Armoured Corps
DTT	Driver Training Tank
DU	Depleted Uranium
ERA	Explosive Reactive Armour
FAA	Forward Assembly Area
FOO	Forward Observation Officer
GDLS	General Dynamics Land Systems
GOC	General Officer Commanding
HESH	High Explosive Squash Head
IFV	Infantry Fighting Vehicle
ISD	In Service Date
ISRD	In Service Reliability Demonstration
JDAM	Joint Direct Attack Munition
JRRF	Joint Rapid Reaction Force
KFOR	Kosovo Force
MBT	Main Battle Tank
MOD	Ministry of Defence
NATO	North Atlantic Treaty Organisation
NBC	Nuclear Biological Chemical
QRL	Queen's Royal Lancers
RAC	Royal Armoured Corps
RDG	Royal Dragoon Guards
REME	Royal Electrical and Mechanical Engineers
RPG	Rocket Propelled Grenade
RRF	Royal Regiment of Fusiliers
RTR	Royal Tank Regiment
SCOTS	DG – Royal Scots Dragoon Guards
TEC	Thermal Exhaust Cowl
TES	Tactical Engagement Simulation
TIP	Thermal Indicator Panel
TIS	Thermal Imaging System
VDS	Vickers Defence Systems
VRN	Vehicle Registration Number

CHALLENGER 2 MAIN BATTLE TANK 1987–2006

THE CHIEFTAIN REPLACEMENT PROGRAMME

By the mid-1980s, the Soviet Union was producing over 3,000 Main Battle Tanks (MBT) a year. Increasingly powerful models, such as the T-64 and T-72, were being introduced that posed a significant threat to the British Army's mixed fleet of Chieftain and Challenger MBTs. Accordingly, the Chieftain/Challenger Improvement Programme (CHIP) was implemented primarily to modernize their turret ergonomics and fire-control systems. Concurrently, the CHARM or CHieftain/CHallenger ARMament programme was underway to develop a new high-performance 120mm rifled gun, the XL30E4, and improved ammunition for both the existing 120mm L11 series and the new tank gun. In addition, a separate up-armouring programme designated Stillbrew was introduced for Chieftain to thwart attack from the 125mm main armament of the T-64 and T-72. The CHIP and CHARM programmes were to be applied to both Chieftain and Challenger pending the introduction of a new MBT before the turn of the century.

Several options were proposed to the Equipment Policy Committee, including further purchases of Challenger together with a comprehensive product improvement programme for the complete Challenger fleet. The purchase of a foreign MBT such as the M1 Abrams or Leopard 2 was also considered, as they were mature designs and the adoption of either would

The first prototype of Challenger 2, 06SP87, stands before the Challenger family with, from left to right, CRARRV, Challenger MBT and the Challenger Training Tank. Although there is a close resemblance between the MBTs, Challenger 2 is essentially a totally new tank. To its crews in the Royal Armoured Corps, the tank is known as Chally. (VDS)

enhance NATO interoperability due to the fact that they both employed a mutually compatible 120mm smoothbore main armament. In November 1986, General Sir Richard Vincent, the Master General of the Ordnance, visited Vickers Defence Systems (VDS) in Newcastle-upon-Tyne to investigate whether the company could suggest a replacement MBT for the 986 Chieftains then in service. The design concept was begun immediately, based on a combination of a revised Vickers Mark 7 turret and an upgraded Challenger chassis – the Mark 7 being a private VDS design offered on the international market. The first official presentation of the Challenger 2[1] by VDS to the Ministry of Defence (MOD) occurred on 30 March 1987 at Millbank Tower, the head office of Vickers plc, overlooking the River Thames in London.

Staff Requirement (Land) 4026

After due consideration, Land Systems Operational Requirements 1 (LSOR 1) promulgated SR(L)4026, the *Staff Requirement for the Replacement of Chieftain*, on 30 November 1987. This followed the disastrous Canadian Army Trophy (CAT) NATO tank gunnery competition of June 1987 when Challenger came last. The subsequent British Army inquiry held in July identified many failings and equipment deficiencies that required immediate rectification.[2] When compared to the M1A1 Abrams, Leopard 2 or even the Leopard 1, Challenger was demonstrably slower to acquire and destroy targets, particularly when firing on the move or against moving targets. However, neither the M1A1 Abrams nor Leopard 2A4 in their current form fully met the requirements of SR(L)4026. Furthermore, the problems of operating two types of MBTs firing different ammunition, let alone logistic spares, were only too apparent if Chieftain was replaced on a one-to-one basis to serve alongside Challenger. Yet the requirement to replace Chieftain was now ever more urgent given the poor performance of Challenger during CAT '87, as they essentially shared the same fire-control system. VDS was asked to refine its proposal for the Chieftain replacement programme as a matter of urgency. Having worked throughout the Christmas period, VDS submitted its formal proposal to the MOD on 10 February 1988 – with a further two amended versions during the year – all as a fixed price contract.

The *Staff Requirement for the Replacement of Chieftain*, SR(L)4026, was quite specific and it could only be fulfilled by improved models of both the M1A1 Abrams and Leopard 2 or a rigorous validation of the VDS proposal for Challenger 2. In effect, all three proposals were paper projects, although those of M1A1 Abrams and Leopard 2 were based on mature in-service designs whereas the VDS one was drawn only from experience with the prototypes of the Vickers MBT Mark 7 and the Engesa EE-T1 Osorio MBT for Brazil, notwithstanding its many years of

1 It remains a mystery why a completely new tank should retain the name of its predecessor, the latter in turn being named after an indifferent tank destroyer design of the late World War II period. It has become the privilege of the incumbent Director of the Royal Armoured Corps (DRAC) to name any new tank. All have traditionally started with the letter 'C' since World War II. The choice of the then DRAC was Corsair. The present author suggested the name Charger to the Royal Armoured Corps (RAC) only to be told that it might suit the cavalry but not The Royal Tank Regiment, despite being advised that one of the original tanks of C or 3rd Battalion of the Tank Corps in World War I (latterly The Royal Tank Regiment) was named Charger. The MOD insists that VDS chose the name for marketing purposes while the company believes it was a political decision by the MOD to bamboozle the Treasury. A scurrilous briefing paper (Loose Minute D/D Army Plans/19/2 of 20 May 1993) circulated through the MOD at the time with some more outrageous suggestions, primarily at the expense of contemporary politicians. Be that as it may, to its crews Challenger 2 is customarily known as 'Chally'.

2 For further details see Dunstan, Simon, New Vanguard 23: *Challenger Main Battle Tank 1982–97* (Osprey: Oxford, 1998) pages 16–33.

AFV design and production. However, there were those within the higher echelons of the British Army that wished to brook no further delay and demanded the immediate procurement of their preferred choice. This was the M1A1 Abrams since the Leopard 2 had been rejected on account of a fundamental design flaw in the armour integrity of the turret front. As such a selection had significant political ramifications, the matter was referred to the Cabinet. The decision to procure an American MBT was rejected out of hand by Prime Minister Margaret Thatcher. She instructed the MOD to think again.

Vickers Defence Systems contract

On 20 December 1988, the Secretary of State for Defence, George Younger, announced to the House of Commons that, in order to give VDS an opportunity to demonstrate that their proposal could meet SR(L)4026, the company was to be awarded a £90 million contract to undertake a 'demonstration phase' lasting 21 months. The 'proof of principle' contract was signed on 20 January 1989. VDS was given a specific set of criteria for the overall vehicle performance against which the success of the demonstration phase was to be measured. The criteria covered such aspects as reliability, maintainability, survivability and, especially, fightability. Essentially VDS was required to demonstrate that its Chieftain replacement could 'be successfully developed and produced to the required standard so as to achieve the required in-service date, and at a price which the company has already offered'. Within the contract, there were three specific 'milestones' to assess actual progress. The set dates fell in September 1989, March 1990 and the final one on 30 September 1990, when the company was required to answer 11 specific questions about the potential performance and capability of the offered product. These were known as 'The Eleven Commandments' and they had to be met before Challenger 2 could be evaluated with the other contenders as the prospective Chieftain replacement.

As part of the agreement, VDS became responsible as prime contractor for the CHARM programme, then under development by Royal Ordnance. CHARM 1 embraced the design and development of the high-pressure XL30E4 120mm rifled gun and the XL26 Armour Piercing Fin Stabilized Discarding Sabot (APFSDS) projectile with a Depleted Uranium (DU) long rod penetrator. The combination of the L26 fin round and L14 propellant charge was used to devastating effect by Challenger MBTs armed with the L11A5 120mm gun during the Gulf War of 1991. CHARM 3 comprised a new DU APFSDS projectile – L27A1 with a new propellant charge L16A1 (later L17A1) – that gave a 25 per cent greater penetration capability than the L26 round, together with the necessary sighting, racking and storage items for Challenger 2. In its definitive form, the L30A1 120mm rifled gun became the main armament of Challenger 2. At this stage, the intention was to retrofit the weapon to all 420 Challenger MBTs to give commonality across the complete tank fleet.

Foreign competitors

The basic requirement was for 600 MBTs to replace Chieftain and serve alongside the fleet of 420 Challengers. As Chief of Defence Procurement for the MOD, Sir Peter Levene decreed that, in the interests of a free

The Chieftain Replacement Programme represented a radical departure for a tank-manufacturing nation whereby Britain held an open competition from across NATO. Here, various models are paraded during an early comparative assessment with, from left to right, Chieftain Stillbrew, Challenger MBT, M1A1 Abrams, Vickers Mark 7/2 and Leopard 2A4. (RAC Centre)

market, the Chieftain replacement programme would be open to those tank-manufacturing countries producing models that could fulfil SR(L)4026 within the given timeframe. At the outset, there was little response to the 'invitation to tender' as no tank-producing country had ever held an open competition before that might damage or compromise its own tank manufacturing industry. None of the European manufacturers or the United States really believed that the competition would be fair and open. None of these countries would ever hold such a competition themselves so it was seen as a paper exercise and not worth expending any significant investment.

Nevertheless, both Krauss-Maffei and General Dynamics Land Systems (GDLS) submitted proposals for the Chieftain replacement programme in August 1987. The Krauss-Maffei entrant was an improved version of the Leopard 2A4 (subsequently designated Leopard 2A5) with a new wedge-shaped turret front that overcame the weakness of previous models as identified by the British, as well as other enhancements. At this time, the Leopard 2 Improved was still under development. The GDLS entrant was the M1 Block 2 (subsequently designated M1A2). Again, this model was under development with the first prototype appearing in July 1990. Both tanks were armed with versions of the Rheinmetall 120mm smoothbore gun firing mutually compatible types of ammunition.

Following a series of high-level meetings between British civil servants and military officials with their American and German counterparts in April 1990, GDLS and Krauss-Maffei were persuaded that all the entrants were to be examined thoroughly and fairly as to whether they fulfilled the requirements of SR(L)4026. Both companies then submitted more detailed specifications for their respective tanks, as well as their current production models for initial testing. Both proposed designs were of conventional layout with a four-man crew, similar to Challenger 2, and both featured a commander's independent stabilized panoramic sight that allowed what was then termed the 'hunter-killer' target surveillance and engagement procedure. In essence, the commander surveys the battlefield through his 360-degree panoramic sight. On spotting a hostile threat, he then switches from a wide field of view to a narrower one at a higher

magnification to lay his aiming mark on to it and identify the target positively. He then fires his laser to provide the fire-control computer with the information it needs to calculate a firing solution. The commander then presses a switch that automatically aligns the turret and gun to the precise point of view that is now stored in the fire-control computer. This allows the gunner to engage the target immediately without having to 'lase' the target again. Meanwhile the commander has started the engagement sequence against a subsequent target. In this way multiple targets in different directions can be engaged and destroyed rapidly with the minimum of time. In these politically correct times, the term 'hunter-killer' is no longer used in the Royal Armoured Corps and the designation 'battlefield management' is preferred.

Besides the two above contenders, GIAT of France subsequently proposed the AMX Leclerc MBT as an entrant in the Chieftain replacement programme. Compact and highly mobile, this innovative design featured an automatic ammunition loading system and a three-man crew of commander, gunner and driver. The Leclerc was included in the competition more out of a sense of European solidarity than expectation, as the Royal Armoured Corps has little faith in automatic loaders or the concept of a three-man crew. In the meantime, in late 1987 VDS began the construction of a number of turrets using company funds, initially £5.6 million, with the first one completed during autumn 1988. At the same time, numerous subcontractors were approached as industrial partners with these companies committing approximately £20 million of private money at their own risk in the project. Following the signing of the 'proof of principle' contract on 20 January 1989, the manufacture began of nine Challenger 2 prototypes and a further two turrets: one as a weapons test rig and one for 'attack on armour' trials.

There is a startling similarity between the configuration of the Sony Playstation controller and the firing handles of both the gunner and commander that form a fundamental part of Challenger 2. The transition from computer-games console to a complex tank fire-control system via training simulators presents few problems to today's generation of recruits. From left to right, the switches engage the day and night sights; their magnification; the laser rangefinder and autolay toggle; weapon selector; turret traverse and gun elevation thumb controller; and fire adjustment toggle. The actual firing button is behind the left-hand handle and the right-hand one incorporates the system activation switch that must be depressed throughout the firing sequence. (Simon Dunstan)

Challenger 2 prototypes

The nine prototypes were built at the new Barnbow Works in Leeds. All were completed by 30 September 1990, on schedule and within budget for the competitive phase of the Chieftain replacement programme. This was to run from October to the end of the year, when the winner would be announced. During this period, VDS was to receive a 'bridging contract' from the MOD prior to a full development and production contract in January 1991 if Challenger 2 won the competition. It must be stated that this was not to be a comparative competition between the four contenders as to the 'best' tank overall but to identify which most closely fulfilled the specific requirements of SR(L)4026. Each contender was to be trialled by a separate dedicated team of British Army personnel with experienced crews from each of the companies. No team was to have any

06SP93, or prototype V7, displays to good effect the main armament of Challenger 2 – the 55-calibre long L30A1 120mm rifled gun. Above the barrel is the barbette housing of the Thermal Imaging System (TIS) that is an improved version of the one fitted to Challenger. This device provides outstanding night vision to both the commander and gunner, as well as in bad weather or through battlefield smoke. (VDS)

contact or dialogue with another and all data was to be assessed by a different body entirely in the interests of fairness and thoroughness.

In the event, the comparative trials were not held in 1990 on account of the Iraqi invasion of Kuwait on 2 August. The whole resources of VDS were now devoted to the support of the Challenger fleet and 7th Armoured Brigade that was deployed to Saudi Arabia as part of Operation *Granby*. It comprised two armoured regiments equipped with Challengers and an armoured infantry battalion mounted in Warrior IFVs. On 22 November, 4th Armoured Brigade began deployment to the Gulf to form 1st (UK) Armoured Division with a total of 221 Challenger MBTs. Numerous modifications were devised for the tanks to improve reliability and survivability. On 1 October 1990, the first 160 'Challenger improvement kits' developed by VDS were shipped to the port of Al Jubail in Saudi Arabia. As the Challenger MBTs arrived in theatre, they were modified by REME technicians and an engineering support team from VDS, the 'Vickers volunteers', as well as teams from Barr and Stroud, David Brown, Marconi, Perkins et al. Through their unstinting efforts and the dedication of the tank crews, 174 out of the 176 Challenger MBTs committed to battle crossed the start line at the outset of the land offensive – Operation *Desert Sabre*; the other two tanks collided and damaged their guns. The remainder of the Challengers were held in the War Maintenance Reserve. In addition, 12 Challenger Armoured Repair and Recovery Vehicles (CRARRV) were deployed to the Gulf, direct from the Armstrong Works factory in Newcastle, seven months prior to their scheduled entry into service with the British Army. The CRARRVs proved to be highly effective and achieved a 100 per cent availability rate during the land offensive. Over 300 enemy AFVs were destroyed by Challenger MBTs but not a single one of the latter was lost in action during Operation *Desert Sabre*.

In its report on the war, the House of Commons Defence Committee stated: 'The tank was the decisive battle winner of the land forces campaign

and the British Challenger force in the 1st (UK) Armoured Division made an important contribution to this success.' In response to a question on 19 March 1991 in the House of Commons, the Prime Minister John Major declared: 'The Challenger tank performed absolutely magnificently in the Gulf – far above the expectations that anyone could have had of it.' However, despite these ringing endorsements, the decision as to the Chieftain replacement had still to be made. The situation was compounded by the fall of the Berlin Wall and the collapse of Soviet Union authority across the countries of Eastern Europe that had formed the Warsaw Pact. The very rationale for the heavy MBT was called into question despite its undoubted success in the Gulf War. Although the Chieftain replacement was a 'core project' and the Treasury had authorized its full funding, there remained considerable debate as to the total number of tanks required for the British Army following the Strategic Defence Review.

The comparative evaluation of the four contenders was duly held in the spring of 1991. All four excelled in one aspect or another but for the reasons stated above the Leclerc was eliminated. The three others met the requirements of SR(L)4026. Within the British Army, particularly the Royal Armoured Corps, there was an influential faction that was seduced by the notion that German engineering was superior to any other. Dubbed the 'BMW syndrome', it was sufficient to create a body of opinion that favoured the Leopard 2 Improved. Although Challenger 2 was perceived to have greater survivability and many other attributes, the Leopard 2 Improved was assessed to have lower 'whole life costs' overall, always a matter of utmost concern to the Treasury. Others still endorsed the M1A2 Abrams, so the Defence Procurement Agency passed the matter to the Government.

THE CHOICE OF CHALLENGER 2

The final decision as to the Chieftain replacement lay with the Cabinet. There were numerous aspects to consider. First and foremost was the question of numbers following the Strategic Defence Review. This was exacerbated by a financial shortfall in the MOD's 1991 Long Term Costings for equipment procurement, and it led to a significant scaling down in the number of new tanks that was affordable in the short term. This now precluded a whole fleet replacement of both Chieftain and Challenger. The Americans and Germans were furious at what they perceived to be a change in the rules, but the original requirement had always been for a replacement for Chieftain to serve alongside Challenger and the new strategic geopolitical situation following the collapse of the Iron Curtain was an unforeseen circumstance. Therefore, the argument for interoperability of a smoothbore main armament with Britain's NATO partners was deemed no longer valid without a full fleet replacement. Ministers concluded that Britain's operational contribution to ARRC (NATO Allied Rapid Reaction Corps) would be stronger by maintaining interoperability between Challenger and the new tank, as the intention was always to rearm Challenger with the L30 120mm high-pressure gun. It was a key factor in their final decision.

There were also the financial implications of purchasing fewer tanks, particularly a foreign one. With fewer than 500 tanks, co-production

The Challenger Armoured Repair and Recovery Vehicle, or CRARRV, provides immediate Royal Electrical and Mechanical Engineers (REME) support to armoured formations on the front lines. The hydraulically driven, double capstan main winch has a maximum single line pull of 52 tonnes, or 510kN, with 150m of winch rope. The front-mounted blade can operate as an earth anchor, dozer or crane stabilizer. The hydraulically operated Atlas AK6000 M8 jib crane is capable of lifting a complete Challenger 2 powerpack to allow replacement in the field. Nicknamed the Rhino, the British Army procured 81 CRARRVs and this example is serving with IFOR (Implementation Force) in Bosnia during 1996. (MOD)

became a less viable financial proposition. For Leopard 2, Krauss-Maffei estimated that up to 60 per cent of the tank could be produced locally before unit costs rose significantly. But the Swiss Army experience suggested otherwise. In a total procurement of 380 Leopard 2A4 MBTs, 345 were built under licence in Switzerland but it took two years of separate contract negotiations with each subcontractor before manufacture began, which raised the unit cost by at least 25 per cent over the original price as well as a delaying its entry into service with the Swiss Army. Inevitably, it would lead to a loss of jobs in Britain's tank-manufacturing industry with its many subcontractors dotted across the country in marginal constituencies. The Conservative government was acutely aware of the loss of tens of thousands of jobs in the manufacturing industries of the North over the previous decade, particularly on Tyneside. In addition, there were dark mutterings at Vickers plc as to whether the company would be party to any co-production deal at all if it should fail to win the competitive procurement process. Finally, the opportunity to sell British tanks on the international market would be lost forever, despite the fact that no country had purchased Challenger.

The politics of defence procurement

All major weapons procurement programmes have a significant political dimension; at over £2 billion, the Chieftain replacement programme was no exception. After the recent Nimrod Airborne Early Warning (AEW) aircraft fiasco that wasted billions of pounds, the British government was determined to obtain value for money through an open competition. The failure of Nimrod AEW obliged the Royal Air Force to purchase the Boeing E-3 Sentry system that would have been significantly cheaper in the first place. It is a prime responsibility of government to procure the most effective military equipment at the minimum cost to the taxpayer.

A1: Challenger 2 Command Tank, Regimental headquarters, The Royal Scots Dragoon Guards (Carbiniers and Greys), Exercise Ulan Eagle, Poland, October 1999

A2: Challenger 2, B Squadron, The Royal Scots Dragoon Guards (Carbiniers and Greys), Operation *Agricola 3*, Kosovo, May 2000

Nevertheless, the remarkable performance of Challenger during the recent liberation of Kuwait could not be overlooked, nor could the wholehearted support by Britain's tank-manufacturing industry throughout the crisis. Furthermore, the Gulf War was deemed to be a complete vindication of the British philosophy of tank design whereby heavy armour protection for the crews and devastating firepower to engage and destroy hostile AFVs at long range were the primary attributes of a Main Battle Tank. However, all the contenders showed such characteristics.

The Cabinet subcommittee tasked with making the final decision comprised the Prime Minister, John Major, the Defence Secretary, Tom King, the Foreign Secretary, Douglas Hurd and the Trade and Industry Secretary, Michael Heseltine. Initially, the Prime Minister questioned the need for a new Main Battle Tank at all given the changing geopolitical situation in Eastern Europe and the pressure on public spending, notwithstanding the recent embarrassing defence procurement failures highlighted by the National Audit Office. The Defence Secretary expressed the view that there were no significant defence reasons to make a particular recommendation. The Foreign Secretary remained neutral beyond stating that the export of Challenger 2 to the Middle East could lead to some foreign policy benefits.

Only Michael Heseltine as the Trade and Industry Secretary expressed strong views on the subject. He argued forcibly that an indigenous tank-manufacturing industry gave a nation political kudos in the same way as possessing nuclear weapons. Furthermore, the purchase of a foreign MBT would represent a lack of faith on behalf of the Government in Britain's national engineering capability that would send a negative signal to foreign trading partners as to the quality of both the British defence sector and British engineering in general. He also highlighted the likely impact on the unemployment figures, especially in the north of Britain, if Challenger 2 was rejected. After due

Prototype V6 thunders along a track during a firing run on Bindon Ranges at the Royal Armoured Corps Gunnery School at Lulworth in Dorset. The sophisticated fire-control system of Challenger 2 is an improved version of that fitted to the M1A1 Abrams. It allows accurate firing on the move out to a range of 2,000m. (VDS)

The first of 22 Challenger Training Tanks as shown here entered service in 1991. As part of the Challenger 2 procurement programme a further 22 were purchased from VDS and designated Driver Training Tank (DTT). The first DTT was completed by VDS on 10 August 1993. Based on the improved Challenger 2 hull, powerpack and running gear, the vehicle is weighted to the same level as the MBT and the instructor can induce faults in the vehicle to test the aptitude of his students. (RAC Centre)

As part of the Challenger 2 procurement programme a whole range of training simulators has been developed. These include the computer based trainer, loader drills trainer and the sophisticated precision gunnery training equipment (PGTE) comprising the part task trainer and the turret gunnery trainer as shown here. This replicates the gunner's and commander's positions incorporating all the sighting systems, controls, switches and indicators to enable the crewmen to undertake all types of engagements in five different virtual-reality scenarios of Central Europe, Canadian prairie, urban area, desert and a tank gunnery range, each covering up to 100km^2. The computer-generated imagery and training programmes are so realistic that it is not uncommon for a newly fledged gunner to achieve a first-round hit on the move at 1,500m firing HESH on his very first battle run in a Challenger 2. (Simon Dunstan)

consideration, Challenger 2 was selected by the Prime Minister and endorsed by the rest of the committee with the proviso that VDS be subject to a rigorous set of contract terms and conditions. On 21 June 1991, Defence Procurement Minister Alan Clark announced in the House of Commons the Government's decision to select Challenger 2 as the replacement for Chieftain.

Just seven days later on Friday 28 June 1991, a contract was signed between the MOD and VDS for the development of Challenger 2 and subsequent manufacture of 127 tanks to meet the requirements of SR(L)4026. The first batch of 127 was to equip the armoured regiments of 4th and 7th Armoured Brigades, with the remaining vehicles being used for training. The In-Service Date (ISD) was planned to be in late 1993. In addition, 13 Driver Training Tanks (DTT) were ordered with the first deliveries scheduled in 1993. The fixed-price contract worth £520 million specified 23 milestones, all related to achievement during development. It placed the onus of responsibility firmly with VDS as the

prime contractor for all aspects of the programme, including training equipment, first-line spares and a comprehensive logistic support package including fielding within the British Army. In addition, there were very tight stipulations concerning achievement of specific levels of reliability, to which some 37 per cent of the stage payments were tied. The first 127 Challenger 2 MBTs were to be equipped with CHARM 1 ammunition while the subsequent issue of CHARM 3 ammunition was planned for 1996 following acceptable user trials. Further orders for Challenger 2 were expected to be placed in batches of 200.

CHALLENGER 2 TRIALS AND TRIBULATIONS

Contracts were now signed between VDS and more than 250 sub-contractors and suppliers throughout Great Britain and overseas to refine the design of Challenger 2 and allow production to begin. At the same time, the trials and development phase of the Challenger 2 prototypes continued at the Armoured Trials and Development Unit (ATDU) at Bovington Camp, Dorset, the home of the Royal Armoured Corps. These were divided into 'reliability growth trials' and 'user trials' using a combination of service personnel manning the tanks supported by VDS technicians. The nine prototypes were numbered by order of build. Prototype V1 (06SP87) was a general trials vehicle and carried out environmental and other aspects of vehicle performance. It was subsequently bought back from the MOD by VDS and became the base model for Project Copenhagen, the modified Challenger 2 MBT for Oman. Prototypes V2 (06SP88), V3 (06SP89) and V4 (06SP90) were the reliability growth and proving vehicles and did most of the automotive mileage. Prototypes V5 (06SP91) and V8 (06SP94) were the two user trials vehicles. Prototypes V6 (06SP92) and V7 (06SP93) were the firing trials and weapon systems proving vehicles. Prototype V9 (06SP95) was kept to the latest build standard. It was used for sales purposes and often

Twenty-four megajoules of sound energy is expended alongside a massive dust cloud as a Challenger 2 of 4th Troop, A Squadron, 1 RTR, fires on the move during gunnery training at the Castlemartin Ranges in South Wales during September 2003. A Squadron of 1 RTR traces its lineage back to the Heavy Branch Machine Gun Corps of 1916 and is equipped with Challenger 2 MBTs whilst the rest of the regiment is part of the Joint NBC Regiment. A Squadron has 15 tanks, as against 14 in a standard armoured squadron, with an extra one – Zero Delta – in the Squadron Headquarters Troop. (RTR)

06SP95, prototype V9, and a CRARRV churn up the dust as they speed past a display stand during a demonstration in the Middle East. During 1992, V9 was despatched to the Middle East on a major sales tour following the Gulf War where it competed against the M1 Abrams for the Kuwaiti Army tank-procurement programme. Being still at an earlier stage of development as compared to the Abrams, the Challenger 2 was unsuccessful. Following further trials in Abu Dhabi, Saudi Arabia and Oman, the Royal Army of Oman ordered 18 modified Challenger 2 MBTs together with four CRARRVs and two Driver Training Tanks in the summer of 1993. A subsequent order for an additional 20 MBTs was placed in November 1997 with final deliveries in 2000. (VDS)

appeared at equipment exhibitions. It became the basis for Project Exmouth, subsequently the Challenger 2E and export model for VDS. It was fitted with production turret No. 2 so a further turret was manufactured at the conclusion of the production run. A further two turrets were built: TA1 for rig testing of the weapon systems and TA2 as an 'armour fire-at turret'.

User trials of V5 and V8 were conducted between September 1993 and February 1994. The aim of these trials was to establish whether Challenger 2 fully met the performance specified in SR(L)4026 in the hands of RAC personnel and also give logistic support services, such as the Royal Electrical and Mechanical Engineers (REME), increased experience of the new MBT to help the preparation of drills, training techniques and publications that would be required prior to its entry into service. Most of the trials were conducted at Bovington and Lulworth for the automotive testing and gunnery firing respectively. Suspension and handling trials were also conducted at the Longcross and Hurn test courses. Cold-weather trials were undertaken in the climatic chamber at Chertsey and subsequently at Catterick in Yorkshire for crew cold habitability testing – Challenger 2 was the first British tank with an integral air conditioning and heating system. Tactical assessments were undertaken on Salisbury Plain Training Area (SPTA) and the training phase culminated in a gunnery exercise at Warcop Training Area. Most of these trials were conducted using a system of 'battlefield days' similar to those devised for the concurrent Reliability Growth Trials (RGT).

Reliability Growth Trials

These RGT were successfully completed in 1994 when three prototypes were tested over a planned total of 285 battlefield days. For the purposes of the RGT phase, a battlefield day consisted of: 27km of road travel; 33km of cross-country travel; the firing of 34 main-armament and 1,000 7.62mm machine-gun rounds with 16 hours of weapon systems operation; and ten hours of main engine idling and 3.5 hours of main engine running at various speeds. During development the Challenger 2 prototypes clocked up 20,400km of road and cross-country running and fired 11,600 rounds of 120mm ammunition. The British Army formally

Despite a combat weight of 65 tonnes, Challenger 2 has admirable battlefield agility. It is powered by a Perkins Engines Company 12-cylinder turbocharged CV12 TCA Model 3 Mark 6A diesel engine developing 1,200bhp (895kW) at 2,300rpm coupled to a David Brown Defence Equipment Ltd TN54 transmission that can be readily replaced in the field as a complete powerpack using the hydraulic crane of a CRARRV. (VDS)

accepted the Challenger 2 on 16 May 1994. Nevertheless, the debate continued as to how many Challenger 2 MBTs were to be procured and what measures were to be implemented for the Chieftain/Challenger Improvement Programme (CHIP). In the event, CHIP was not pursued and it was decided to replace both Chieftain and Challenger with a complete fleet of 426 Challenger 2 MBTs. Due to financial constraints, this number was reduced by 40 to 386. The order for the remaining 259 MBTs as well as nine further DTTs was announced in July 1994.

The first production vehicle was completed on 1 August 1994. However, the MOD was determined to ensure that the production models of Challenger 2 met the stringent demands of the original specification. In September 1994, a 'first off production trial' of three of the first six vehicles revealed that VDS had not succeeded in transferring the level of build quality and reliability achieved in the custom-made prototype models to the manufacturing process and the production vehicles. Accordingly the first batch of tanks was not accepted by the MOD and these were held in storage until the faults were rectified. Inevitably, the original In-Service Date slipped by, much to the dismay of the first armoured regiment scheduled to receive Challenger 2 – The Royal Scots Dragoon Guards. Many armies prefer to introduce a piece of equipment into service and then eliminate any teething problems subsequently. But for Challenger 2 the MOD held VDS to the strict terms of the contract as to quality control and reliability. In time, the problems were solved and modifications made to all the tanks held in store. To achieve this the MOD imposed a series of Production Reliability Growth Trials (PRGT), each with incrementally more difficult reliability targets. PRGT 1 was completed in November 1997 with PRGT 2, 3 and 4 scheduled to be held in March, June and October 1998. In the event the production line tanks achieved the desired degree of reliability within the first three PRGTs so the last was not held. Even so, the MOD demanded an In-Service Reliability Demonstration (ISRD) of a complete armoured squadron of Challenger 2 MBTs as a final proof of the tank's overall performance.

Challenger 2 Fielding Team

From the outset, the Challenger 2 (later AFV) Fielding Team played a vital role in the procurement process; their purpose was to ensure the quality of the tanks as they rolled off the tank transporters and on to the regimental tank parks. Fielding activity was suspended from October 1995 until January 1998 while the Production Reliability Growth Trials were undertaken to improve the quality of the product coming off the assembly lines in Leeds and Newcastle. Once deliveries began in January 1998, the tanks were inspected in batches of 38: the number of Challenger 2 MBTs allocated to each armoured regiment in the Type 38 organization then extant. With a total production run of 386 tanks, the fielding team tested ten batches of tanks over a period of two-and-a-half years. The Challenger 2 Fielding Team was tasked with ensuring the suitability of each and every tank before it was accepted from VDS. The team consisted of an RAC major, a REME ASM and several highly skilled and experienced RAC instructors and REME artificers. Augmenting the Fielding Team staff were crews from the regiment that was to receive the tanks in that batch. These crews took part in the handover of the tank to the Fielding Team, assisted in all of the inspections, performed the Batch Test under Armoured Trials and Development Unit (ATDU) supervision and accompanied the tanks during their delivery to their regiments in Germany and the UK. Every one of the tanks in each batch of 38 was subjected to an inspection that covered every aspect of the tank in the most exacting detail. Every fault from a software glitch in the fire-control system through inaccuracies in vehicle configuration documentation to paint overspray on a grease nipple was recorded. Every tank was tested on a road run to and from the Lulworth gunnery ranges where the ordnance was commissioned and the gun and sighting system 'zeroed' for accuracy. In excess of 22,000 'incidents' were identified on the total of 386 Challenger 2 MBTs and 22 DTTs. A panel of experts scrutinized all of these incidents and applied corrections where needed, as agreed between the Fielding Team and the VDS on-site team. Additionally, out of each batch of 38 tanks, four were chosen and sent to ATDU for a Reliability Batch Test that put those particular tanks through a rigorous three battlefield days' trial. The fate of the whole batch of 38, acceptance or rejection, hung on the results of the Batch Test. The result was that no armoured regiment received a single tank that had a major fault. Any remaining minor faults, and these were extremely rare, were identified to the receiving regiment by the Fielding Team prior to the tank's delivery and fixed by VDS field representatives, usually as soon as the parts arrived within one or two days of the tank's arrival.

The first eight Challenger 2 MBTs were delivered to The Royal Scots Dragoon Guards at Fallingbostel in Germany in late January 1998. The last of the regiment's 38 new tanks was handed over in a ceremony on 30 June 1998, witnessed by some of the leading luminaries in the Challenger 2 story, including the Master General of the Ordnance, Lieutenant General Sir Robert Hayman-Joyce, who had been a keen and consistent advocate of Challenger 2. The final and most difficult hurdle in the Challenger 2 programme acceptance procedure was the In-Service Reliability Demonstration (ISRD). This was conducted by B Squadron, The Royal Scots Dragoon Guards, between August and

The firepower of Challenger 2 is formidable, as was shown to telling effect during Operation *Cray* held on 16 September 1996. This was a demonstration of new equipments of the British Army to foreign military observers and Challenger 2 62KK25 engaged and destroyed six separate targets in just 26 seconds – faster than an automatic loader. Challenger 2 uses three-piece ammunition with all explosive elements stowed below the level of the turret ring for greater survivability. Here, the tank commander, Corporal Colin MacIntyre, guides his Challenger 2 into position at the start of the demonstration as his loader, Lance Corporal Sam Boyd, scans to the rear. (VDS)

December 1998 when 12 Challenger 2 MBTs were tested at ATDU in Bovington and at the Gunnery School in Lulworth. The trials involved the tanks covering 5,040km during 84 battlefield days while firing 2,850 rounds of 120mm ammunition and 84,000 rounds of 7.62mm ammunition. The final result of ISRD was an unqualified success with all the targets for performance and reliability exceeded conclusively.

The second armoured regiment to be equipped with Challenger 2 was 2nd Royal Tank Regiment (2 RTR) during late 1998 and early 1999. The last of the 386 Challenger 2 MBTs was presented to the British Army on 17 April 2002 at a ceremony held on Salisbury Plain. Fittingly, the tank was delivered to A Squadron, 1 RTR, that can trace its lineage to the very first unit to take the tank to war on 15 September 1916 – A Company, Heavy Machine Gun Corps, subsequently A Company of the Tank Corps, and so forth to this day. For the first time ever, the British Army received a reliability-proven MBT that was ready to go to war as soon as it arrived on the tank park of an armoured regiment – and war was not long in coming.

OPERATIONAL DEPLOYMENT OF CHALLENGER 2

Challenger 2 was first deployed operationally in the year 2000 following the NATO intervention in the ethnic dispute between Albania and Serbia over the benighted province of Kosovo. As part of KFOR (Kosovo Force), B Squadron, The Royal Scots Dragoon Guards, was committed on Operation *Agricola 3* with its complement of Challenger 2 MBTs while the other squadrons were 'dismounted'. The heavy armour acted as a deterrent force to the warring factions by undertaking road patrols and VCPs (Vehicle Check Points) at known flashpoints within the Area of Operations (AOR) of the Multi-National Brigade (Central), such as Gate 3 on the main route

from Pristina to Serbia. Extended road marches within the brigade's AOR throughout the six-month roulement were designated Operation *Scotsman* (see Colour Plate A2) and acted as a tangible show of force, often covering as much as 250km by road. None of the various ethnic factions in Kosovo deemed it sensible to contest the presence of Challenger 2 during its first operational deployment.

Exercise Saif Sareea

The volatile situation in the Middle East and Saddam Hussein's continuing refusal to abide by the various resolutions promulgated by the United Nations prompted the British government to conduct a major military exercise in the region to test the Joint Rapid Reaction Force (JRRF) concept in a medium-scale, combined arms warfighting scenario. Codenamed Exercise Saif Sareea II, 'Swift Sword' in English, it was conducted in Oman in conjunction with His Majesty the Sultan's Armed Forces between September and November 2001. In addition to the main training activity in desert conditions, the UK armed forces proved the deployment process and support structures needed to sustain and recover over 20,000 UK military personnel thousands of miles from their home bases. The deployment involved some 22,500 personnel, 6,500 vehicles and trailers, 93 aircraft of all types and 21 naval vessels at a projected cost of some £90 million. The expeditionary force included 547 AFVs, of which 66 were Challenger 2 MBTs.

The first part of the exercise, comprising British forces alone, was conducted in the hostile desert conditions of the virtually unpopulated southern and central portions of Oman – an area where the Royal Omani Army rarely conducts exercises despite much of its equipment being specially modified for desert conditions, such as their version of Challenger 2. The planners were aware of the difficulties of operating over the appalling terrain and in such arduous conditions, but cost constraints did not allow for any specific modifications to equipment. In particular, it was the advice of the Headquarters Director Royal Armoured

Challenger 2 is fitted with six double roadwheels each side, mounted on hydrogas suspension arms. Each of the 12 roadwheel stations is independently sprung and gives 450mm of wheel travel that results in an exceptionally smooth ride. This provides greater comfort to the crew and a more stable gun platform when firing on the move. Of particular note on Challenger 2 is the facility for the driver to adjust the tension of both tracks from inside his compartment through the use of the Hydraulic Track Tensioner (HTT) at the front of the hull, hitherto often a muddy and onerous manual chore for tank crews using outsize spanners. By ensuring that the tracks are always at the correct tension, cross-country performance and vehicle stability are greatly improved whilst trackwear and crew maintenance tasks are reduced. Through the combination of its powerpack and advanced suspension, Challenger 2 is capable of a maximum road speed of 59kph and a sustained cross-country speed of 40kph, depending on terrain, to a maximum road range of 450km or 250km cross-country. This well-camouflaged Challenger 2 belongs to B Squadron, The Royal Scots Dragoon Guards during Exercise Ulan Eagle in Poland, October 1999. (Simon Dunstan)

Challenger 2 incorporates the advanced armour technology known as Dorchester. The original composite armour as fitted to Challenger is known generically as Chobham after the town near the defence research establishment where it was developed. Similarly, Dorchester is the generic name for the latest armour configuration and is so called after the market town near the home of the Royal Armoured Corps at Bovington in Dorset. The details of Dorchester armour remain a secret and any speculation as to its composition is futile. The configuration of the armour array on the basic tank is known as Dorchester Level 1 or DL1. The designation differs according to the appliqué armour arrays fitted in the warfighting role. Suffice to say, Dorchester provides outstanding protection against both kinetic and chemical energy attack weapons that is unsurpassed in contemporary MBT designs. However, following experiences in Iraq, the concept of bar armour has been resurrected to thwart further the threat of RPGs and other infantry anti-tank weapons, as well as the addition of appliqué armour on the turret sides. This armour array is designated Dorchester Level 2F or DL2F. (Simon Dunstan)

Corps (DRAC) for all Challenger 2 MBTs to be fitted with Dorchester Level 2 appliqué armour arrays over the front and sides of the tanks during major exercises such as Saif Sareea to simulate warfighting conditions as closely as possible. It was also known from experience in the Gulf War of 1991 that the side Chobham armour panels reduced the amount of dust being thrown up by the tracks in sandy conditions that could be ingested into the engines and cause severe damage. During the land offensive of Operation *Desert Sabre* in February 1991 this did not pose a problem as the weather conditions were so foul and the desert sand more gritty. However, the cost of transporting and fitting the armour arrays as well as other 'desertization' aspects for Challenger 2 was calculated at £343,000 per tank or over £20 million for 66 tanks: a sum that would have added a further 20 per cent to the overall cost of the exercise. As the principal aim of Saif Sareea was to test the deployment of 3 Commando Brigade, Royal Marines, within the JRRF command

structure, the 'desertization' of the Challenger 2 MBTs was not deemed to be feasible within the budget. Furthermore, the appliqué armour arrays in storage would be required if an operational deployment became necessary during the course of the exercise.[3]

The Challenger 2 force comprised four armoured squadrons of The Royal Dragoon Guards (RDG) as well as headquarters elements and a contingent of The Queen's Royal Lancers (QRL). The RDG had only recently converted to Challenger 2 but had conducted highly successful exercises in Poland and BATUS in Canada. After a period of acclimatization for the troops – the temperatures in Oman rose to 54 degrees centigrade – the tanks were soon put to the test in the harsh conditions. In particular the very fine sand blown up by the tracks rapidly clogged air filters, causing a loss of power in the engines. The rocky ground also took a terrible toll on trackpads and roadwheels. Air filters were now lasting a matter of days instead of months and, under the most extreme conditions, had to be changed after a matter of hours. In north-west Europe, air filters are expected to last up to 12 months before requiring replacement in a normal training year. On average, the 66 tanks in Oman were consuming 46 filters each day at a cost of £1,000 each. The supply of air filters and track consumables in theatre was rapidly becoming exhausted. By the final day of the divisional Exercise Desert Rhino, both A and D Squadrons were able to attack the final objective with just two tanks each. Each of the four RDG squadrons was obliged to stand down a troop of tanks and the QRL contingent was sent home to reduce demands on the supply chain. It was now apparent why the Royal Omani Army did not readily conduct exercises in the south.

Valuable airlift capacity was needed to fly out a consolidated load of spare parts weighing some 55 tons, with air filters being drawn from every source. This prevented the supply of spare parts for the 'B' Vehicle fleet – supply and support vehicles such as Land Rovers and eight-tonners – as well as the helicopters and C-130 Hercules transport aircraft in theatre. Other equipments were also suffering from the hostile conditions, such as the AS-90 self-propelled howitzer and the Lynx battlefield helicopter: the main rotor blades of the latter lasted on average just 27 hours in Oman as against a life expectancy of 500 in European conditions. The remaining tanks moved to the northern region of the country to take part in a major joint exercise with 12,800 troops of the Royal Omani Army. There the pace of operations was less intense and the conditions less hostile. At the final combined live-firing exercise and firepower demonstration, 42 British and Omani Challenger 2 MBTs were used, with C Squadron, RDG, firing 400 fin and 300 HESH rounds in three days. But by now the press was publishing alarmist stories about the effectiveness of Challenger 2 that eventually led to a parliamentary enquiry. (See *Report by the Comptroller and Auditor General HC 1097 Session 2001–2002: 1 August 2002*, which is overtly critical of the Ministry of Defence on many aspects of equipments

3 Following the 1991 Gulf War, it was decided that further measures, including additional air conditioning and extra powerpack cooling systems, would be necessary for any new MBT of the British Army for operations in more extreme desert conditions. The Strategic Defence Review of 1998 recognized the need for equipment to operate 'globally'. As a result, funding was assigned in 1999 (some £464,000) to include 'desertization' modifications for 30 tanks or two squadrons. Among these modifications was the 'skirt plate' that involved the incorporation of new seals, dust mitigation skirts and extended track guards; this was costed at £23 million for four battlegroups, or 116 Challenger 2 MBTs, exactly the number deployed on Operation Te lic. However, this funding was subsequently delayed and ultimately deleted as part of the Equipment Capability Customer's re-evaluation in May 2000 of Equipment Plan 2001.

B: Challenger 2, Cyclops Squadron, 2nd Royal Tank Regiment, Operation *Telic*, Az Zubayr, Southern Iraq, 26 March 2003

C: Challenger 2, B Squadron, The Queen's Royal Lancers, Operation *Telic*, 'The Loop', Basra, Southern Iraq, 3 April 2003

This classic image graphically illustrates the problems encountered by the Challenger 2 MBTs of The Royal Dragoon Guards during Exercise Saif Sareea II in Oman during September and October 2001. The rocky terrain constantly damaged tracks and roadwheels; one tank lost all 320 trackpads within 15km after new ones had been fitted. Air filters were consumed at an alarming rate due to the very fine nature of the sand. These problems led to alarmist articles in the press that unjustly damaged the reputation of Challenger 2 and possibly compromised foreign sales of the tank thereafter. (MOD)

employed during Exercise Saif Sareea II.)[4] However, the fundamental problem was the inadequate scaling of spare parts for the prevailing conditions. This was compounded by a lamentable failure in 'asset tracking' within the logistic chain, whereby spares may have been available but their exact whereabouts remained unknown on immediate demand. This was to come back and haunt the British Army during Operation *Telic* in 2003.

Out of all the NATO members, only the UK and United States have proved the capability of deploying any formation of brigade size or larger in an expeditionary role over such distances and in such a demanding environment. None of the contemporary MBT designs within NATO, such as Ariete, Leclerc or Leopard 2, have fired a shot in anger and therefore remain unproven in battle. Exercise Saif Sareea was a classic example of preparing for the most likely prospect of war in the most difficult circumstances, rather than a casual three-day exercise in Limbourg or Bergen-Hohne during a temperate autumn in Europe. Despite the rugged terrain and conditions, Challenger 2 performed admirably when spares were to hand, although the performance of the tracks gave rise for concern. Plans were set in hand to find a solution. Similarly, the problems of dust ingestion were addressed to make Challenger 2 as battleworthy as possible in desert conditions. In spite of the problems, 4th Armoured Brigade still met its Collective Performance Training Standard objective and gained its Lead Armoured Task Force readiness status in January 2002. Attaining this status seemed all the more urgent as the 9/11 terrorist attacks in New York and Washington DC occurred during Exercise Saif Sareea II, and the prospect of war in the region became ever more likely.

4 The comparative availability rates of equipments during Exercise Saif Sareea II are indicative of the harsh conditions, ranging from a high of 93 per cent for Land Rovers through Challenger 2 at 60 per cent and helicopters at 55 per cent to a low of 45 per cent for DROPS (Demountable Rack Offload and Pickup System) vehicles and the Combat Engineer Tractor.

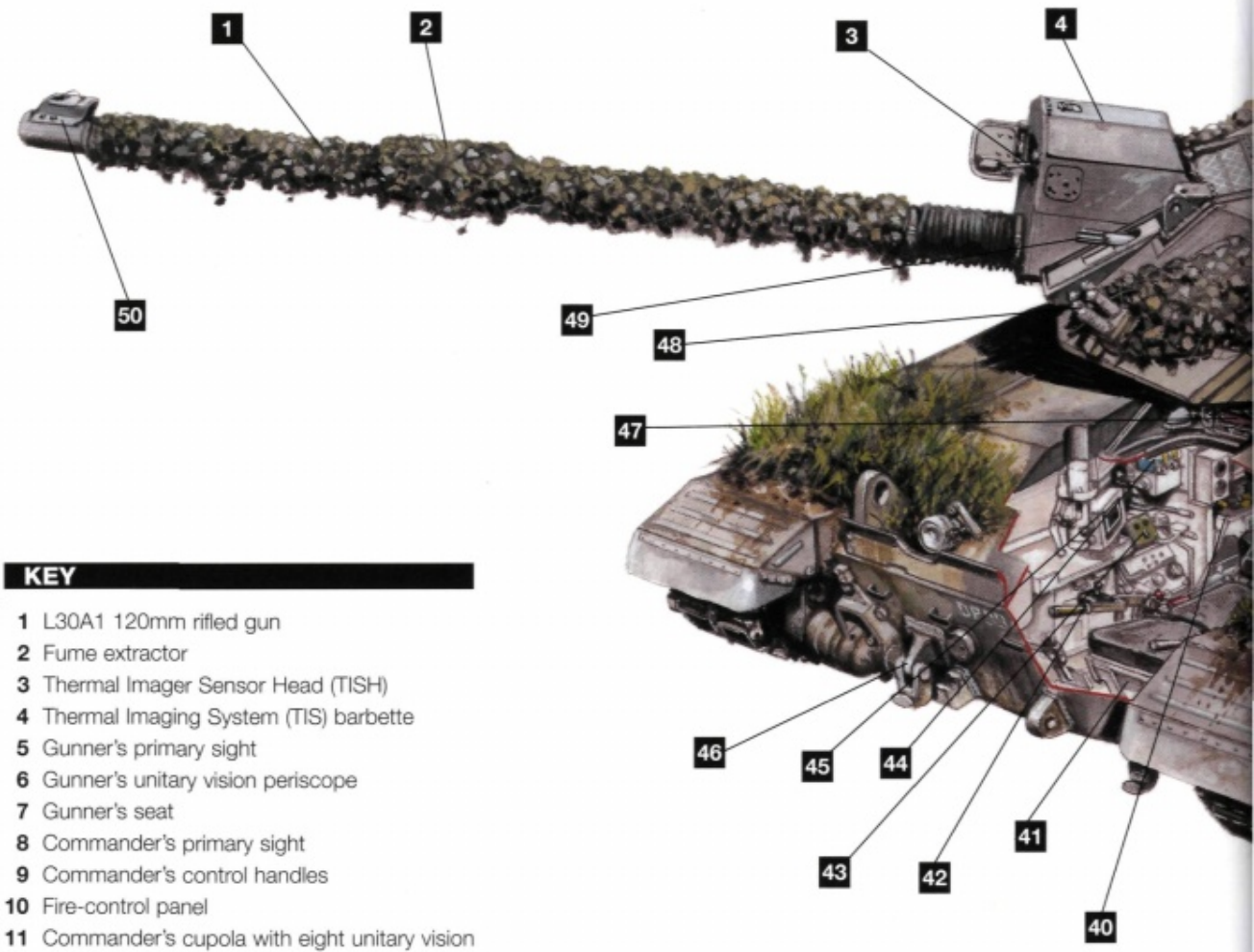
Following Exercise Saif Sareea II, the Armoured Trials and Development Unit experimented with various dust mitigation aspects for Challenger 2 culminating with a full trial at BATUS in September 2002. It was conducted by Egypt Squadron, 2nd Royal Tank Regiment, during Exercise Iron Anvil. The tanks were fitted with Dorchester Level 2 appliqué armour arrays and thick rubber skirts covering the suspension and attached to the frontal toe plate in a style reminiscent of contemporary Russian MBTs. Note the TES, or tactical engagement simulation equipment, attached to callsign One One of 9th Troop as it charges over the prairie. The design of the dust mitigation skirts was refined in time for Operation *Telic*, just months away. (RTR)

OPERATION *TELIC*

Space precludes a detailed history of the campaign during the Iraq War of 2003. This account will highlight the performance of Challenger 2 during Operation *Telic* through typical squadron and troop actions drawn from each of the three armoured regiments deployed to the region: The Royal Scots Dragoon Guards (Carbiniers and Greys) – SCOTS DG – with A, B and C Squadrons; The Queen's Royal Lancers – QRL – (from 4th Armoured Brigade) with B and C Squadrons and 2nd Royal Tank Regiment – 2 RTR – with Cyclops, Egypt and Falcon Squadrons plus headquarters elements. In all, 7th Armoured Brigade employed 116 Challenger 2 MBTs and 26 CRARRVs during Operation *Telic*, the British codename for the campaign that the Americans termed Operation *Iraqi Freedom*. During deployment, the experiences of each regiment were similar, but for the sake of this narrative those of 2 RTR are recounted here.

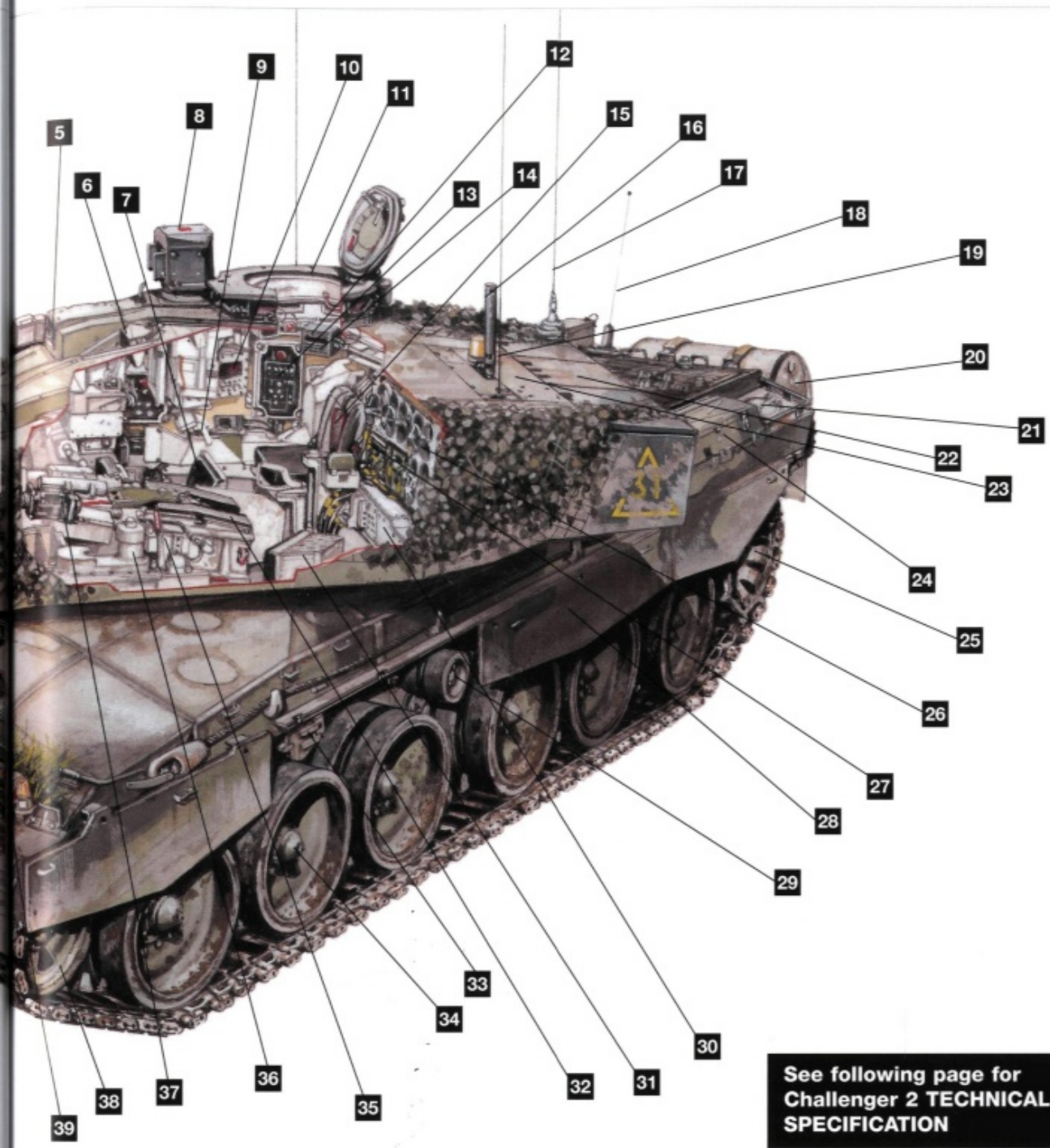
Following the Christmas and New Year celebrations, the regiment returned to work on 6 January 2003 to be warned of the likelihood of deployment to the Middle East. For the next two weeks, the regiment conducted individual and troop training before conducting a range package at Bergen-Hohne between 20 and 24 January. There followed a combined-arms tactical trainer session at Sennelager from 25 to 27 January. A battlegroup field-training exercise was conducted for the next three days on Bergen-Hohne in blizzards and driving snow with A and D Companies of 1st Battalion, The Light Infantry, in their Warrior IFVs in temperatures as low as -17 degrees centigrade: as one Scottish trooper observed, 'Someone tell the squaddies it's the Middle Eastern front, no' the Eastern Front we're supposed tae be fightin' oon.' The training concentrated on squadron/company group manoeuvres against Soviet-

D: CHALLENGER 2, A SQUADRON, THE KING'S ROYAL HUSSARS, EXERCISE SABRE'S THRUST, SALISBURY PLAIN, FEBRUARY 2006



KEY

1 L30A1 120mm rifled gun
2 Fume extractor
3 Thermal Imager Sensor Head (TISH)
4 Thermal Imaging System (TIS) barbette
5 Gunner's primary sight
6 Gunner's unitary vision periscope
7 Gunner's seat
8 Commander's primary sight
9 Commander's control handles
10 Fire-control panel
11 Commander's cupola with eight unitary vision periscopes
12 Bowman User Selector Box (USB)
13 Commander's control panel
14 'Winky wonky' flashing hazard beacon
15 Commander's seat
16 Fire-control system metrological sensor
17 3X Bowman radio antennae
18 Reversing direction indicator stalk
19 NBC filtration system compartment
20 175-litre external fuel drum
21 Fuel filler cap
22 Turret stowage bins
23 Coolant supply unit (CSU) compartment
24 Driver's tool bin
25 Drive sprocket
26 APFSDS ammunition rack
27 Bowman VHF radio sets
28 Dust mitigation side skirts
29 Top guide roller
30 Power distribution box
31 Ration bin
32 Breech ring
33 Refuse ejector door
34 Roadwheel station and Hydrogas suspension unit



See following page for Challenger 2 TECHNICAL SPECIFICATION

35 Breech closing lever
36 Power traverse gearbox
37 Coaxial L94A1 7.62mm chain gun
38 Idler wheel
39 Dry powder fire extinguisher
40 Crew Temperature Control System (CTCS)
41 Driver's supine seat
42 Steering levers
43 Radio selector box
44 HTT directional control levers
45 Driver's display device
46 Remote Hydraulic Track Tensioner (HTT)
47 Driver's unitary vision periscope
48 Smoke-grenade discharger
49 L94A1 chain gun shroud and spent case aperture
50 Barrel alignment muzzle reference system (MRS)

TECHNICAL SPECIFICATION

Length 180in (4.57m)
Crew Four – commander, loader/operator, gunner, driver
Weight 62,500kg
Length 11.5m gun forward; 9.86m gun rear; 8.33m hull
Width 3.52m
Height 2.49m
Ground clearance 0.5m
Track width 0.65m
Length of track on ground 4.79m
Ground pressure 0.9kg/cm^2
Maximum road speed 59kph
Maximum gradient 60 per cent
Vertical obstacle 0.9m
Trench crossing 2.34m
Fording depth 1.07m
Maximum road range Approximately 450km
Fuel capacity 1,592 litres
Engine Perkins Engines Company CV12 TCA V-12 12-cylinder turbo-charged aspiration air-to-air charge cooling 26.1 litre diesel
Model No.3 Mark 6A
Output 1,200bhp at 2,300rpm
Transmission David Brown Defence Equipment Limited TN54 epicyclic transmission with six forward and two reverse gears
Steering Commercial Hydraulics double differential hydrostatic control
Suspension Hydrogas
Tracks William Cook double-pin track
Main Armament 120mm L30A1 rifled gun
Secondary Armament Coaxial 7.62mm L94A1 chain gun and roof-mounted 7.62mm L37A2 machine gun

Egypt in Iraq – callsign One One of 9th Troop, Egypt Squadron, 2 RTR, comes to grief in soft terrain. The leftward-facing black chevron was the mutual recognition of the Coalition Forces; the white squares to either side are an indicator of the tank and troop within the squadron. Egypt Squadron was attached to the 1st Black Watch Battlegroup, as was A Squadron, SCOTS DG. (RTR)

style Iraqi dug-in defensive positions, a matter of preparing to fight the Gulf War of 1991 again that would be far removed from the actual conflict to be faced by the troops. During early February, the tanks and vehicles of the various armoured regiments were loaded aboard ships at the port of Emden and despatched to what was termed in operational planning as the 'sandy place' – Kuwait.

The main body of the regiment's personnel arrived in Kuwait between 5 and 8 March with the tanks arriving on the following day. The tanks were taken to the Udairi range complex close to the Kuwait/Iraq border. From 10 to 13 March, the Challenger 2 MBTs underwent weapons zeroing with the L27A1 Depleted Uranium (DU) round

followed by a combined arms live-firing exercise. The tanks then moved to the barracks of the Kuwaiti 6th Armoured Brigade where they were up-armoured and fitted with 'desertization' modifications. On 18 March the ammunition arrived and the tanks were 'bombed up'. On the following day, D Day, 7th Armoured Brigade and 1st (UK) Armoured Division were declared operational, although there remained some shortages of equipment such as new NBC filters for the tanks and personal items of uniform. The war began in earnest on 20 March, G Day, with a concerted air campaign across the length and breadth of Iraq. As the troops waited in the Forward Assembly Area (FAA) on the Kuwait/Iraq border they were subjected to repeated Scud and gas attack alerts. At 0307hrs on 21 March, the Challenger 2 MBTs of 3rd and 4th Troops, B Squadron, The Queen's Royal Lancers, and the Warriors of Y Company, 1st Battalion, The Royal Regiment of Fusiliers (1 RRF), led the assault of 1st (UK) Armoured Division across the border defensive lines and into Iraq.

Preparing for combat, callsign One One of 9th Troop, Egypt Squadron, 2 RTR, is 'bombed up' on 18 March 2003: a brutal indicator that war is imminent, but only confirmed when the mobile telephones of the troops are impounded for the duration. The black L27A1 APFSDS rounds with their orange protective caps can be seen lying in the foreground with their L17A1 propellant charges behind them. At the outset of the campaign the tanks had an ammunition ratio that was 'fin heavy' in the expectation of engaging Iraqi armour but that soon changed to 'HESH heavy' as few hostile tanks were encountered. (RTR)

The assault on Az Zubayr

The account now follows the exploits of Cyclops Squadron of 2 RTR in the assault on Az Zubayr to the south-west of Iraq's second city of Basra and the principal objective of 1st (UK) Armoured Division. Cyclops Squadron crossed the Kuwait/Iraq border on the morning of Saturday 22 March. It then led the 2 RTR Battlegroup in the clearance of Route Topeka that ran parallel to Highway 8 (Route Tampa), which was the Main Supply Route (MSR) of the US 1st Marine Expeditionary Force – the parent formation for 1st (UK) Armoured Division. This was achieved without incident by nightfall after bypassing numerous deserted enemy positions. Nevertheless, the squadron leader, Major Andrew Britton,

A Challenger 2 MBT of Cyclops Squadron, 2 RTR, displays its newly fitted 'desertization' items of dust mitigation skirts attached to the appliqué side armour panels and extended mud flaps front and rear. Note also the thermal exhaust cowls (TECs) fitted to the exhaust outlets to vent hot gases to the rear and thus reduce the vehicle's heat signature in combat. Other modifications included a revised air filtration system and a new rotary base junction. Note the Cyclops insignia below the red jerboa of the Desert Rats on the door of the TIS barbette and the old-style camouflage netting. (RTR)

With the horizon obscured by explosions, the Challenger 2 MBTs of 7th Troop, Cyclops Squadron, 2 RTR, advance along Route Topeka towards the town of Az Zubayr soon after crossing the Kuwait/Iraq border on 22 March 2003 at the outset of the ground war. It was a time of considerable trepidation as intelligence reports indicated there were some 200 T-72 MBTs and 100 BMP IFVs lying in wait within miles of the border. (Andy Topping)

noted the effectiveness of their camouflage and concealment, with deep fortified vehicle scrapes that covered all avenues of approach. Fortunately, they were abandoned and the squadron took up a night defensive position to the south-west of Az Zubayr – AZ to British troops – after relieving A Squadron, SCOTS DG. The task of the squadron was to deny enemy movement out of the western side of AZ and to prevent interference with Route Tampa to the west.

The squadron deployed three of its troops forward, with 8th Troop manning a vehicle checkpoint (VCP), 6th Troop to their south, callsign Zero Bravo and the Forward Observation Officer (FOO) in overwatch centrally and 7th Troop to the south. Squadron Headquarters,

Callsign One Two of 5th Troop, Cyclops Squadron, 2 RTR, approaches the remains of the Ba'ath Party headquarters in Az Zubayr – Objective Brain – after the attacks of 26 March 2003 by a JDAM bomb and concerted tank fire. (MOD)

5th Troop and the LAD (Light Aid Detachment) remained in reserve.[5] As dawn was breaking, an incident occurred at the 8th Troop VCP that led to the tragic death of Sergeant Steven 'TC' Roberts. Despite this setback, Cyclops continued their mission and soon identified the Fedayeen militia headquarters in AZ. A team of snipers moved forward to place the building under observation covered by Three One of 7th Troop (Sgt Andy Topping), Zero Bravo (Maj Andrew Britton) and the FOO (Capt Joe Power) in his Warrior AOP (Artillery Observation Post) in case artillery support became necessary. However, the snipers were spotted and militiamen debouched from the building and engaged the tanks with RPGs and heavy machine-gun fire. The tanks returned fire with coax and HESH rounds before retiring with the unscathed sniper team. It was now apparent that the Iraqi forces, both regular and irregular, were trying to lure Coalition forces into urban areas where their overwhelming firepower would be minimized and heavy casualties inflicted upon them in costly street-fighting.

Armoured raids against specific targets identified by Special Forces troops or local intelligence now became the norm in order to minimize civilian casualties and eliminate the enemy militia, or Fedayeen and Ba'ath Party infrastructure. At dawn on 26 March, Cyclops Squadron attacked the militia headquarters supported by precision-guided close air support from US Marine Corps aircraft that destroyed Objective Brain, the militia HQ, without a single shot being fired in return. At noon, the squadron mounted another raid into the town following reports that militiamen were withdrawing from the vicinity of Objective Brain. But this time the enemy was ready with numerous RPG teams waiting in ambush. 7th Troop led the assault in reverse 'V' formation down the main dual carriageway through the town. Three One 'Crusader' under the command of Sergeant Andy Topping (see Colour Plate B) was on the left with Three Zero

5 2 RTR currently has a particularly interesting tribal composition with the A to D squadrons of a standard armoured regiment having the following names – Badger, Cyclops, Egypt and Falcon; the Headquarters Squadron is known as Nero. Badger is made up of 1st to 4th Troops, Cyclops 5th to 8th and so on. Egypt Squadron was attached to the 1st Black Watch Battlegroup during Operation *Telic* and arrived in Kuwait prior to the main body of the regiment.

'Conqueror' (Lt Sam Clarke) in the centre and Three Two 'Comet' (Cpl Joe Dale) on the right followed closely by Zero Bravo 'Cyclops' and the squadron leader, Major Andy Britton, with 5th Troop following up behind. With extraordinary courage, the militia RPG teams opened fire at the 65-tonne charging tanks at virtually point-blank range.

As 7th Troop was passing the town hospital close to a crossroads, Three One was struck by an RPG-7 round in the turret side, which had no effect beyond blasting the crew's personal effects hanging on the exterior of the tank. Sergeant Topping immediately traversed his turret and engaged the two militiamen with coaxial machine-gun fire at a range of 10m, killing them both. A second four-man militia team was positioned at the base of a building across the junction behind a low stone wall. This team engaged and hit Three Zero with an RPG at a range of 40m, striking the turret armour but causing no damage. Again, Sergeant Topping quickly spotted the enemy and engaged them with a 120mm HESH round killing them all. Another militia team was engaging Three Zero with RPG rockets and small-arms fire from the upper floor of a building to their front. Sergeant Topping again engaged with a HESH round causing the complete destruction of the firing position. He then provided further effective suppressive coaxial machine-gun fire in support of his troop as the squadron group passed through and beyond 7th Troop to Objective Brain. On the route back towards the squadron location, Sergeant Topping spotted militia activity around a static MTLB APC in the vicinity of the hospital close to the original ambush site. Observing militiamen with RPG weapons, he opened fire with three rounds of HESH, killing the assailants. The complete contact lasted approximately 15 minutes. Sergeant Andrew Topping received a 'Commander's Commendation' from the OC, 7th Armoured Brigade, for his professionalism and that of the crew of 'Crusader'.

This was a defining action as it proved Challenger 2 had a high survivability rate against Iraqi infantry anti-tank weapons, even in an urban environment without infantry support, which was traditionally a completely unacceptable tactical scenario for tanks. The three Challenger 2 MBTs of 7th Troop, Cyclops Squadron, suffered seven direct hits from RPG rockets with no significant damage to the tanks or injury to their crews. Operational planning now capitalized on the overt power presence of Challenger 2, with its immediate and flexible firepower for undertaking shock attacks that reduced the need for the infantry to dismount from their Warrior IFVs in the face of concerted small-arms fire. This led to the innovative tactic of undertaking 'raid and aid' operations throughout the British area of operations, using intelligence drawn from numerous sources and striking at the key positions held by the militia or Ba'ath Party officials. Following the raid, humanitarian aid was then provided to the local populace as a means to promote confidence in the Coalition Forces.

'Crusader', the Challenger 2 of the troop sergeant, Sergeant Andy Topping, of 7th Troop, Cyclops Squadron, 2 RTR, halts at the replenishment point after the decisive action at Az Zubayr on 26 March 2003 when the tanks of 7th Troop were hit repeatedly by RPG rockets without any significant damage. Note the impact point of an RPG-7 on the turret side of callsign Three One. (Andy Topping)

The advance on Basra

Meanwhile, B and C Squadrons, The Queen's Royal Lancers, were operating in support of the First Fusiliers Battlegroup in the 'battle for the bridges' over the Shatt-Al-Basra on the western approaches to the city. The fighting was ferocious and sustained as the four battlegroups of 7th Armoured Brigade and 3rd Commando Brigade, Royal Marines, tightened their grip around Basra. At 0120hrs on 25 March, a tragic 'friendly fire' incident occurred to the south-west of Bridge 3, codenamed Leicester, when callsign One Two of C Squadron, QRL, was struck by a 120mm HESH round fired by a Challenger 2 of the 1st Black Watch Battlegroup. The commander, Corporal Steven Allbutt, and the driver, Trooper David Clarke, were killed outright and the remainder of the crew, Lance Corporal Twiddy and Trooper Julien, critically injured. That anyone survived at all was miraculous. It was a severe blow to the battlegroup but the war continued unabated. Major Giles Harrison, the commander of B Squadron QRL, takes up the story of the battle for Basra.

> At 0230hrs ZULU [0630hrs local time] on Wednesday 3 April 2003, three tanks from B Squadron supported by 12 Platoon [Lt Chris Rees-Gay] from Z Company [1 RRF] and a section of Milan, moved forward to the road overpass known as the 'Loop' to put in a Vehicle Check Point (VCP) which changed the timetable for the liberation of Basra. The Brigade Commander [Brig Graham Binns] had given permission for a bold move forward, which would send a message to the enemy that Coalition Forces were ready and poised to take the city. Without laying siege to Basra itself, the enemy were being sent an unequivocal message that the Coalition was in control. It was a gamble; this was the furthest forward that friendly forces had been allowed to push and many anticipated that B Squadron Group would be pushed off the 'Loop' by superior enemy firepower. The plan was for two tanks to move up the slip roads on to the overpass, to cover east and west, whilst one tank pushed forward under the road bridge to cover north. The four Warriors would then move up on to the overpass and put in the VCP, with their vehicles split into

Zero Charlie, the Challenger 2 of the second-in-command (2i/c) of Cyclops Squadron, 2 RTR, takes up position among the tomato fields on the outskirts of Az Zubayr. Of particular note is the position of the GPS antenna, just visible behind the loader's hatch, and the white box of the Blue Force Tracker on the turret roof. As its name implies, this device assisted in identifying the positions of friendly forces and was commonly fitted to the tank of the 2i/c in each armoured squadron. (RTR)

The Challenger 2 MBTs 'Crusader', 'Comet' and 'Conqueror' of 7th Troop, Cyclops Squadron, 2nd Tank Regiment, launch an attack into the town of Az Zubayr on 26 March 2003 under concerted fire from Iraqi militiamen. (Reproduced with kind permission of The Royal Tank Regiment and the artist, David Rowlands)

pairs orientated in different directions, this would allow them to stop two-way traffic and prevent the possibility of a drive-by shooting.

In the event, and predictably, the plan did not survive contact with the enemy. As the Warriors were pulling into position, the lead vehicle spotted a T-55 at about 1,000m with its turret traversing to bring the main armament to bear. Tank callsign Zero Bravo [the squadron leader's tank] pulled forward and engaged, first with HESH and then with DU to make sure. As soon as the DU round hit, the enemy tank started to brew up – a confirmed kill. At the same time callsign Two One [Sgt Gardner], under the bridge, began to report activity from a large number of enemy RPG teams that were moving into position to his front. I realized that unless I committed more combat power I would run the risk of being forced back. I decided to call forward Three Zero [SSgt Southam] and Three Two [Cpl Driver]; Three Zero moved under the bridge to support Two One, Three Two moved up on to the overpass to support Two Two [Cpl Uprichard] who was orientated east and had spotted further RPG teams in the buildings to his front. The plan worked. Callsign Three Zero immediately took control of the situation and kept me informed as he and Two One dealt with the enemy dismounts. Once an RPG team took refuge in a building to avoid the scything coax fire, the tanks would drop the building with HESH. This tactic served to demoralize the enemy who had no means of replying.

The commander of 1 RRF Battlegroup [Lt Col David Paterson], who had been watching our progress with interest, called me back to the slip road on to the 'Loop' for a quick conference; he was content that we probe the enemy whilst continuing with our task. This seemed to me to be an excellent idea. About two hours into the task, the US Field Human-Intelligence Team (FHT) equipped with Arab speakers was cut to me. They proved to be extremely useful

E: Challenger Armoured Repair and Recovery Vehicle, Light Aid Detachment, Royal Electrical and Mechanical Engineers, C Squadron, The Royal Scots Dragoon Guards, Operation *Telic*, Al Faw Peninsula, Southern Iraq, 30 March 2003

and we started to gain some excellent intelligence. Perhaps the most significant fact learned was that the Coalition had the Basra University and the Naval Academy marked incorrectly on our maps. We were also told that the University had two T-55s on guard outside it. I realized from a quick map recce that, if this was so, then the first tank that had been destroyed was probably one of the reported T-55s. I called forward Four Zero [Capt Horne] to act as wingman, and together we pushed forward to have a look. As Zero Bravo rounded the corner leading to the University my driver spotted a T-55 at 400m, the gunner pumped a DU round into it and into a military truck that seemed somewhat surprised to see us. We had now confirmed the location of Basra University.

Meanwhile, under the bridge, Three Zero and Two One were still fighting hard. I decided to commit Four Zero to the fray. It was now apparent that it was in this area that the enemy were concentrating their Main Effort. Shortly after this decision, we were mortared for the first time that day. Luckily for us, the enemy seemed pretty bad at adjusting fire, although it was somewhat poetic that the FOO [Forward Observation Officer] got his Raven sight knocked out by the first round. The indirect fire did not affect our mission. Challengers and Warriors closed down, I ordered the majority of the dismounts to remount and await further orders. The FHT pulled back from the 'Loop' until the mortar fire died down because they were mounted in Hummers. Under the bridge the makeshift troop pushed forward; they discovered a number of enemy mechanical diggers and the start of an earthwork, obviously designed to delay our progress into Basra. The diggers were destroyed to prevent their further use. The 'Troop' even got eyes on to the Iraqi Naval Academy and despite constant fierce fighting, during which Two One was hit by an RPG that failed to detonate, they brought in an effective fire mission killing over 30 combatants inside the Academy.

Once the indirect fire had stopped, I called back the FHT and carried on with the VCP. I was determined to collapse the VCP on my terms, not the enemy's. After ten hours we had largely silenced enemy resistance, and callsigns Two One, Three Zero and Four Zero were dangerously low on ammunition, at this point I decided to pull back. That evening, the GOC [Maj Gen Robin Brims] and the Brigade Commander congratulated the squadron on a job well done and staff officers stopped saying that Basra would not fall until after Baghdad.

The Challenger 2 bridgelayer is named Titan. With the three-man crew completely protected under armour, Titan can carry and launch the 26m-long No 10 Tank Bridge within two minutes to span gaps up to 24.5m. It can also carry and launch the 13.5m-long No 12 Tank Bridge, as shown here, within 90 seconds. These bridges can be retrieved from either end for maximum tactical flexibility. Like Trojan, Titan can be fitted with the universal dozer kit or track-width mine plough. (Simon Dunstan)

REME to the rescue

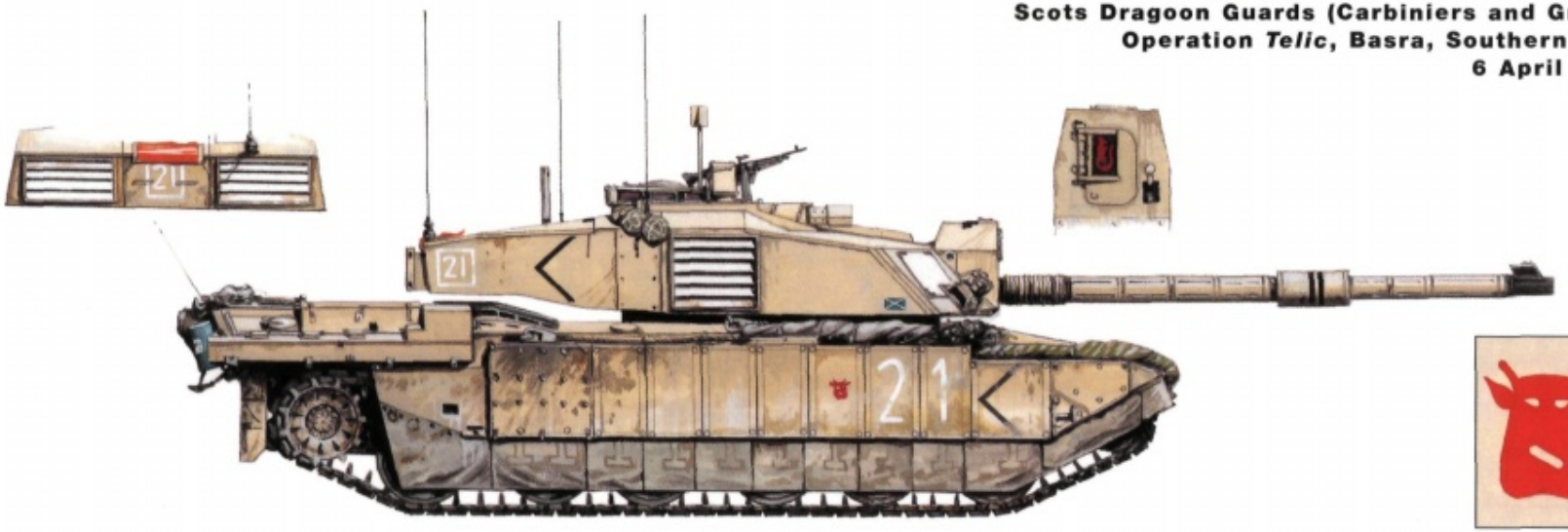
Further to the south, the SCOTS DG Battlegroup was acting as the brigade reserve, although A Squadron was part of 1st Black Watch Battlegroup and

C Squadron was attached as armour support to 3 Commando Brigade, Royal Marines, operating in the Al Faw Peninsula. There, C Squadron – Cruel C – conducted Operation *James* between 29 and 31 March in conjunction with 40 Commando, Royal Marines, as they advanced into the area of Abu-al-Khasib, a suburb south of Basra. The marshy salt flats of the peninsula were particularly poor terrain for the 65-tonne tanks and movement was often precarious and difficult, with the tanks confined to the narrow, raised earthen causeways more suited to horse and cart than AFVs. On the morning of 30 March, Delta Company, 40 Commando, Royal Marines, supported by 2 Troop, C Squadron, was tasked with the capture of two objectives rejoicing in the codenames of Pussy and Galore – Operation *James* referred to James Bond and all the objectives were given names drawn from the Ian Fleming novels. Callsign Two Two was in the van followed by Two One, commanded by Sergeant David Baird, and Two Zero interspersed with the Commandos in their Pinzgauer trucks, while in support were the squadron leader, Major Jonathan Biggart, in Zero Bravo, the FOO in his Warrior AOP and a CRARRV, callsign Three Three Bravo, from 2nd Battalion, REME, commanded by Corporal John Morgan. Their target was a crossroads that commanded the southern approaches to Basra.

The causeway was so narrow that the tanks and trucks advanced on a single vehicle frontage; deep ditches to each side also made manoeuvring nigh on impossible. Soon after 1130hrs, as the advancing force neared the crossroads, it came under concerted RPG and machine-gun fire from a group of mud shacks and buildings to the left front. Two Two was soon hit four times by RPGs and was forced to withdraw. Other Fedayeen rushed forward grasping children in one hand and weapons in the other. Sergeant Baird in Two One forbade his crew to return fire until the children broke free and escaped. A single HESH round killed six militiamen followed by coaxial machine-gun fire that eliminated a dozen more. The first enemy burst of automatic fire smashed the driver's vision block of Two One so that Trooper Ilivia 'Mac' Macawai from Fiji could no longer see anything; an RPG round also struck the right-hand headlight. With reckless determination, the enemy closed with the tanks and concentrated their fire at the vehicle sights. In short order, RPG rockets destroyed the gunner's primary sight as well as the coaxial chain gun and left-hand smoke discharger. Another RPG impacted on the turret roof and, in the ensuing explosion, two of the commander's rear view vision blocks were destroyed. The driver now had no forward vision and the commander very little to the rear. Inside the blinded tank, nerves were becoming strained. The tank commander, Sergeant Baird, calmly ordered the driver to reverse but an empty Commando Pinzgauer truck blocked the withdrawal. Intending to push it aside, Sergeant Baird gave the order 'left stick' to direct the driver. Unfortunately, the inexperienced Trooper Macawai, who had only been with the regiment since Christmas, pulled the right stick instead, causing the tank to veer off the causeway into a deep ditch, shedding both tracks.

The other tanks jockeyed into position to provide suppressive fire on the enemy. The FOO called for a fire mission from the supporting 105mm Light Guns of 29 Commando, Royal Artillery. Inside Two One things went from bad to worse when a wire-guided anti-tank projectile struck the front of the turret, flinging the loader, Trooper William Frazer, backwards and

F1: Challenger 2, B Squadron, The Royal Scots Dragoon Guards (Carbiniers and Greys), Operation *Telic*, Basra, Southern Iraq, 6 April 2003

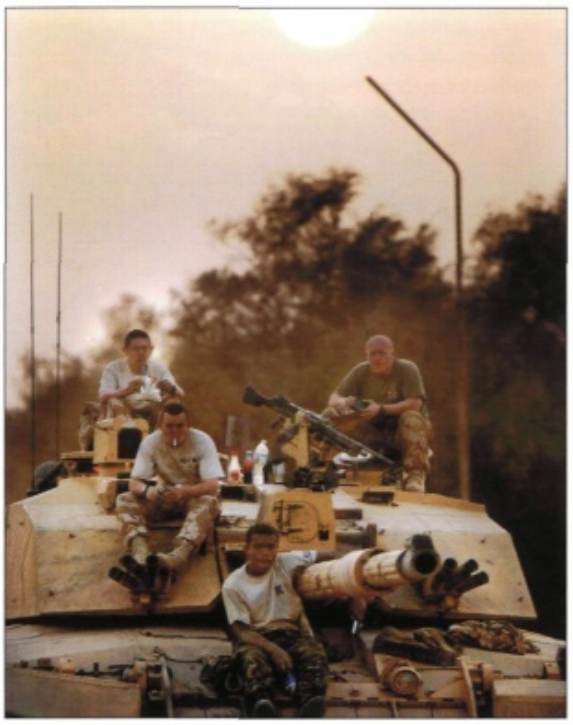


F2: Challenger 2, The Queen's Royal Hussars Battlegroup, Exercise Medicine Man 1, Batus, Canada, May 2003

breaking his wrist. Eventually, the enemy fire slackened under the sustained bombardment of tank and artillery shells, although sporadic small-arms and mortar fire continued. It was time to recover the stricken Two One from the ditch. With considerable difficulty, CRARRV Three Three Bravo moved forward to the site but the situation was dire. With both tracks shed and jammed around the suspension under great tension, the tank was completely immobile. It would require a pull in excess of 100 tonnes that was beyond the capability of even the powerful CRARRV. And so it proved when the winch of Three Three Bravo failed under the effort. The CRARRV was obliged to withdraw taking with it the injured loader from Two One for medical treatment as well as its gunner, Trooper Stuart Ferguson.

The C Squadron, REME, Light Aid Detachment, was called forward with its CRARRV, callsign Two Four Charlie, commanded by Corporal James Garrett with recovery mechanic Corporal Justin Simons and technician Corporal Rick Parker (see Colour Plate E). As it approached the site, Two Four Charlie picked up Corporal John Morgan, the commander of CRARRV Three Three Bravo. The disabled Challenger 2, Two One, was still under enemy fire as the light began to fail in the late afternoon. At the outset, Two Four Charlie fired its smoke-grenade dischargers to mask the recovery operation as Corporals Morgan, Simons and Parker attached the winch rope to the stranded tank and gently pulled it on to the causeway; however, the angle was so acute and the roadway so narrow that it slid down the opposite side into an even more difficult position. In addition, the winch rope of Two Four Charlie snapped, so both CRARRVs were now for all intents and purposes out of action. Undeterred, the REME team tried to break the tracks with conventional tools but the tension was much too great. As darkness fell the enemy returned in strength, attempting to infiltrate the position, but Corporal Garrett laid down effective suppressive fire from his roof-mounted machine gun as the mechanics continued with the recovery operation. Throughout, the other tanks provided supporting fire and artillery fired HE and smoke shells to mask the scene.

By now the darkness was interspersed with the crump of impacting mortar rounds combined with the lazy arcs of tracer fire and RPG rockets as the enemy tried to disrupt the recovery operation, forcing the REME mechanics to dive for cover when enemy small-arms and RPG fire fell close by before returning to the task in hand. Corporal Simons resorted to desperate measures by trying to cut the tracks with arc-welding equipment that highlighted his position to the enemy in the darkness.[6] This too failed. Eventually, he decided on a most unorthodox recovery technique whereby he combined the two CRARRVs, Two Four Charlie and Three Three Bravo, which had returned to the scene, together by chains, and with A-frame drawbars attached to the victim from Two Four Charlie. This audacious method was successful and, some 14 hours after the original incident, Two



The crew of Two One, C Squadron, SCOTS DG, grab a meal during Operation *James* prior to the extraordinary action they fought in support of Delta Company, 40 Commando, Royal Marines, at Abu-al-Kashib. At the commander's position is Sergeant David Baird (with his Kilmarnock FC supporter's scarf close to hand) while beside him is his loader/operator Trooper Stuart Ferguson and to his front his gunner, Trooper Willie Frazer. With his arm draped round the 120mm gun is the driver, Trooper Ilivia 'Mac' Macawai. (SCOTS DG)

6 Since World War II, REME recovery mechanics have been trained in the technique of cutting tracks that are jammed around a tank's suspension with explosives. If explosive cutting charges had been available, Two One could have been recovered in minutes rather than hours.

Besides its dozer blade, Trojan incorporates a hydraulically operated Caterpillar Model 319 excavator bucket that is used for clearing obstacles as well as for digging. For self-defence, the three-man crew has a remotely controlled weapon station with all-round traverse and an integral thermal imaging observation device. There are numerous other cameras, or indirect viewing systems, for the crew to monitor every aspect of vehicle operation on their individual display units when working 'closed down' under armour. A 'midi-pipe' fascine can also be carried over the rear decks to fill water-filled anti-tank ditches or streams. The fascine is deployed and retrieved by the excavator arm. (Simon Dunstan)

One was dragged back to friendly lines some 3km away. Within four days Two One was repaired with new sights, roadwheels and tracks. It had been hit a total of eight times by RPGs and an ATGW missile without penetration of the crew compartments. For their professional diligence and bravery under fire, Corporals Garrett and Simons of the Royal Electrical and Mechanical Engineers were both Mentioned in Despatches.

The battle for Basra

By the first week of April, Basra was ripe for the plucking. The Ba'ath Party and both regular and militia forces had been seriously degraded by repeated raids and precision aerial attacks without causing undue casualties among the civilian populace. All the battlegroups of 1st (UK) Armoured Division were steadily encroaching on the city. By now, B Squadron, SCOTS DG, were based at a camp known as Dundee from where they mounted raids into the city. On Thursday 3 April, the squadron conducted a raid along Route Red, the codename for the south-western highway into Basra, in conjunction with Nos 1 and 2 Companies of the Irish Guards in their Warrior IFVs. By early morning, the infantry was well ensconced in the primary objective that was the Technical College just beyond Bridge 4. To increase the pressure on the enemy, several raids a day were undertaken with the tank troopers working 22 out of 24 hours; guarding, patrolling, fighting and finally maintaining the tanks for the next round with perhaps a few minutes' sleep. All the while the tenacious enemy fought with great determination and never faltered in the face of the overwhelming onslaught of the Coalition forces.

On Saturday 6 April, three troops of B Squadron, as well as Squadron Headquarters, raided further along Route Red as the tanks destroyed any barricades across their path. Captain Ran de Silva, 2nd Troop leader, and his crew had a rude shock when a seemingly abandoned T-55 fired a 100mm round that struck the central ERA panel protecting the nose of their Challenger 2. After a spectacular explosion, there was no penetration of the tank. Within seconds, the whole troop opened up on the hapless T-55, destroying the enemy tank completely. The tanks now passed a complex of buildings identified as a Ba'ath Party command and

Callsign Five Two thunders down the road in a cloud of dust as it approaches Camp Abu Naji following a night patrol to deter infiltration by insurgents around the outskirts of Al Amarah – 'Show Me The Way To Al Amarah' – on New Year's Day 2005. During Operation *Telic 5*, The Royal Dragoon Guards fielded two squadrons of Challenger 2 MBTs – A Squadron, 'The Blue Horse', and C Squadron, 'The Black Dragoons'. Each squadron had two troops with three tanks each and one for the squadron commander. A further two MBTs served with Regimental Headquarters giving a total of 16 tanks with the remainder held in reserve. In A Squadron, RDG, the tanks were employed by 3rd and 5th Troops while 1st and 2nd Troops were equipped with Land Rovers, both armoured and unarmoured, while 4th Troop were part of the regiment's reconnaissance troop. Accordingly, callsign Five Two is the troop corporal's tank of 5th Troop, A Squadron, with Corporal 'Dinger' Bell in command, Lance Corporal Danny Teall as loader/operator, Trooper 'Jono' Johnson as driver and Trooper 'Austin' Powers as gunner. One of the standard modifications in Iraq is the addition of a metal picket stanchion 'cheesecutter' welded to the left front smoke-grenade discharger to protect the turret crew from overhead wires. (RDG)

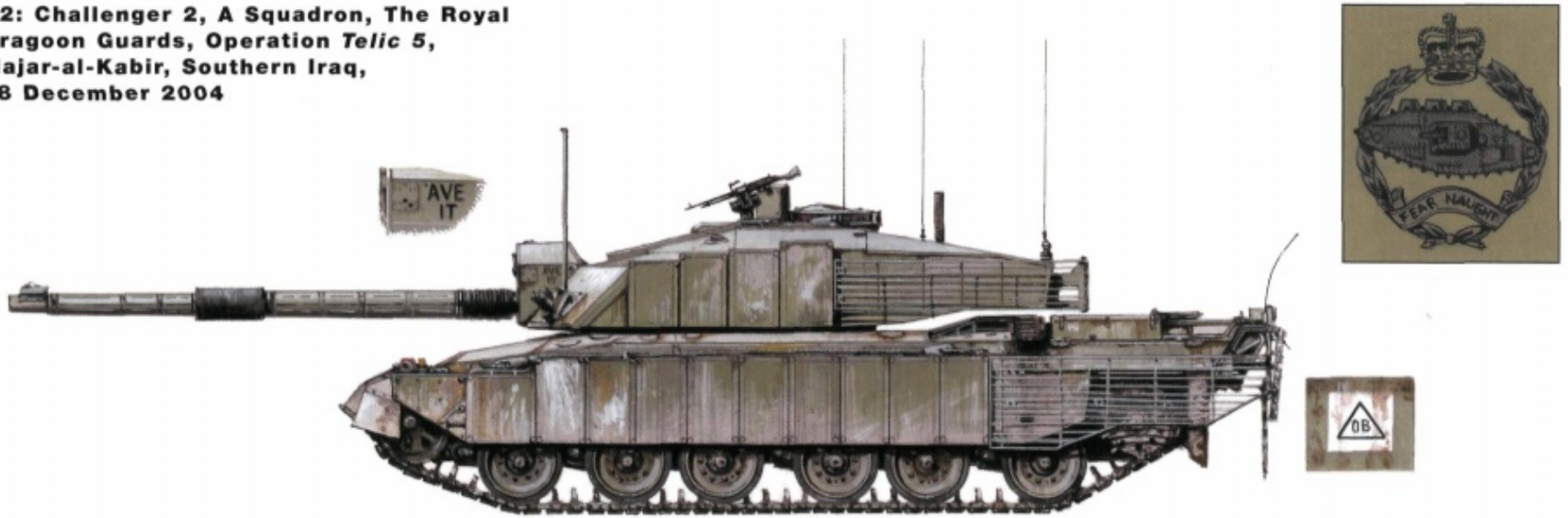
control centre. Like ships of the line, the tanks fired broadsides into the buildings and bunker positions as well as the lattice communications tower of a nearby television station, an event recorded for British television by a camera mounted on the turret of Zero Bravo, the Challenger 2 of the squadron leader, Major Chris Brannigan. The raid was deemed so successful that yet another was planned for the following day.

B Squadron was tasked to mount a deeper raid along Route Red as far as Objective Granite, a place known as the 'Gateway to Basra' – symbolically, whoever held the gateway held the city. It was to be another exhausting day for the SCOTS DG Battlegroup and the 'Mutants' of B Squadron who were in the van once more. 2nd and 4th Troops led the advance to provide a base of fire at RED 4 as 1st and 3rd Troops passed through and on towards the College of Literature, or Objective Elysium. There a brisk firefight ensued with 3rd Troop destroying numerous bunker positions and causing widespread enemy casualties. It was hard pounding all day as the Mutants advanced into Basra, causing the systematic destruction of enemy positions and AFVs. By midday, 3rd Troop had expended virtually all of their main armament ammunition and were relieved in place by 2nd Troop. Attention now returned to the College of Literature that remained uncleared of the enemy. Supported by 5th Platoon, No 2 Company, Irish Guards, Zero Bravo smashed through the front gates followed by Zero Charlie and 2nd Troop to find the ground littered with bodies. The infantry were called forward in their Warriors to search the complex.

Suddenly, the bodies rose up from 'dead' and began to engage the tanks and Warriors with RPGs and small-arms fire. A desperate close-quarter struggle ensued. One unfortunate militiaman met his death in an unequal 25m engagement between his Kalashnikov and a 120mm HESH round from a Challenger 2 MBT, while another was crushed by tank tracks as he rose to fire his RPG. No 1 Company, Irish Guards, rushed forward and dismounted from their Warriors to clear the complex although it was much too great a task for a single infantry company. Nevertheless the enemy was eventually subdued, although not without casualties. As the light was failing, another militiaman feigning death rose up from the shadows and fired into the back of a Warrior, killing two guardsmen and seriously wounding two others. When the dead were searched later, most of them turned out to be foreign nationals from Tunisia, Morocco, Egypt,

G1: Challenger 2, A Squadron, 1st Royal Tank Regiment, Exercise Aurora, South Carolina, USA, 3 July 2004

G2: Challenger 2, A Squadron, The Royal Dragoon Guards, Operation *Telic 5*, Majar-al-Kabir, Southern Iraq, 28 December 2004



A worn and battered Challenger 2 *of 12th Troop, Egypt Squadron,* 2 RTR, illustrates the configuration of the explosive reactive armour (ERA) array on the toe plate and the appliqué armour on the glacis plate, masked here by an Israeli camouflage net. Note the prominent CIPs on the front turret faces. These were mutual recognition devices for the Coalition forces and relied on the principle of varying thermal characteristics of different materials. (RTR)

With Basra burning in the background, the exhausted crew of Two One, B Squadron, SCOTS DG (see Colour Plate F1), catch a moment's rest after removing their helmets and body armour at the end of hostilities on 7 April 2003. Note the thermal indicator panel on the turret side and the B Squadron thermal indicator on the turret roof. (SCOTS DG)

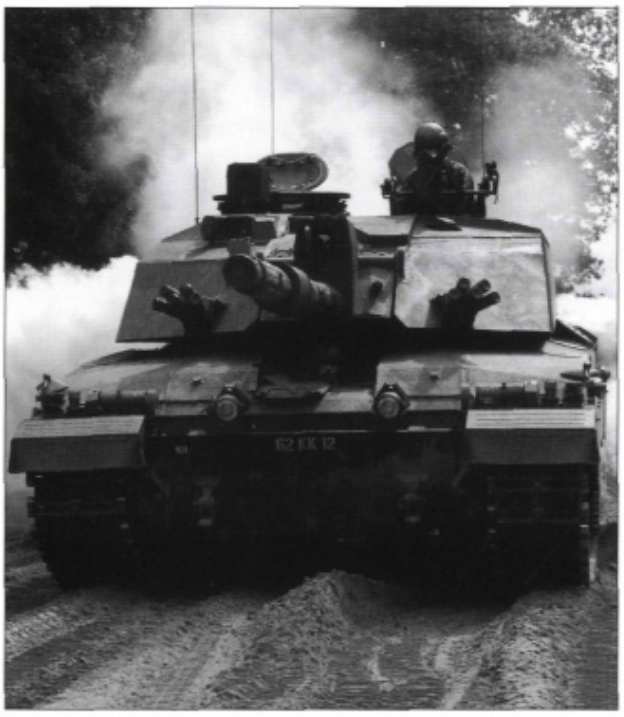
Syria and other Arab states that had come to Iraq to fight for Saddam Hussein against the Coalition forces. None of them was able to use the return portion of the airline tickets found in their kitbags.

After many hours of fierce fighting, the exhausted Mutants were relieved in place by C Squadron at 1500hrs. They returned to Dundee to replenish their tanks and undertake essential maintenance tasks with the promise that they would be stood down for at least 12 hours for rest and recuperation. Four hours later, the squadron was tasked to support 3rd Parachute Battalion in a further assault into the oldest part of Basra, a maze of alleyways and narrow streets hardly suited to 65-tonne MBTs. A troop of tanks was attached to each Parachute company with Squadron Headquarters joining 3 PARA Tactical HQ. The clearance operation began at first light. The mood in the city was strikingly different from the day before. Resistance melted away and the local populace came out to greet the troops as the battlegroups of 1st (UK) Armoured Division linked up in the centre of Basra. Within minutes, crew helmets were exchanged for grey, black, maroon or green berets, as well as hackles and tam-o'-shanters. The transition from warfighting to peace-support operations was as sudden as it was welcome. Then the looting began.

COLOUR PLATE COMMENTARY

A1: CHALLENGER 2 COMMAND TANK, REGIMENTAL HEADQUARTERS, THE ROYAL SCOTS DRAGOON GUARDS (CARBINIERS AND GREYS), EXERCISE ULAN EAGLE, POLAND, OCTOBER 1999

The Royal Scots Dragoon Guards was the first armoured regiment to be equipped with Challenger 2 and the first to use it on field training exercises in Canada and Poland. One One Bravo was the command tank of the commanding officer, Lieutenant Colonel Andrew Philips, during the 7th Armoured Brigade field training exercise conducted at Drawsko Pomorske Training Area in Poland during October 1999. The tank is painted in the standard British Army camouflage scheme of black stripes over a base colour of dark green. As a reflection of their antecedents, the Carbiniers and Greys, all the tactical markings such as the callsign One One Bravo are painted in grey as is the Lion Rampant on the turret sides to denote the CO's tank. The Lion Rampant is also flying from the radio antenna. As a command tank this Challenger 2 has an extra HF radio set and antenna but as a deliberate *ruse de guerre* to disguise command and control tanks, all Challenger 2 MBTs in the British Army carry three radio antennae at all times. Low down on each side of the turret front is a diminutive cross of St Andrew – the Saltire – as the SCOTS DG is known as The Scottish Cavalry. The Vehicle Registration Number (VRN) 66KK82 is displayed centrally on the front lower hull plate and at the top right of the rear hull. On each side of the front VRN is a small black rectangle with a vehicle 'zap code', 400, superimposed in white. Centrally on the rear hull plate above the towing bar is the convoy distance marker consisting of an illuminated square with alternating black and white stripes, which allows the driver of a following tank to maintain a safe distance at night.



A2: CHALLENGER 2, B SQUADRON, THE ROYAL SCOTS DRAGOON GUARDS (CARBINIERS AND GREYS), OPERATION *AGRICOLA* 3, KOSOVO, MAY 2000

B Squadron – Beautiful B – of The Royal Scots Dragoon Guards was the first unit to deploy Challenger 2 operationally as the other squadrons in the regiment were acting in the infantry role. The tank is fitted with appliqué armour panels on the sides and front; those on the sides are passive arrays while those on the front are of the ERA type. These are fitted in a warfighting role and are designated Dorchester Level 2. The VRN is displayed vertically on the top right of the rear with a small Union Flag to the left. 62KK80 was commanded by Corporal Andy Potter and the vehicle callsign, One One, is displayed in a stencilled square on the rear turret sides and far right on the rear of the turret. Again, the tactical markings are painted in grey and again the tank carries the Saltire on the turret sides. Camouflage netting masks the turret and main armament. The tank is shown during a road running patrol that was a standard part of Operation *Scotsman* during the deployment to Kosovo.

B: CHALLENGER 2, CYCLOPS SQUADRON, 2ND ROYAL TANK REGIMENT, OPERATION *TELIC*, AZ ZUBAYR, SOUTHERN IRAQ, 26 MARCH 2003

During Operation *Telic*, all the tanks of Cyclops Squadron had names beginning with the letter 'C'. Those of 7th Troop were named after former British tanks – 'Conqueror', 'Comet' and 'Crusader' – although whether the latter was really appropriate in the theatre of operations remains open to debate. 'Crusader' was commanded by Sergeant Andy Topping with Lance Corporal Jason Hammell as loader/operator, Trooper Andy Collens as gunner and Trooper Wayne Lee as driver. The tank took part in the decisive action described on pages 29 to 32 during the assault on the town of Az Zubayr. The tank is painted overall in sand yellow with black stencilled tactical markings including the vehicle callsign, Three One, on the side armour panels, turret sides and offset to the right on the turret rear within a stencilled square; subsequently the callsign was applied centrally when thermal indicator panels (TIPs) were later fitted to the tank. The square indicates the second squadron within the regiment, in this case Cyclops Squadron within 2 RTR, and the three white rings on the fume extractor of the main armament the third troop in the squadron, in this case 7th Troop. This is repeated on the lower rear hull plate as a convoy distance marker and vehicle-identifying marker during night replenishments. The leftward-facing black chevron was the mutual recognition device for the Coalition

The design of Challenger 2 incorporates stealth technology to reduce its radar and thermal signatures. It also features smoke-grenade dischargers on the front turret faces to create an instant smoke screen to mask the tank, as do the engine smoke generators as shown here. Note the loader's D-mount for his L37A2 7.62mm machine gun that was fitted to early production models of Challenger 2. This proved unpopular with crews and a simpler pintle mount has been subsequently installed during Base-Level Inspection and Repair. (VDS)

The Challenger 2E began as Project Exmouth based on prototype V9, 06SP95, but space limitations preclude a full account of this version of the MBT. Suffice to say, it features many enhancements, not least of which is the MTU/Renk 1,500bhp EuroPowerPack and full thermal imaging for both the gunner's and commander's primary sights, that takes Challenger 2E at least half a generation beyond the standard MBT. VDS subsequently purchased the tank from the MOD and it became the export model of Challenger 2 for the company, latterly Alvis Vickers Ltd and now BAE Systems Land Systems. By combining the best elements from around the world with German automotives, French sights, a North American fire-control system and British armour protection, Challenger 2E is a truly formidable MBT. (VDS)

forces. It is painted on the turret sides and offset to the left on the turret rear as well as on the side armour panels. The vehicle name, 'Crusader', is painted on each forward side armour panel. The VRN DS35AA is applied at the top right of the rear hull plate together with a Union Flag. On the door of the TIS barbette housing is the red jerboa of 7th Armoured Brigade – the Desert Rats. Beneath that is the insignia of Cyclops Squadron. This is repeated offset to the left on the rear of the turret. The tank carried combat indicator panels (CIPs) on each front face of the turret but no TIPs on turret sides or rear during the action at Az Zubayr, although the mounting holes had been drilled. There was a shortage of TIPs at the outset but they were later added to each side of the turret rear obscuring the rear-facing callsign, which was reapplied centrally between the black chevron and squadron insignia. The crew's personal kitbags were hung from the radio antennae; although they were prone to combat damage there was insufficient space to stow them inside the tank. Due to a shortage of supplies, Three One did not display an air recognition panel during the action at Az Zubyar.

C: CHALLENGER 2, B SQUADRON, THE QUEEN'S ROYAL LANCERS, OPERATION *TELIC*, 'THE LOOP', BASRA, SOUTHERN IRAQ, 3 APRIL 2003

This Challenger 2 is the mount of Staff Sergeant John Southam, the troop leader of Three Troop, B Squadron, QRL, during the action at the 'Loop' described on pages 33 to 36. The callsign, Three Zero, is painted on the side armour panels and rear quarters of the turret sides. A detachable black plate, outlined in a yellow square representing B Squadron, combined with the vehicle callsign also in yellow, is attached centrally to the rear of the turret. Three Zero indicates the troop leader as does the tennis ball impaled on the right rear radio antenna as viewed in the colour plate: a device peculiar to the QRL to indicate commanders' tanks. The crossed lances and pennants of The Queen's Royal Lancers is displayed on the left-hand side of the turret behind the TIP and forward of the rear-facing black chevron that is also applied to the side armour panels. CIPs are carried on the front faces of the turret and two further four-louvre TIPs are attached to the rear of the turret. Again an orange air-identification panel is visible on the top of the turret. Draped round the front of the vehicle is an Israeli camouflage net. Characteristic of many QRL tanks during Operation *Telic*, the thermal sleeve of the main armament was not painted in desert yellow. The rest of the crew comprised Corporal Burnett as loader/operator, Trooper Spiers-King as gunner and Trooper Whitby as driver. Sergeant Southam was Mentioned in Despatches for his actions at the 'Loop'.

D: CHALLENGER 2, A SQUADRON, KING'S ROYAL HUSSARS, EXERCISE SABRE'S THRUST, SALISBURY PLAIN, FEBRUARY 2006

See plate for full details.

E: CHALLENGER ARMOURED REPAIR AND RECOVERY VEHICLE, LIGHT AID DETACHMENT, ROYAL ELECTRICAL AND MECHANICAL ENGINEERS, C SQUADRON, THE ROYAL SCOTS DRAGOON GUARDS, OPERATION *TELIC*, AL FAW PENINSULA, SOUTHERN IRAQ, 30 MARCH 2003

With its callsign, Two Four Charlie, this CRARRV is depicted during the recovery operation portrayed on pages 37 to 40. The vehicle is painted overall in desert yellow and is fitted with dust mitigation skirts. On each side is the vehicle callsign of Two Four Charlie within a circle denoting C Squadron, SCOTS DG, as is the Saltire just above the vehicle exhaust outlets. As a mutual recognition device, the CRARRV has a left-facing black chevron on each side. The VRN is 46KJ89 carried front and rear. Lashed to the gun planks on the hydraulic crane is

As replacements for the venerable Chieftain Armoured Vehicle Royal Engineers (CHAVRE) and the Chieftain Armoured Vehicle Launched Bridge (CHAVLB), the Engineer Tank Systems led to the development of Challenger 2 models with comparable mobility and protection to those of the MBT. The Challenger AVRE is named Trojan. It is a sophisticated obstacle-breaching vehicle. Its highly capable universal dozer kit can dig 25m of anti-tank ditch an hour and a tank scrape within minutes. Trojan can also be fitted with a full-width mine plough in place of the dozer for mine clearing, in conjunction with a trailer-mounted rocket-propelled Python explosive mine-clearing hose. To this end, Trojan has much enhanced mine blast protection over the standard MBT. (Simon Dunstan)

an orange air-identification panel and there is a further fluorescent orange rectangular safety marker painted on the very top of the jib. With the failing light, the recovery mechanic, Corporal Justin Simons, was obliged to use cutting equipment that highlighted his position and the CRARRV to the enemy as the vehicle commander, Corporal James Garrett, gave covering fire with his roof-mounted L37A2 7.62mm machine gun. Throughout the action, the flag of the Corps of Royal Electrical and Mechanical Engineers flew from the CRARRV's radio antenna. The REME crew of Two Four Charlie comprised Corporal Jay Garrett, Corporal Justin Simons, Corporal Rick Parker together with Corporal John Morgan.

F1: CHALLENGER 2, B SQUADRON, THE ROYAL SCOTS DRAGOON GUARDS (CARBINIERS AND GREYS), OPERATION *TELIC*, BASRA, SOUTHERN IRAQ, 6 APRIL 2003

Under the command of Sergeant Andy Potter, Two One is depicted during the battle on Route Red during the final assault on Basra codenamed Operation *Sinbad*; the other 'Mutant' crewmen were Trooper Kevin Young as loader/operator, Trooper Callum Griffiths as gunner and Trooper 'Doc' Docherty as driver. The tank is fitted with the full panoply of CIPs and TIPs on all turret faces as well as Dorchester Level 2E armour, thermal exhaust cowls (TECs) and dust mitigation skirts. The callsign, Two One, is painted in white on the turret sides and rear as well as on the side armour panels. The two black rings around the fume extractor denote B Squadron, as does the square metal device on a stalk beside the commander's cupola. This is a thermal indicator and is peculiar to the SCOTS DG. A triangular one signifies A Squadron, square B, circular C and rectangular D. However, C Squadron has taken the system one step further with two shapes on the stalk. With the circular C Squadron sign at the bottom, the same shapes are added above to show each troop within the squadron. Thus, a triangle above the circle indicates 1st Troop of C Squadron and so on – two circles being 3rd Troop, C Squadron. These shapes are visible through TOGS at night and in poor visibility. Another indicator of the Beautiful B is the 'Mutant' squadron insignia emblazoned on the side armour panel behind the callsign. Not known for being the most handsome personnel in the regiment, the term 'Mutants' originated with Sergeant 'Tam' Spence and was encapsulated in a graphic design created by Lance Corporal Frankie Kyle. It now adorns much B Squadron equipment. Taped to the top of the TIS barbette is a small Union flag and an orange air-recognition panel is lashed to the turret roof. A small Saltire adorns each side of the turret at the forward bottom edge. The VRN DR17AA appears on the top right of the rear hull plate.

F2: CHALLENGER 2, THE QUEEN'S ROYAL HUSSARS BATTLEGROUP, EXERCISE MEDICINE MAN 1, BATUS, CANADA, MAY 2003

This Challenger 2 is painted in the green and yellow camouflage scheme characteristic of the vehicles of the British Army Training Unit Suffield, BATUS, in Canada. Highly realistic live-firing exercises are conducted there and safety is a prime consideration. To this end there are white stripes on the turret roof known as the '45s' that are visible through the commander's and gunner's sight and serve to indicate the safe arcs of fire when using live ammunition. Similarly, the commander's primary sight has red and green patches on each side so that range safety staff know at all times exactly in which direction the CPS is facing. Behind the commander's cupola is another safety feature – a red metal triangular device indicating that the tank's weapon systems are loaded with live ammunition and ready to fire. On the turret sides and rear are the vehicle callsign, One Two. This is also painted on the side skirts as is the vehicle 'zap code'. The VRN is DP73AA.

G1: CHALLENGER 2, A SQUADRON, 1ST ROYAL TANK REGIMENT, EXERCISE AURORA, SOUTH CAROLINA, USA, 3 JULY 2004

At 0745hrs on 3 July 2004, the United States of America was 'invaded' by foreign tanks when Challenger 2 MBTs of 1st Troop, A Squadron, 1 RTR, waded ashore from LCUs (Landing Craft Utility) of HMS *Albion* on to Onslow Beach at Camp Lejeune, the home of the US Marine Corps. The four Challenger 2 MBTs of A Squadron, 1 RTR, were acting as tank support to 42 Commando, Royal Marines, during Exercise Aurora, a joint exercise involving troops from Britain, France, Holland and the USA. The four tanks belonged to The Queen's Royal Lancers and were repainted in Royal Tank Regiment markings for Exercise Aurora. As a composite troop, it had four tanks with the fourth one under the command of Sergeant 'Frog' Weeks having the callsign One Three. This is displayed within the triangle of A Squadron and is painted in yellow on the turret sides and rear as well as the forward side skirts. Centrally on the turret rear to the left of the callsign is a large decal bearing the Fear Naught crest of the

Both Titan and Trojan are fitted with the latest version of the Challenger 2 powerpack incorporating the CV 12 TCA No. 3 Mk 8A engine and TN54E transmission that provide increased durability, improved low-speed performance and reduced fuel consumption. They also feature a new double-pin track and the latest perforated roadwheels. There is a requirement for 33 Trojans and 33 Titans, with the last Chieftain AVREs and AVLBs being replaced in 2008. (Simon Dunstan)

The drum horse 'Ramillies' and a piper of The Royal Scots Dragoon Guards lead a ceremony on the tank park at Fallingbostel in Germany. Challenger 2 is currently scheduled to remain in service until 2035. During that time it will undergo many modifications and improvements under the auspices of a programme known as HARM (Heavy Armour Road Map). The most fundamental aspect being addressed is CLIP – the Challenger 2 Lethality Improvement Programme. CLIP envisages the fitting of a new 120mm smoothbore gun in place of the L30A1 that will entail an extensive redesign of the ammunition stowage. In addition an independent panoramic thermal-imaging solution for the commander's primary sight is a priority. Whatever the outcome, the Chally will remain one of the most formidable MBTs currently in service and one of the few that has been proven in battle. (SCOTS DG)

Royal Tank Regiment. At the forward bottom edge of the turret sides is the Chinese Eye insignia of 1 RTR, acquired following its amalgamation with 4th Royal Tank Regiment that traces the symbol back to World War I. Around the fume extractor is a single white band indicating 1st Troop. The VRN is DR88AA.

G2: CHALLENGER 2, A SQUADRON, THE ROYAL DRAGOON GUARDS, OPERATION *TELIC 5*, MAJAR-AL-KABIR, SOUTHERN IRAQ, 28 DECEMBER 2004

Like Operations *Palatine* in Bosnia and *Agricola* in Kosovo, Operation *Telic* has become another longstanding commitment for the British Army. An armoured regiment is deployed for a six-month roulement in support of the British forces in Southern Iraq. This Challenger 2 belongs to A Squadron, The Royal Dragoon Guards, and is the mount of the squadron leader, Major Dan Rawlins. Accordingly, the tank's callsign is Zero Bravo displayed on the convoy distance plate on the rear hull. The crew comprises Corporal 'Skippy' Greenwood as loader/operator, Trooper 'Spence' Spencer as gunner and Trooper 'Rushy' Rushworth as driver. The tank is depicted during Operation *Fenners* in the town of Majar-al-Kabir over the Christmas period of 2004. Known as 'MAK' to British troops, Majar-Al-Kabir is one of the most lawless towns of Southern Iraq and was the scene of the massacre of six Royal Military Police soldiers in June 2003. During the regime of Saddam Hussein, it required 30,000 troops, scores of helicopter gunships and hundreds of AFVs to suppress the Maysan Province. As part of the Welsh Guards Battlegroup during Operation *Fenners*, A Squadron comprised six Challenger 2 tanks together with 14 Warrior IFVs of Burma Company, 1st Battalion, The Duke of Wellington's Regiment. As crews are rotated constantly, the tanks do not carry specific callsigns on the turret. The VRN of Zero Bravo is DS21AA, applied on the right rear hull plate above the light cluster together with a small Union flag above. The tanks of A Squadron – The Blue Horse – in Iraq feature names beginning with the letter A and Zero Bravo is named 'AVE IT, painted on the sides of the TIS barbette. The Challenger 2 tanks in Iraq are no longer painted in desert camouflage and dust mitigation skirts are not replaced once damaged beyond repair. The tank features the DL2F armour configuration and further survivability enhancements are being incorporated but details remain classified, apart from the 'cheesecutter' to protect the crew from overhanging wires and boobytraps.

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