ROYAL AIR FORCE

The Royal Air Force and UK Air Power in Operation Telic, Iraq, 2003

Air Historical Branch (RAF)

Author:

Sebastian Ritchie

Photographs:

Air Historical Branch

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GENERAL INTRODUCTION

On 19 March 2003, a coalition of nations led by the United States opened the second Gulf War against Iraq – the US Operation Iraqi Freedom, the UK Operation Telic. By the middle of April, combat operations had been successfully concluded and the primary coalition goal, the overthrow of Saddam Hussein's regime, had been achieved.

The Royal Air Force deployed around 8,000 personnel and 126 aircraft for the operation, including 51 offensive aircraft and a range of intelligence-gathering, air-to-air refuelling and air transport platforms, as well as E-3Ds for airborne command and control, and support helicopters. Fixed-wing aircraft committed to Telic flew more than 2,500 operational sorties. The RAF's Tornado GR4s and Harrier GR7s released some 872 air-to-ground munitions, of which 85 per cent were precision-guided, and launched 47 Air Launched Anti-Radiation Missiles (ALARM).

While the Air Historical Branch maintained records of virtually all aspects of the RAF's participation in Operation Telic major combat operations, from March to April 2003, this study was never intended to provide a comprehensive account of RAF activity. Desirable as such a history might have been, it lay some distance beyond the research and writing resources available to AHB at the time or since. Instead, there is a narrower focus here, specifically, the UK's exercise of air power at the coalface: in other words, the RAF's contribution to the primary objectives of the coalition campaign.

The UK's involvement in the operation followed on from more than a decade of No-Fly Zone (NFZ) policing over northern and southern Iraq and from the coalition campaign to unseat the Taliban in Afghanistan (UK Operation Oracle) after the 11 September 2001 terrorist attacks on the United States. Two decades later, it is hard to recapture the sentiments of the time about the strategic threats represented by the Iraqi and Afghan regimes. Broadly, the UK's participation in Oracle (which did not extend to combat air power) enjoyed a high degree of public support, but the prospect of a major operation in Iraq was far more controversial. It was never, in any sense, a popular concept, but any backing it might have retained in the early months of 2003 declined rapidly during the transition from major combat operations to stabilisation and reconstruction, as Iraq descended into insurgency, anarchy and turmoil. By 2004, when the government was confronted by a choice between military expansion in Iraq or Afghanistan, the perceived unpopularity of the Iraqi option exerted a significant influence on UK strategy. The deployment of British ground forces to Helmand in 2006 was a direct result.

It is not the role of AHB studies to pass political judgements or record political processes that extend far beyond the history of UK air power. Rather, they are written to record how the RAF fulfilled its operational tasking, as it is always bound to do in accordance with the foreign and defence policy of the elected government of the day.

In 2003, the RAF was committed to the second major campaign waged by US-led coalitions against Iraq in just 12 years. The end of the Cold War had been accompanied by widespread expectations of peace and a substantial peace dividend provided by reduced defence spending. The reality proved to be far more frequent live conflict than western countries had experienced in the Cold War era. The RAF was not well prepared for this eventuality, which could hardly have been foreseen, and was required to adapt very rapidly. Rather than addressing the perceived demands of conflict scenarios on NATO's central front, it was necessary to respond to the actual demands of air policing and combat operations extending from the Balkans to the Gulf, and to do so under increasingly stringent resource pressures.

Quite reasonably, perceptions of the nature of modern conflict were shaped by the operations of the 1990s – operations in which air power repeatedly played the lead role. In 1991, the first Gulf War involved an extended air campaign followed by a short but sharp ground offensive to oust Iraq's heavily depleted forces from Kuwait. Air power was subsequently cast in an independent policing role after the NFZs were established over northern and southern Iraq and the former Yugoslavia. Air power was again employed independently, without a ground campaign, over Bosnia in Operation Deliberate Force in 1995, over Iraq in Operation Desert Fox in 1998, and over Kosovo and Serbia in 1999. Meanwhile, air operations continued to maintain the Iraqi NFZs. In 2001, the coalition ground campaign in Afghanistan was substantially conducted by Special Forces (SF) and 'proxy' ground forces – the so-called Northern Alliance. Once more, conventional force was overwhelmingly exercised from the air.

In summary, experience from 1990 onwards pointed towards air-based strategies and limited conventional ground commitments, and there was no reason after the turn of the century to expect a significant divergence from this pattern. The parameters of the operational environment seemed clear enough. The RAF had to evolve accordingly in terms of capability, doctrine and training.

However, subsequent years witnessed a fundamental shift in the application of air power, involving a far greater emphasis on the provision of direct support to ground forces via unplanned or 'dynamic' tasking, not only under NATO and coalition auspices but in operations with proxy forces in Libya, Iraq and Syria. The RAF thus faced very different demands from those that characterised the

1990s. Operation Telic was the watershed: instead of repeating the strategy of the first Gulf War, US commanders gave pride of place to the Land Component. This did not imply independent ground operations but a high level of integration between the Land and Air Components.

This was not the only contrast between two Gulf Wars. In 1990, for most RAF personnel, the Gulf was an unknown theatre. There was minimal experience of the desert environment and its associated demands, there were no longer any RAF airfields, and the expectation of a conflict fought from well-established main operating bases in Europe had undermined the Service's capacity to deploy and sustain forces beyond the NATO area. RAF attack aircraft were still largely expected to employ unguided weapons if committed to war, and many other capabilities had likewise been shaped by NATO requirements. There was little knowledge of potential host nations and their idiosyncrasies, and intelligence coverage of Iraq was also very limited. Many features of US command and control were unfamiliar, and the RAF's grasp of USAF doctrine and capabilities was shaped by the experience of NATO and other exercises, which unsurprisingly failed to anticipate fully their approach to defeating Saddam Hussein.

By 2003, much had changed. The RAF had an established presence in Saudi Arabia and Kuwait and abundant experience of operations in the Gulf theatre. The regional governments were more familiar and there were better channels for dealing with them. The RAF's expeditionary logistical capacity had improved considerably since 1991, and there had also been major advances in capability – notably in precision-guided bombing. Most of all, due primarily to the Iraq NFZ mission, the RAF had developed an exceptionally close working relationship with the USAF and an intimate knowledge of their command and control processes.

Hence, the operational challenges that faced the RAF in 2003 were very different from those confronted in 1990. They were primarily linked to the transition from limited NFZ policing to major combat operations, which took place in an atmosphere of great political uncertainty with far-reaching implications, extending into such fundamental issues as basing and operational planning. On the one hand, it was necessary to enlarge the deployed force many times over; on the other, NFZ policing had to be maintained within strictly defined limits and operational definitions pending any formal directive to initiate more general hostilities with Iraq. The first section of this study focuses on these complex issues.

If the build-up to war in 2003 differed significantly from the equivalent process in the first Gulf War, it is equally true that the coalition campaign rejected Schwarzkopf's strategy of employing air power to weaken Iraqi forces before the ground offensive began. Indeed, as already suggested, the operation plan was wilfully designed not to duplicate the Desert Storm plan.

Yet the true extent of this divergence remained unclear until the outbreak of hostilities. Consequently, there was much uncertainty in the Air Component about how the campaign would be conducted. While there was talk of air operations that would achieve 'shock and awe', the time allowed for their execution steadily contracted. It was obvious that campaign planning was chiefly focused on ground operations, implying a supporting role for air power, but the likely balance between planned attack or interdiction air missions and dynamic Close Air Support (CAS) was never clarified; moreover, the capacity of the coalition Land and Air Components to collaborate effectively after more than a decade of largely independent air operations was largely taken for granted.

The reality – that integrated cross-component operations are invariably both complex and extremely demanding – only became clear after the coalition ground offensive began. These issues provide the focus for Part 2 in the context of operations involving the three RAF detachments assigned to the main coalition offensive in southern Iraq.

The resumption of large-scale operations against Iraq in 2003 raised one particularly important strategic issue. In 1991, in response to Desert Storm, the Iraqis had launched around 90 Scud missiles at Saudi Arabia and Israel. The US-led coalition had not been prepared for this eventuality and had ultimately redirected a significant volume of resources to prevent or reduce its impact. The diversion was costly but not especially effective. In 2003, determined that this sequence of events should not be repeated, senior coalition commanders sought to draw on experience gained in Afghanistan to achieve the systematic integration of air power and SF to deter or defeat Iraqi Scud operations. This mission, although lower in profile than the main coalition offensive into southern Iraq, ultimately accounted for a substantial proportion of the UK Air Contingent's contribution to Operation Telic and is considered in detail in Part 3.

Operation Telic is of enduring historical importance because it demonstrated a very different approach to military intervention than the world had witnessed since the end of the Cold War. Its lessons extended into a multiplicity of spheres that included capability, planning, deployment, preparation of the battlespace, Transition to War (TTW), Effects-Based Operations (EBO), Air-Land Integration (ALI), and combat identification. For some, it demonstrated a viable alternative to air-based strategies and a blueprint for future campaigns; for others, it highlighted the disadvantages of launching a major ground campaign with only limited air preparation, and of shackling air power to tactical support or narrowly defined duties such as the Scud hunt. The truth lies somewhere between these two polarised perspectives.


TURKEY
Doğubeyazit
Malatya
Mus
Muş
Van
Makū
Naxçıvan
Khvoy
Lənkər
Marand
Tabriz Intl
Ahar
Salmās
Ardabīl
Āstārā
Van Feri Melen
Diyarbakır
Tabrīz
Gaziantep
Şanlıurfa
Mardin
Şırnak
Hakkâri
Lake Urmia
Orūmīyeh
Marāgheh
Mīāneh
Rasht
Dahūk/Dihok
Zanjān
Halab (Aleppo)
Al Ḥasakah
Ar Raqqah
Sinjār
Al Mawṣil (Mosul)
Erbil Intl
Arbil/ Hewlêr
Mahābād
Saqqez
Ash Shaddādah
Mosul Intl
SYRIA
Bījār
Dayr az Zawr
Subaikha
Kirkūk
As Sulaymānīyah/ Slêmanî
Sanandaj
Tadmur (Palmyra)
Ālbū Kamāl
Bayjī
Tikrīt
Hamadān
'Ānah
Al Ḥadīthah
Jalawlā'
Qaṣr-e Shīrīn
Malāyer
At Tanf
Al Qa'im
Kermānshāh
'Akāshāt
H-2
H-1
Ba'qūbah
Baghdad Intl
Khorramābād
Ar Ruṭbah
BAGHDĀD
Īlām
Ar Ramādī
Al Fallūjah
Mehrān
Dorūd
H-3
IRAQ
Nahr Dijlah (Tigris)
JORDAN
Karbalā'
Al Ḥillah
Dezfūl
Al Kūt
Turayf
Al Najaf
Al Ashraf Intl
Ad Dīwānīyah
Al 'Amārah
'Ar'ar
Ash Shabakah
As Samāwah
An Nāṣirīyah
Ahvāz
Al Qurnah
Basrah Intl
Khorramshahr
As Salmān
Sakākā
Al' Uwayqīlah
Al Baṣrah (Basra)
Ābādan
Dawmat al Jandal
Al Buṣayyah
Al Khom
Fāw
Rafḥā'
KUWAIT
AL KUWAYT
Kuwait Intl
SAUDI ARABIA
Mīnā' Su'ūd
Hafar al Bāṭin

PART 1: THE BUILD-UP TO OPERATION TELIC

1. Introduction

The Royal Air Force's involvement in Operation Telic followed on from some 13 years of almost continuous UK air operations in the Persian Gulf. In 1990, in response to Iraq's invasion of Kuwait and the initiation of Operation Granby, a force of more than 120 fixed-wing aircraft, 36 helicopters and 5,500 personnel deployed to the Gulf as part of the US-led coalition that ultimately liberated Kuwait in the following February. September 1991 witnessed the start of coalition air patrols over the northern NFZ designed to protect Iraq's Kurdish minority, while the RAF based a detachment of six Tornado GR1s at Dhahran in Saudi Arabia in August 1992 to contribute to the maintenance of the southern NFZ. This detachment later moved to Prince Sultan air base, Al Kharj (PSAB).

During the so-called UNSCOM (United Nations Special Commission) crisis, beginning in late-1997, this force was augmented by a detachment of carrier-borne Harrier GR7s, and more GR1s deployed to Ali Al Salem air base, Kuwait, from where 12 aircraft eventually participated in Operation Desert Fox in December 1998. Soon afterwards, Tornado F3s took over the Saudi commitment, and the GR1 detachment in Kuwait was reduced to 8 aircraft at the beginning of 2000. This remained the UK posture in the Gulf in 2002, when the build-up to Telic began. Initially, UK operations over the southern NFZ occurred under the auspices of Operation Jural, while those over the northern NFZ were assigned the name Operation Warden. In 1998 operations in southern Iraq, embracing both NFZ patrolling and support for UNSCOM, were re-named 'Bolton'. By 2002, Southern and Northern NFZ operations were known respectively as Resinate (South) and Resinate (North). The equivalent coalition operation names were Southern Watch and Northern Watch.

The following narrative considers from a broad perspective the RAF's planning and preparations for Operation Telic, surveying the development of coalition thinking on the future operation, the problems created by the transition from Resinate to Telic, and more practical issues, such as force deployment and command and control. The aim is to provide an introduction to AHB's more detailed studies of Telic and a logical sequel to the earlier history, *The Royal Air Force in Operation Bolton*.

2. Operation Plan 1003V

The first indirect intimations that the United States was preparing contingency plans for a major operation against Iraq were received by Headquarters Strike Command (HQ STC) in March 2002. The capacity of the RAF to contribute to such an operation was added to the agenda of a meeting between the Deputy Chief of Staff (Operations) (DCOS (Ops)), HQ STC, and the Assistant Chief of the Air Staff (ACAS), scheduled for 18 March. By May, contingency planning was being conducted by a Strategic Planning Group (SPG)[1] at the Ministry of Defence (MOD). ACAS reported to the Chief of Defence Staff (CDS), Admiral Sir Michael Boyce, on the 22nd that the UK could deploy some 88 fast jets and 38 supporting aircraft within a period of between three and four months for an operation of the scale of Granby. Two days later, the Deputy Chief of Defence Staff (Commitments) (DCDS(C)) fulfilled a promise to update the Secretary of State for Defence on the progress of MOD contingency planning work on Iraq in advance of his meeting with the US Secretary of Defence on 6 June. The MOD's key conclusion at this stage was that the UK could not contribute to large-scale offensive action before December.

At the beginning of July, the MOD confirmed to the Prime Minister that US military thinking on Iraq was 'quite well advanced' but that no political decision had been taken. US contingency planning assumed that the objective of any prospective operation would be to overthrow Saddam Hussein's regime, destroy his Weapons of Mass Destruction (WMD) capability and reduce the perceived threat that Iraq posed to surrounding countries and the US itself. CENTCOM had briefed the basic military concept to the President on 19 June, and work had then been initiated to turn it into an operational plan. Apart from this, there was little specific information except that the plan was certain to be crucially dependent on local basing in, and overflight of, the Gulf States and Turkey. Although CENTCOM at first envisaged that only US forces would be involved, by July there was a *de facto* invitation to the UK and Australia to participate (although no formal request was submitted until November). It was thought that the US wanted from the UK:

1. Under UK doctrine in 2003, if a potential crisis was foreseen, CDS (through DCDS(C)), might direct PJHQ to develop a range of contingency plans, the aim being to reduce the time required to produce a detailed campaign plan if a crisis occurred. At this time, DCDS(C) might also direct the formation of a Strategic Planning Group (SPG) to aid with planning, take a long-term view and assess strategic options.

1. A second opinion and conceptual thinking to help them with their operational planning.

2. Participation in an operation to spread the political load, but also bring key enablers and specific capability.

3. Influence at the political level to place the military option into a strategic campaign plan.

As a first step, the US invited a small number of British military personnel to join their planning teams at various levels of command. Consequently, the Secretary of State sanctioned the early dispatch of a six-man team to Tampa on the strict understanding that no political decision had been taken on UK participation in an operation; there was absolutely no commitment to UK involvement at this stage. The UK was officially informed and indoctrinated into US planning on 16 July, and the MOD then tasked PJHQ to make an assessment of the plan to inform ministers on the 23rd, and to examine UK contingency options in a US-led operation against Iraq. Although these measures promised to clarify the UK's grasp of US thinking, the MOD recognised that engagement with the US might ultimately reduce the scope for keeping UK options open.

In the meantime, work on the UK air contribution to a possible operation against Iraq had been assigned to contingency planners at HQ STC. The limited information then available was that the UK might contribute forces up to medium-scale war-fighting level to participate in a US-led air campaign against Iraq starting in October 2002. All that was known of the British government's position was that the Prime Minister was determined to stand shoulder to shoulder with the Americans. The RAF planners assumed that the US would launch heavy initial strikes against Iraq using in-theatre assets, which would then be rapidly re-enforced. The UK might contribute a mixture of offensive and combat support capabilities – Airborne Command, Control and Communications (ABCCC), Intelligence, Surveillance and Reconnaissance (ISR), and Air-to-Air Refuelling (AAR) – to such a campaign.

More detailed information soon became available. CENTCOM's operation plan, numbered 1003V, would seek to overwhelm the Iraqi regime through a coordinated multiplicity of threats applied across several lines of operation. The seven lines of military operations were:

1. Operational fires

2. Operational manoeuvre

3. Special Forces operations

4. Unconventional warfare/support to other governments

5. Influence operations

6. Humanitarian assistance

7. Political-military engagement

One of the most striking features of OPLAN 1003V, even at this early stage, was the proposal to launch simultaneous offensives into Iraq from her northern and southern frontiers. The insertion of forces from Turkey seemed essential for three reasons. First, it would probably hold Iraqi forces in the north, preventing their concentration against the US offensive on the southern approaches to Baghdad; second, the presence of US or coalition forces in northern Iraq would help to ensure the territorial integrity of a region threatened by Kurdish separatism and in-fighting between rival Kurdish factions, and potential Turkish and Iranian encroachments. Finally, it was vital to secure Iraq's northern oilfields, for it appeared likely that Saddam Hussein would respond to an invasion by setting fire to the oil wells, using the tactics he had employed in Kuwait in 1991. For the same reason, Iraq's southern oil fields were also crucial early objectives for the operation. A third front was to be opened in western Iraq, where SF with dedicated air support would seek to prevent the launch of Theatre Ballistic Missiles (TBM) at Isreal or friendly Gulf states.

Within this very broad operational construct, the Combined Forces Air Component Commander (CFACC), the Commander CENTAF, General TM 'Buzz' Moseley, was assigned five principal offensive tasks:

1. Counter-air (airfields and Integrated Air Defence System (IADS))

2. Counter-TBM in Western Iraq

3. Counter-land

4. Strategic attack on regime targets (seen as vital to early regime collapse)

5. Support for Special Forces

At first, however, air power would be employed primarily for effect, with the aim of achieving what was famously termed 'shock and awe'. Early hostilities would include a massive bombing effort covering a wide range of targets. Reportedly, the US believed that 'The initial "shock and awe" created by the synchronised opening of both air and ground operations' would 'lead to the rapid collapse of much of the potential opposition, enabling the coalition to seize control of up to two-thirds of the country within days.' The UK National Contingent Commander for Operation Telic, Air Marshal Brian Burridge, later commented on this expectation:

> Early regime collapse had been hoped for by many and predicted by some. It did not materialise. Intelligence underestimated the depth of fear the Regime had inculcated in the populace as the mechanism for their control. The people needed the reassurance of a strong Coalition presence in their cities, but this conflicted with the imperative for our forces to bypass urban centres and reach Baghdad. Also, whilst HUMINT had a number of key successes, much was aimed at what the listener wanted to hear, and this contributed to an expectation of capitulation. Furthermore, the effect of our IO campaign was overestimated whilst, in contrast, the Iraqi IO campaign proved unexpectedly successful.

Kuwait, although small and potentially vulnerable, could always be counted on for support and was to be the launching platform for the southern offensive, but the northern axis was dependent on Turkey's willingness to permit large numbers of coalition troops and aircraft to be based on her soil. In Washington, there was every confidence at first that the Turkish government would co-operate, but American expectations in this regard soon proved over-optimistic. For reasons of domestic politics, Ankara proved extremely reluctant to embrace any commitments that openly supported US military planning. With hindsight, it could be argued that the Americans should have abandoned the northern option at an early stage (or alternatively planned an airborne insertion into northern Iraq from the outset) in the absence of an unequivocal pledge from the Turks. Instead,

CENTCOM tied itself to a strategy that was based on very uncertain foundations. This would have profound implications for the UK, because CENTCOM quickly assigned a key role to British land and air forces on the northern front.

3. The Royal Air Force Task

HQ STC's first outline plan for RAF participation in the prospective operation appeared at the end of July and reflected the increased exchange of information between the UK and the US (chiefly CENTAF's planners at Shaw Air Force Base, South Carolina), as well as CENTCOM's enthusiasm for UK involvement in northern Iraq. The plan envisaged offensive air operations by Tornado GR4s from Ali Al Salem in Kuwait, and from either Akrotiri or south-east Turkey, and air support to UK land forces by Harrier GR7s from south-east Turkey. The Tornado F3s already located in Saudi Arabia would operate in the Air Defence (AD) role. Tornado GR4s and Jaguars would provide tactical reconnaissance, again flying from Ali Al Salem and either Akrotiri or south-east Turkey, while ISR assets such as E-3Ds, Canberra PR9s and Nimrod R1s and MR2s would operate from the eastern Mediterranean or Oman. VC10 and Tristar tankers would provide AAR support, not only for RAF assets but also for US naval aircraft, and there would be in-theatre air transport and air support for SF. The RAF's tasking, as then understood, was as follows:

> 1. Contribute offensive air assets to the US campaign against Iraq.
>
> 2. Contribute additional 'niche' air capabilities that can add value to the US campaign against Iraq.
>
> 3. Support a UK land campaign inserting from Southern Turkey into Northern Iraq.
>
> 4. Enable an Air Point of Disembarkation (APOD) in Turkey for the deployment of UK Land Forces.

STC's plan emphasised the RAF's pronounced dependence on Turkish basing and overflight. In addition to Incirlik, where RAF Jaguars were already stationed for Operation Resinate (North), the planners anticipated that at least two other bases in southern Turkey would be required, while some base facilities in Jordan might also be needed. Early intelligence appreciations concluded that 'Turkey

would be willing to provide basing for a US-led attack on Iraq,' as would Kuwait, Bahrain, Qatar, the UAE, Oman and, to a lesser extent, Jordan.

At the beginning of August, a Senior British Military Advisor (SBMA) attended a CENTCOM Component Commanders Conference on prospective Iraqi operations, and knowledge of the CENTCOM plan was extended across key areas of the defence community over the next two weeks, including the Front-Line Commands (FLCs), the Defence Intelligence Service (DIS), the Defence Logistics Organisation (DLO), and Joint Helicopter Command (JHC). On 5 August, a Crisis Planning Team formed at PJHQ, and DCDS(C) issued PJHQ with formal planning guidance four days later. PJHQ in turn presented a submission to DCDS(C) on UK contributions to the prospective operation on 13 September. The air package was expected to involve the deployment of about 6,700 personnel and the following fixed-wing detachments:

Base	**Aircraft Deployment**
Akrotiri	8 VC-10
Incirlik (Turkey)	8 Jaguars
	18 Tornado GR4s
	3 E-3Ds
	1 Nimrod R1
	2 Tristars
Diyabakir (Turkey)	18 Harrier GR7s
Jordan	4 Nimrod MR2s (over-land role)
	2 Canberra PR9s
Bahrain	2 Tristars
Prince Sultan (Saudi Arabia)	6 Tornado F3s
Ali Al Salem (Kuwait)	12 Tornado GR4s
Thumrait (Oman)	2 Nimrod MR2s (maritime role)

The structure of the UK Air Contingent remained largely unchanged between September 2002 and March 2003. The only significant adjustments involved the allocation of 8 out of the 18 Harrier GR7s to the western Iraq Counter-TBM operation, and the enlargement of the deployed F3 force. The air contingent's composition was predominantly dictated by CENTCOM requirements, which encompassed such capabilities as ABCCC, AAR, AD, ISR, stand-off and precision offensive capability, and offensive air support for ground forces. The RAF was asked to contribute aircraft to each of these roles.

OPLAN 1003V required three separate E-3 orbits, each for an airborne warning and command role for the joint campaign. The USAF did not have enough

E-3s to meet the Iraq requirement and other global operational commitments. RAF E-3Ds were therefore required to maintain a 24-hour orbit in western Iraq – one third of the overall task – supporting the strategically important Counter-TBM mission.

The requirement for AD assets was heavily influenced by the CFACC's aim of achieving shock and awe in the preliminary air campaign, his expectation being that swing-role aircraft would be employed offensively to the maximum possible extent. This, together with the US's homeland defence commitments, placed a severe strain on USAF Defensive Counter-Air (DCA) resources. The RAF was therefore asked to provide additional Tornado F3s and to shoulder a proportion of the operation's DCA task, amounting to one orbit for 16 hours per day.

RAF AAR support for OPLAN 1003V was particularly important. As in earlier operations in the Gulf and over Kosovo and Afghanistan, US Navy (USN) fast jets would require significant numbers of probe-and-drogue AAR assets (as opposed to the USAF tankers, which employed a boom system) to support their tasking. By February 2003, Anglo-US planning envisaged that RAF tankers would enable 106 fast jets to reach their targets through probe-and-drogue refuelling during each Air Tasking Order (ATO) cycle.

As for ISR, the tactical air reconnaissance role represented a niche capability that the USAF no longer maintained. Since the first Gulf War, the RAF had undertaken this role for the coalition over Iraq, and US planners thus instinctively looked to the UK to provide tactical air reconnaissance support to OPLAN 1003V. The Tornado GR4's capacity to fulfil US requirements had recently been enhanced by the introduction (ahead of its formal acceptance into RAF service) of the new RAPTOR (Reconnaissance Airborne Pod for Tornado) reconnaissance pod. Canberra PR9s were meanwhile required for the Counter-TBM operation and broader intelligence collection plans due to their capacity to supply near real-time data and high-quality imagery in support of land and SF operations, and RAF Nimrod R1s were incorporated into the US SIGINT collection plan.

The offensive elements within the air package were divided between three basic tasks. A detachment of eight Harrier GR7s assumed Counter-TBM duties in western Iraq, their night capability being central to the maintenance of 24-hour operations. The remaining GR7s were primarily required to provide support to land forces, while the Tornado GR4s were described in the PJHQ submission as 'a vital element of the main offensive weight of effort against static targets during the initial days of the conflict'. They would overwhelmingly employ their established Paveway (PW) II Laser-Guided Bombing (LGB) capability and the recently introduced Enhanced Paveway (EPW) II bomb, which could be guided by GPS if cloud cover prevented laser guidance. To maximise the weight of effort

during the first days of the operation, considerable risks were to be taken with the Iraqi IADS – particularly in the so-called Super-Missile Engagement Zone (or 'Super-MEZ') around Baghdad. To help reduce the dangers involved (and with the experience of the first Gulf War very much in mind), the RAF took steps to accelerate the introduction of the new Storm Shadow missile, which provided the GR4 with a stand-off penetration weapon.

4. Command and Control

Between 19 and 22 August, the Chief of Staff, Joint Forces Headquarters (JFHQ), visited CENTCOM to discuss command and control and the integration of the British land, maritime and air contingents into a US-led coalition. Although the nomenclature changed somewhat, the system that emerged differed little from that employed during the first Gulf War. The Chief of Joint Operations (CJO) was to become Joint Commander (JC) for the operation, exercising his responsibilities through PJHQ to the National Contingent Commander (NCC) at his deployed headquarters in the Gulf. As JC he would exercise Operational Command (OPCOM) over all UK forces assigned to the operation, while the NCC exercised Operational Control (OPCON) of the three UK contingents. In turn, the NCC delegated Tactical Command (TACOM) to the three Contingent Commanders; where the Air Contingent was concerned, Tactical Control (TACON) was to pass to the coalition air commander (the CFACC) during the execution of agreed tasks in the ATO.

The command structure was trialled in a five-phase exercise entitled 'Internal Look' during November and December, in which an appointed NCC and the staff of the JFHQ ran the NCC headquarters, while contingent headquarters personnel were drawn from the three FLCs - Strike, Land and Fleet. Phases 4 and 5 of Internal Look took place at CENTCOM's prospective forward headquarters in Qatar. As the NCC for an operation against Iraq had obviously to be involved in the exercise, his appointment had to be settled before it began; Air Marshal Brian Burridge, then Deputy Commander-in-Chief at HQ STC, was selected for the post.

Exercise Internal Look ended on 15 December 2002. The exercise provided a clearer picture of the targeting delegations needed by the NCC and highlighted a number of potential areas of concern, such as the adequacy or otherwise of AAR provisions; many important lessons were apparently identified. Yet the exercise seems only to have been a partial success where the Air Contingent was concerned. According to the official Air Lessons Identified report,

> The 3 vignettes played out were insufficiently long to draw significant conclusions. The crucial first few days of the campaign were not covered, which failed to expose fully the problems of synchronisation between A and G days,[2] and the full air operations cycle was never achieved. In addition, many of the processes (ISR, BDA[3] and the capacity of the ASOCs[4] to manage the planned levels of KI/CAS[5]) that eventually proved key weaknesses were not highlighted.

As for the overall command and control system, it probably represented the only logical framework for the UK to employ, given the structure and functions of the MOD, PJHQ and the front-line commands at that time. Advantageously, it provided a single operational commander in theatre acting on behalf of all deployed UK forces for Commander CENTCOM (the Combined Forces Commander – CFC) to deal with, while effectively integrating the three UK contingents into the relevant coalition components at the same time.

The one possible disadvantage had been highlighted during the first Gulf War. Arguably, the UK command structure, with its Joint Headquarters, deployed Joint Forces Headquarters and individual contingent headquarters, had too many layers. In the early weeks of the Kuwait crisis in 1990, it was argued that the creation of a JFHQ involved an unnecessary duplication of effort, and the Secretary of State for Defence briefly considered removing the Joint Headquarters from the chain of command at one stage. During Operation Telic (by which time PJHQ had been established) a small minority questioned whether the JFHQ (subsequently known as the National Contingent HQ - or NCHQ) was necessary. Although both CDS and the Chiefs of Staff supported the NCHQ/JFHQ concept, CJO (the UK Joint Commander) was unhappy to find that his influence waned in CENTCOM after the NCHQ stood up in theatre, and CENTCOM itself deployed forward. To the UK Land Contingent Commander (UKLCC) the NCHQ seemed to represent an extra link in the command chain that caused inertia.

These are complex questions. Suffice it to say here that the NCHQ's abolition would have required elements of PJHQ to deploy to the Gulf in its place. It would then have been necessary for the (deployed) PJHQ to deal with each of the UK

2. The start of air and ground operations.
3. BDA – Battle Damage Assessment.
4. ASOC – Air Support Operations Centre.
5. KI/CAS – Kill-box Interdiction/Close Air Support; US Marine Corps Close Air Support procedure adopted by the coalition Air Component during Operation Telic.

FLCs and the MOD from overseas. Clearly, the implications of such a change in UK command arrangements would have been far-reaching; where communications alone were concerned, the challenges would have been daunting. The approach employed in the first Gulf War and Operation Telic did at least offer the advantage of a single chain between the deployed and UK operational headquarters, as well as, in PJHQ, a conduit in the UK linking the MOD and the FLCs with deployed forces. Interestingly, the commander of the UK Air Contingent, far from questioning the role of the NCHQ, argued that it had been empowered too late (20 February 2003) by CJO, with adverse consequences both for the management of UK force deployments and command and control of deployed forces.

5. The United Nations Route

When UK planning for prospective operations in Iraq began, it seemed possible that hostilities might start in October 2002; by August, the MOD thought military action unlikely before November. But it was in August, primarily to ensure the participation of the UK and other countries in a coalition against Iraq, that President Bush instructed his Secretary of State, Colin Powell, to begin a concerted diplomatic effort within the UN to bolster the legal case for military action. The decision to 'follow the UN route' promised to push back the start of any conflict into early 2003. This delay did provide both the US and the UK with valuable additional time to complete their preparations, but it introduced a second critical uncertainty into the process at the same time, adding to the difficulties caused by CENTCOM's determination to open a northern front.

The accusation that Iraq's possession of WMD posed a major threat both to her neighbours and the West had always been at the forefront of Washington's case for military preparations, and there was broad acceptance throughout the international community that efforts to disarm Iraq were unlikely to succeed unless supported by a credible threat of force. By September, the perceived threat from Iraqi WMD and its link with possible preparations for military action had become a major focus of public debate. The British government published a dossier detailing Iraq's alleged illegal weapons holdings and the potential for their use, and the Prime Minister stated publicly on the 24th that neither sanctions nor the policy of containment of Iraq through the NFZs had succeeded in preventing Saddam Hussein from developing WMD. In his view, 'There must be genuine preparedness and planning to take action' if diplomacy failed.

Work began to secure a new resolution on Iraqi disarmament through the United Nations Security Council. Passed on 8 November, UNSCR 1441 declared

Iraq to have been in 'material breach' of earlier disarmament resolutions, insisted on the provision of a full declaration of her WMD holdings, and demanded the resumption of weapons inspections. These were to be conducted by the UN Monitoring, Verification and Inspection Commission (UNMOVIC), which had been created to succeed UNSCOM in 1999. The resolution concluded:

> The Council has repeatedly warned Iraq that it will face serious consequences as a result of its continued violations of its obligations.

On the 13th, the Iraqi government formally accepted UNSCR 1441 and agreed to allow weapons inspectors to enter Iraq from the 18th; UNMOVIC duly arrived in Baghdad and commenced inspections at the end of the month. However, within the UN, a disagreement almost immediately surfaced about the interpretation of the SCR. The US and UK stressed that Iraq was effectively in breach of the UN Resolutions that had suspended hostilities at the end of the 1991 Gulf War and that Saddam Hussein's regime should face military action if it did not comply with SCR 1441. Other nations, led by Russia, France and Germany, argued that a further UNSCR was necessary before military action could lawfully commence. They also sought to give UNMOVIC more time for weapons inspections than the US would accept before considering such a resolution. The insertion of the term 'material breach' into UNSCR 1441 nevertheless represented a curious concession from France and Russia, who had consistently blocked US and UK attempts to employ such language in resolutions on Iraqi disarmament in the late 1990s because it might have been construed to provide a legal basis for war.

Iraq produced what it claimed was an accurate and complete declaration of its WMD, missile, and other weapons delivery programmes for the UN on 17 December, but UNMOVIC's initial report to the UN Security Council on the 19th revealed that this declaration fell short of the full, final, and complete disclosure required. Iraq had failed to account for WMD such as nerve agent, chemical precursors and munitions listed in UNSCOM's final report, and had provided little hard evidence to substantiate its claims. Up to this point, it had been difficult for the UK to embark on open preparations for war, although the government had announced in September that prudent measures of planning and preparation were being instigated. However, in the aftermath of UNMOVIC's report, more visible steps could be taken.

6. Southern No-Fly Zone Operations to December 2002

Against this background of mounting international tension, the second half of 2002 witnessed a sharp increase in the intensity of air operations in the Iraqi NFZs. Back in the summer of 2001, improvements in Iraq's IADS had persuaded the Commander of the Joint Task Force of Operation Southern Watch (CJTF OSW) to restrict coalition air patrols in the southern NFZ to the south and west of the Euphrates River (the so-called Tigris-Euphrates (T-E) Line). Further restrictions were introduced later in the year after Combat Search and Rescue (CSAR) cover was diverted to Afghanistan, but the situation continued to deteriorate. By April 2002, Iraqi Surface-to-Air Missiles (SAMs) were threatening aircraft confined even to this limited airspace. This was hardly consistent with the more robust stance on Iraq being taken by the US government. With the tempo of the Afghanistan mission declining, CJTF OSW ordered a return to full patrolling of the southern NFZ and operations designed to roll back the Iraqi IADS incrementally. These initiatives have sometimes been described as 'shaping operations' or (more controversially) 'spikes', and they were certainly viewed as such by the UK Chiefs of Staff. Yet the documents do not entirely support this interpretation of US action in southern Iraq.

The process began with a reconnaissance drive to map the whole of the southern NFZ and was reinforced in September when the USS George Washington brought 85 additional aircraft into theatre. RAF Tornado GR4s were heavily involved in updating old imagery, paying particular attention to Indicator and Warning (I&W) targets and IADS facilities. No 13 Squadron – then maintaining the Operation Resinate (South) commitment – recorded reconnaissance sorties over Zubayah, Basrah, Shahban, Rumaylah, Tallil and Nasiriyah. Iraq's reaction was predictable: more SAMs were deployed into the southern NFZ, and there were increasingly frequent SAM launches against coalition aircraft, which duly gave rise to a growing number of retaliatory strikes, known as 'Response Options'. From 22 August 2002, all Tornado missions carried enough weapons to allow them to be re-roled for Response Options. Aircrew were briefed for a mixture of fixed and mobile targets to give commanders flexibility in target selection. For mobile targets, crews were given a basic latitude and longitude prior to sortie brief, which might be corrected by real-time imagery gathered by Predator Remotely Piloted Air Systems (RPAS) airborne during the mission.

Apart from steadily degrading the Southern Iraqi IADS, these actions provided valuable opportunities for testing new capabilities, which would be of considerable importance in the future. The first operational use of EPW II, involving Tornado GR4s of 2 (AC) Squadron, occurred on 19 May against a

direction-finding facility near Al Salman. Cloud in the target area made laser guidance impossible so GPS was employed instead, and the attack was a complete success. In August, GR4s collaborated with a Predator to strike two mobile radars near Basrah. The Predator both located and maintained positive identification of these traditionally difficult targets, feeding real-time target imagery back to the HQ Joint Task Force Southern Watch that was used to direct the GR4s' subsequent attack. TIALD[6] imagery, the Predator feed and subsequent US BDA all confirmed that the radars were destroyed. On 6 October, 12 (B) Squadron flew the first operational tactical reconnaissance sortie with the new RAPTOR reconnaissance pod. One subsequent assessment read:

> The potential of RAPTOR has been quickly demonstrated; imagery of an SA-2 site was of such good quality that the site was proven to be a dummy and a planned coalition attack was cancelled, thus saving the nugatory expenditure of weapons.

A Tornado GR4 carrying the RAPTOR reconnaissance pod during a mission over Iraq in 2003.

November witnessed a substantial increase over previous months in the number of Response Options in the Southern NFZ, following violations by the Iraqi Air Force, surface-to-air fire by Iraqi Ground-Based Air Defences (GBAD),

6. TIALD – the Thermal Imaging Airborne Laser Designator was the standard RAF laser designating pod in 2003.

and the detection of other air defence equipment in the zone. Senior RAF officers in theatre began to suspect that a transition might be taking place from extended NFZ activities to preparatory actions for the contingency of the operation that became Telic or, to the US, Iraqi Freedom. As one of them put it, 'The UK position within the coalition ops had to be carefully guarded to remain within the Op Resinate (S) remit and not stray into preparation for a possible action against Iraq.'

It is certainly true that a fundamental problem confronted the CFACC, who had potential responsibility for running a US-led coalition air campaign in support of Iraqi Freedom. Initially, US planning had envisaged a conventional phased operation against Iraq in which a ground offensive was preceded by 16 days of bombing. Yet the preliminary air campaign was then compressed down to just 5 days. With further reductions appearing possible – if not probable – the CFACC found himself facing the formidable challenge of discharging his five main tasks (see above) almost simultaneously. Hardly any time was left for shaping the battlespace or dismantling the Iraqi Super-MEZ around Baghdad, which was crucial if the Republican Guard divisions protecting the city were to be targeted effectively. It must have appeared eminently sensible to start conducting at least some shaping operations under the Southern Watch banner.

That US objectives now extended beyond the immediate parameters of Southern Watch was also apparently reflected in a new concept of operations, (CONOPS) introduced in November. Analysis of the so-called CONOPS 2003 undertaken by PJHQ and the MOD concluded that it was chiefly concerned with the expansion and rationalisation of targeting delegations from Washington down to the CJTF OSW. CENTCOM was said to have no imminent plans for *expanding* the Southern Watch target set. Yet the new CONOPS did provide for strikes against 'targets from the CENTCOM approved Response Option target list *or targets other than those on the CENTCOM approved response option target list'*. Moreover, the US Secretary of Defence's authorisation signal for a parallel US EUCOM CONOPS 2003 for Operation Northern Watch referred specifically to:

> ONW[7] responses to align with OSW[8] CONOPS 2003 to increase flexibility, expand latitude on timing of strikes, and shape battlespace for possible future operations.

Nevertheless, the reality seems largely to have been that the Response Options, although increasing in intensity, still struck the type of air defence sites that had

7. ONW – Operation Northern Watch.
8. OSW – Operation Southern Watch.

been targeted almost continuously since 1998. Moreover, they remained confined to Southern Iraq and did not extend to the Baghdad Super-MEZ. The targets included specific SAM or Anti-Aircraft Artillery (AAA) batteries that had fired on coalition aircraft, and more general air defence facilities, such as integrated operations centres, early warning radars, direction-finding installations, and associated communications targets, such as communications bunkers and Fibre-Optic (FO) cable repeaters. In striking the operations bunkers and cable repeaters, the Americans hoped to compel the Iraqis to employ what the CFACC later referred to as 'more exploitable comms' – in other words, communications that were more vulnerable to interception or interdiction.

Meanwhile, RAF assets in the Gulf continued to operate in accordance with CONOPS 2001 and UK Operation Resinate Rules of Engagement (ROE), and this only led to their exclusion from Response Options on a few occasions. The most notable of these was an attack that struck some 25 aiming points (Desired Mean Points of Impact – DMPIs) on 26 December after the Iraqis violated the Southern NFZ and shot down a Predator.

7. Deployment

In the history of the build-up to Operation Telic, January 2003 was dominated by the steady unravelling of the northern (Turkish) option. Even in mid-November 2002, there were signs that Turkey's acquiescence might be dependent on the passage of a second UNSCR authorising force if SCR 1441 was violated. Early in December, the US Deputy Secretary of Defence admitted to CDS that Turkey 'had been sending contradictory signals', and the possibility of a UK 'plan for the south' was mooted for the first time. On the 19th, the MOD advised Downing Street that although the Americans remained 'confident of securing Turkish bases and airspace', they would make up the difference and find space for British forces in the south if Turkish access, basing or overflight were denied. The MOD itself was by this time far from confident of Turkey's willingness to allow US or UK ground troops to mount an offensive from her soil into Iraq.

By the final week of December, there was an urgent need to resolve these issues once and for all to ensure that UK preparations for the prospective operation (formally named 'Telic' on the 20th) remained aligned with US timelines, which increasingly pointed to the start of hostilities in early March. There were, of course, steps that could be taken to increase the readiness of forces potentially involved in Operation Telic, even without a formal governmental commitment to military action. Hence CDS's Planning and Preparation Directive for Telic of 30 December directed that all earmarked forces be brought to 10 days' notice-to-

move or less by early January and that specified overt training be undertaken. On 7 January, the Secretary of State for Defence advised Parliament that an initial tranche of reservists was being called out. Meanwhile, HQ STC made preparations to extend the detachments of personnel who were already in theatre on Operation Resinate to six months, and all personnel were advised that they would probably have to remain in post until hostilities with Iraq ceased. However, while basing arrangements and the broader role of UK forces in OPLAN 1003V remained unclear, little more could be done.

On 30 December, CENTCOM finally learnt that Turkey was unlikely to allow US or coalition ground forces to base on or stage through her sovereign territory pending an attack on Iraq. Plans for a ground offensive from Turkey into northern Iraq with UK forces were then abandoned and a new concept of operations emerged, involving their deployment in the south to release US forces for the main advance on Baghdad. At the same time, the growing likelihood of a Turkish refusal to permit air basing or overflight compelled UK planners to consider a similar realignment of RAF detachments. They had previously assumed the availability of basing at Incirlik for 18 GR4s and an enlarged Jaguar detachment, together with the E-3Ds, Tristars and a Nimrod R1. The plan to locate all deployed GR7s at Diyabakir had already been changed following a decision to locate some of these aircraft in Jordan for Counter-TBM operations, but the balance of 10 GR7s was still expected to base in Turkey, probably at Batman. Additionally, the VC10 tankers destined for Akrotiri were dependent on Turkish overflight permission.

Alternative arrangements were clearly needed. PJHQ therefore proposed that the GR4s be transferred to Qatar; 10 GR7s would then operate from Kuwait, the E-3Ds and the Nimrod R1 from PSAB, Saudi Arabia, and the various tankers from bases in Qatar and Bahrain.

On the 15th, CDS wrote to General Myers, the Chairman of the Joint Chiefs of Staff in the US, asking him to press Turkey for a decision on basing for the UK Air Contingent during a forthcoming visit to Ankara. A firm decision was needed by 25 January at the latest. In the meantime, however, the UK Chiefs of Staff agreed that it was already too late to pursue the Batman option and, at the Chief of the Air Staff's urging, initiated preliminary steps to secure the bilateral agreements with the Gulf states that would be necessary to effect PJHQ's revised basing plan.

After General Myers reported on his visit to Turkey in somewhat ambiguous terms, CDS himself decided to travel to Ankara in a last-ditch effort to clarify the position. On the eve of his visit, the Commander-in-Chief HQ STC wrote to CJO expressing his concern over the practicality of deploying the UK Air Contingent in time to achieve full operating capability by A-Day. He argued: 'Unless CDS

gets an unambiguous yes from the Turks on 23 Jan, we should draw stumps on Incirlik and move the 18 Tornado GR4s to Al Udeid' in Qatar.

CDS could make no more headway than his US counterpart with the Turks, who insisted that no decision to allow foreign forces to pass through Turkey for operations in Iraq would be taken until the head of UNMOVIC, Hans Blix, reported to the UN on 27 January. As this was beyond the latest date that would enable UK air assets to reach Full Operational Capability (FOC) by A-Day, the Turkish option was abandoned (although efforts continued to obtain overflight clearance). The first ship carrying enabling equipment for the Turkish bases, which had left the UK on 18 January, re-routed to the Gulf, while the first air package ship sailed for the Gulf on the 26th.

The UK now approached Qatar for approval to base 18 GR4s at Al Udeid. Efforts were also initiated through CENTCOM to secure alternative basing for the E-3Ds and VC10s in Saudi Arabia. There seems to have been less concern over the availability of base facilities in Kuwait for the 10 GR7s and, in the event, Al Jaber airfield provided the necessary ramp space. A planned and routine Operation Resinate deployment of GR4s to Ali Al Salem on 27 January functioned as a first step towards enlarging the detachment, and additional GR4s engaged in pre-deployment training in Cyprus were held there pending movement to the Gulf.

As events turned out, the deployed Tornado GR4/4A force was re-distributed so that the larger detachment, including the GR4As, went to Ali Al Salem, while the smaller went to Al Udeid. Ultimately, the new fixed-wing aircraft basing plan (less in-theatre transport aircraft) was as follows:

Base	**Deployment**
Ali Al Salem	18 Tornado GR4/4A
Al Udeid	12 Tornado GR4
Al Jaber	10 Harrier GR7
Azraq (Jordan)	8 Harrier GR7
	2 Canberra PR9
PSAB	14 Tornado F3
	7 VC10
	4 E-3D
	4 Nimrod MR2
	1 Nimrod R1
Muharraq	4 Tristars
Seeb (Oman)	3 Nimrod MR2
Incirlik	8 Jaguars

The objective was now to deploy the UK Air Contingent into theatre during the second and third weeks of February to reach FOC by 3 March – apparently the earliest possible date on which an air campaign might begin. However, to achieve this deployment deadline, basing agreements were needed with Kuwait, Qatar, Bahrain, Saudi Arabia and Jordan, ground equipment had to be deployed to the Gulf – largely by sea – and protracted Omani and Saudi diplomatic clearance processes had to be completed. By 31 January, Kuwait, Bahrain and Jordan had signified their acceptance of the RAF deployments, although Jordan had requested that the aircraft destined for Azraq should not deploy until the coalition had taken the political decision to initiate hostilities (notionally, at least two weeks before the operation began). There was nevertheless considered to be some risk to the deployment time scales. The Secretary of State for Defence was advised:

> In the worst case, we may find that we are unable to agree basing for significant elements of the air package. Even with such agreement, a combination of enabling requirements and diplomatic clearances may delay the actual deployment. At best, some elements of the package will not achieve full operating capability until well after the target date of 15 February, but on current planning assumptions they should still be able to achieve it before the beginning of the air campaign.

By 4 February, there were grounds for more optimism. Qatar was thought to be willing to accept the UK basing request, and reports from Washington also suggested that a decision on military action was likely to be delayed by US deployment hold-ups, as well as international pressure to give UNMOVIC more time. Coincidentally, this allowed the UK to contemplate some lengthening of deployment timelines.

On 6 February, the Secretary of State for Defence announced in Parliament the deployment of the UK Air Contingent, declaring that:

> We envisage that in the days and weeks ahead we will increase the Royal Air Force presence in the region to around 100 fixed-wing aircraft supported by around 7,000 personnel, including members of the Royal Auxiliary Air Force.

The National Contingent Headquarters deployed to the Gulf on the 8th, and the Air Officer Commanding (AOC) 1 Group, Air Vice-Marshal Glenn Torpy, assumed the post of UK Air Contingent Commander (UKACC) the next day.

The Joint Force Air Component Headquarters (JFAC HQ) had started to deploy to PSAB to begin preparations for the formation of the Operation Telic UK Air Contingent Headquarters (ACHQ) on 20 January. The HQ was established from a combination of the standing Resinate HQ, the JFAC HQ, and additional augmentees. It was structured as follows:

A1	-	Personnel
A2	-	Intelligence
A3	-	Air Operations and Force Protection
A4	-	Logistics and Infrastructure
A5	-	Strategy and Plans
A6	-	Communications and Information Systems
A8	-	Contracts/Civil Secretariat

The A2, A3 and A5 cells comprised the operations section of the HQ, while the A1, A4, A6 and A8 cells made up the support section. The headquarters ultimately numbered some 220 personnel, including support personnel. Additionally, 55 Air command and control personnel, largely drawn from the JFAC HQ, were fully embedded within the Combined Air Operations Centre (CAOC), stretching trained air command and control manpower resources almost to the limit.

Due to the uncertainties over basing and diplomatic clearances, the timetable for deploying Air Contingent personnel was frequently revised. For some units, departure times were repeatedly delayed, while other personnel were called forward for deployment – often to unknown locations – at unexpectedly short notice. This inevitably created an impression among those involved that the deployment plan was far from robust, but there was no obvious alternative. In the view of the DCOS (Ops) at HQ STC, the process 'actually demonstrated our ability to fully utilise our AT[9] fleet in the face of changing circumstances by rapidly re-planning and reprioritising the deployment schedule'.

9. AT – Air Transport.

Air Vice-Marshal Glenn Torpy, UK Air Contingent Commander (later Air Chief Marshal Sir Glenn Torpy, Chief of the Air Staff, 2006 to 2009).

Air Marshal Brian Burridge, UK National Contingent Commander (later Air Chief Marshal Sir Brian Burridge, AOC-in-C HQ STC 2003 to 2006).

Less excusable were failures in communication between the UK and the APOD at Kuwait International Airport and poor administration by Army staff in the APOD, which resulted in some RAF personnel being sent to the wrong Deployed Operating Bases (DOBs). Ali Al Salem became the default. In February, a succession of weary, bewildered and frustrated individuals arrived at the base, often in the early hours of the morning, only to learn that they were needed elsewhere. It was for this reason that the RAF's Operation Telic Air Lessons Identified report recommended that 'UK Doctrine on APODs should be reviewed and clarified but must reflect control by the Air Component to ensure effective oversight of air operations and movements.'

As far as infrastructure was concerned, well established RAF base facilities already existed in theatre at Ali Al Salem, PSAB, and Thumrait, in Oman, for Resinate and Operation Oracle (Afghanistan). For Telic, it was planned to switch basing in Oman to Seeb, and all the necessary infrastructure required to make Seeb operational was therefore transferred from Thumrait. New provisions, including living accommodation, technical accommodation, storage, offices and flight planning rooms had then to be established at Al Jaber and Azraq. At Al Udeid, which was already an important USAF base, the Americans provided headquarters and accommodation buildings, but office, engineering and storage facilities were still required, along with additional ramp space.

The deployment process was far from straightforward. The UKACC believed that the task of establishing his headquarters should have been completed well before force elements began to deploy, and subsequently maintained that too many decisions on the structure of his force had been taken in the UK. In his view, specific theatre requirements should have been more influential: there was 'too much "UK push" rather than theatre pull'. He also recorded:

> The most notable issue has been the inability to build up forces at the pace we would have liked due to the lack of Diplomatic Clearances to bring personnel, equipment and aircraft into the host nations involved. The build-up of the aircraft detachments and the UK ACHQ at Prince Sultan Air Base in Saudi Arabia have been particularly badly affected.

There were daunting logistical hurdles to overcome. As the ACHQ's Operations Record Book (Form 540) put it, 'The size of the task, together with fragile communications, has caused difficulty in maintaining visibility of exactly what equipment has been scheduled to arrive where and when, whether moving by sea or air.' Seaborne equipment packages prepared for Turkish bases (which of

necessity left the UK before the Turkish option collapsed) were inevitably not optimised for the Gulf airfields. DOB commanders found that enabling equipment and personnel arrived in the wrong order and at short notice. 'Hub and spoke' air transport operations centred on the UAE base at Fujarah began later than expected (the original plan was to use Akrotiri while the Turkish option was still open).

Difficulties securing diplomatic clearance then disrupted flying and led to a four-day backlog in freight movement. Shortages of weapons and Ground Support Equipment (GSE) delayed the declaration of FOC at Al Udeid and PSAB and required some redistribution from Ali Al Salem and Bahrain respectively; GSE sent to PSAB from the UK, which reached Bahrain by sea on 10 March, was not delivered until the 17th because of further diplomatic clearance problems. Counter-Nuclear, Biological and Chemical (NBC) weapons stores proved inadequate and were unevenly distributed between force elements. The deployment was also beset by chronic communications problems forward to the DOBs and back to the UK. According to the Air Lessons Identified report,

> Communications bearers and gateways were insufficiently robust, and the multitude of different CIS,[10] across the operational, intelligence and support communities, meant that it was difficult and often impossible to communicate between UK Organisations … In addition, there is little interoperability with US systems and a key concern was a lack of connectivity or access to SIPRNET.[11]

The UKACC would later identify CIS as his gravest area of concern in his personal evaluation report on Operation Telic. Yet he was recording as early as February 2003 that his headquarters had 'paid the price for past lack of investment in robust communications, with literally days of being unable to place secure calls through the Whitehall exchange'. Data communications had not fared much better.

Of course, many early teething troubles in the communications sphere were ultimately resolved, but the more fundamental weaknesses within the UK CIS infrastructure could not be rectified in the middle of a major operation. The urgent need for a single robust defence-wide system was perhaps the most prominent lesson identified from Operation Telic. By contrast, the other physical deployment obstacles were overcome in due course. Virtually all base infrastructure work had

10. CIS – Communications and Information Systems.
11. SIPRNET – Secret Internet Protocol Router Network; this was the main US intelligence CIS.

been completed by 18 March, leaving only minor enabling works ongoing, and the various logistical difficulties did not prevent all the DOBs declaring FOC by 19 March. The delays in obtaining overflight and diplomatic clearances, which so concerned the UKACC in February, did not stop the majority of aircraft (and appropriate force protection units and equipment) deploying to the Gulf by the end of the month.

This revised schedule might still have been problematic had the Americans adhered to their original time scales for hostilities, but the key strategic-level decisions were eventually postponed, providing nearly two additional weeks to complete the deployment process (see below). By March, only the GR7s bound for Azraq in Jordan were still giving the UKACC legitimate cause for concern: the Jordanians were refusing to permit their deployment until five days prior to A-Day, whereas Air Vice-Marshal Torpy wanted seven days to give sufficient time for theatre familiarisation and training. Not until the 9th was Jordan finally persuaded to admit the detachment, which duly flew in from Akrotiri that evening.

Overall, then, despite the problems, the achievement was considerable. The UK air contingent deployed to eight DOBs in seven different countries in a matter of weeks, at a time when the medium-scale war-fighting criteria envisaged deployment to just four DOBs. Moreover, the full deployment was effected in far less time than had been required before the first Gulf War. Yet it must be remembered there was more time to prepare for Telic, and the Air Contingent would have been less sustainable in the longer term because the RAF had been so drastically reduced in size in the intervening years.

8. The Shift to the Right

At the same time as the UK force deployments were taking place, US timelines for the commencement of OPLAN 1003V were beginning to slip. At the end of 2002, US planning still envisaged that a short preliminary air campaign preceding a ground offensive into Iraq would be launched late in February, but the Chiefs of Staff were advised on 15 January of 'a possible marginal shift to the right' for the US political decision to go to war. Moreover, 'The gap between A and G-Days had been compressed so that G-Day was now assumed to be A+5 (8 Mar).' The delay was apparently required to give more time both for military preparations and for the 'political process' – i.e., the presentation of a case for war based on UNMOVIC's expected failure.

A C-17 Globemaster flown by 99 Squadron at a Gulf base in 2003.

The C-17's lift capacity was of vital importance to the Air Contingent's rapid deployment before Operation Telic.

On 27 January, UNMOVIC submitted a report to the UN revealing that, while no WMD had yet been found, Iraq had still not fully complied with UNSCR 1441. The Commission again drew attention to the uncertainty surrounding the whereabouts of weapons stocks that had existed when UNSCOM left Iraq in 1998. A few days later, on 3 February, the Prime Minister declared himself satisfied that Iraq was in material breach of UNSCR 1441, and the Government re-emphasised that, while a peaceful, voluntary disarmament of Iraq was preferable, the UK was prepared to use force as a last resort to secure Iraqi compliance. UNMOVIC's basic message was strengthened by a further report, dated 14 February, after which the Bush administration once more insisted that Iraq's actions were clearly in breach of UNSCRs. Yet UNMOVIC's pronouncements subsequently became more cautious. On the 26th, the Chiefs of Staff were advised that the Commission were 'tending to retreat from making reports that might be used to precipitate conflict'. A Foreign Office representative suggested to the Chiefs that UK efforts might best be concentrated on securing the passage of a second UNSCR authorising the use of force in the event of Iraq's failure to comply with UNSCR 1441.

Meanwhile, the timetable slipped again. A further report to the Chiefs of Staff declared that the Combined Forces Land Component Commander (CFLCC) was working towards a G-Day of 15-16 March but with a near-simultaneous A-Day and G-Day. By the end of February, it was becoming clear that opinion in Washington was divided over the timing of initial operations. The political decision to launch OPLAN 1003V was apparently taken on 22 February and the US administration began working towards a mid-March A-Day, perhaps precipitated by an UNMOVIC report to the UN due on the 7th. But the military were concerned about logistical bottlenecks and sought to postpone A-Day until the third or fourth week of March. US deployments were said to be nearly two weeks behind schedule.

Ultimately, there was no alternative but to adjust the political process to reflect these delays. On 7 March, the UK, US and Spain introduced a new draft of a UN Resolution giving Iraq a deadline of 17 March to co-operate fully with the Security Council's demand to rid itself of WMD. However, France, Germany and Russia had already by this time issued a joint declaration that they would 'not allow' (they did not say 'veto') a UN resolution authorising war. The UK, the US and Spain still went through the motions of promoting the draft resolution, but there was no chance at all that the required nine votes in its favour would be secured in the UN Security Council. By 12 March, the Foreign Office was considering its withdrawal on the basis that other permanent members of the Security Council had

undermined the UN process by prematurely declaring their intention to block the resolution without full sight of its contents.

The US government now prepared an ultimatum demanding that Saddam Hussein leave Iraq within 48 hours or face military action. This would be issued on 17 March – the deadline date for the draft UN resolution – making the 19th D-Day for OPLAN 1003V. On the 17th, the draft resolution was duly withdrawn, and the British Ambassador to the UN announced that the UK and US would not seek a vote at the Security Council on a resolution presenting an ultimatum to Iraq. However, they reserved the right to take their own steps to secure Iraq's disarmament, using UNSCR 1441 as the ultimate authority for action.

On the same day, the Attorney General, Lord Goldsmith, set out his view of the legal basis for using force. In his opinion, authority for military action against Iraq existed from the combined effect of resolutions 678, 687 and 1441, all of which had been adopted under Chapter VII of the UN Charter, which allows the use of force for the express purpose of restoring international peace and security:

> 1. In resolution 678 the Security Council authorised force against Iraq, to eject it from Kuwait and to restore peace and security in the area.
>
> 2. In resolution 687, which set out the ceasefire conditions after Operation Desert Storm, the Security Council imposed continuing obligations on Iraq to eliminate its weapons of mass destruction in order to restore international peace and security in the area. Resolution 687 suspended but did not terminate the authority to use force under resolution 678.
>
> 3. A material breach of resolution 687 revives the authority to use force under resolution 678.
>
> 4. In resolution 1441 the Security Council determined that Iraq has been and remains in material breach of resolution 687, because it has not fully complied with its obligations to disarm under that resolution.
>
> 5. The Security Council in resolution 1441 gave Iraq "a final opportunity to comply with its disarmament obligations" and warned Iraq of the "serious consequences" if it did not.

> 6. The Security Council also decided in resolution 1441 that, if Iraq failed at any time to comply with and co-operate fully in the implementation of resolution 1441, that would constitute a further material breach.
>
> 7. It is plain that Iraq has failed so to comply and therefore Iraq was at the time of resolution 1441 and continues to be in material breach.
>
> 8. Thus, the authority to use force under resolution 678 has revived and so continues today.
>
> 9. Resolution 1441 would in terms have provided that a further decision of the Security Council to sanction force was required if that had been intended. Thus, all that resolution 1441 requires is reporting to and discussion by the Security Council of Iraq's failures, but not an express further decision to authorise force.

On 18 March, Parliament approved all means necessary to ensure the elimination of Iraq's WMD; on the 19th, the US ultimatum having been rejected, CDS signed and issued the Operation Telic Execute Directive and Implementing Order to CJO. Military operations were authorised from 19 March 03 at 1800Z.

9. Southern No-Fly Zone Operations, January-March 2003

During the deployment period, the operational environment in the Gulf did not change substantially. By January 2003, the Operation Resinate (South) Response Options were occurring almost daily but they remained, overwhelmingly, responses to Iraqi actions that threatened coalition forces engaged in patrolling the southern NFZ, or those located at bases around the Gulf. Any shaping of the battlespace was still largely confined to dismantling the IADS in southern Iraq and the destruction of associated communications nodes, although a few exceptions may have been made for very high pay-off targets that would have a significant operational-level impact or unquestionably save coalition lives later. The Response Options were mostly executed by US aircraft, which were now in theatre in abundance; RAF participation declined from December onwards after concerns about stocks of EPW II bombs in the event of a major bombing campaign led to the imposition of severe restrictions on their use.

RAF officers at PSAB nevertheless became increasingly concerned that the parameters of their ROE were too restrictive, and the Americans sometimes also showed signs of frustration over the UK's strict interpretation of the Operation Resinate mission. While there was no shortage of strike capacity in the Gulf, certain other problems arose. On at least one occasion, the UK refused to allow USAF B-52s located on the British-owned island of Diego Garcia to participate in a Response Option; on another, the UK withheld support for so-called 'intrusive' ISR beyond the normal Resinate boundaries. Immediately after assuming his post as UKACC, Air Vice-Marshal Torpy addressed his views on this subject to PJHQ:

> We do not appear to have developed a plan for how to align our military posture under Op Resinate with the political and diplomatic lines of operation … It is becoming increasingly untenable – certainly at the tactical level – for the UK to operate within the existing Op Resinate mandate, when the US is starting to expand the scope of Op Southern Watch.

As the build-up of American and British forces in the Gulf gathered pace, the CFACC produced plans to organise larger coalition packages and triple the length of time spent by aircraft in Iraqi air space. One of his paramount aims was to desensitise the Iraqis by confronting them with forces and flying patterns similar to those that would ultimately be employed if Iraqi Freedom was implemented. Against this background, more than a month before the start of the operation, the UKACC felt obliged to warn PJHQ:

> There are some in Whitehall who may not appreciate that as far as the CFACC is concerned he is already into 1003V Phase 2 – Shaping the Battlespace – and the drive to bring A and G Day closer together will require this preparation to become increasingly aggressive in order to deliver the conditions for G Day.

Air Vice-Marshal Torpy urged the revision of the Operation Resinate Targeting Directive and ROE. He was also anxious to ensure that aircraft and crews embarked on a balanced programme of Resinate flying and training as they arrived in theatre.

In the UK, the MOD soon accepted that a limited change in the Targeting Directive was necessary, but not as a precursor to the initiation of Operation Telic. Rather, a change was required to delegate to theatre the authority to take action

against Iraqi forces deemed to be threatening deployed coalition units. On 11 February, several Iraqi Ababil-100 Surface-to-Surface Missiles (SSMs) were spotted in the southern NFZ. The CAOC proposed a Response Option, but the UKACC had to refer the issue to PJHQ (at 0500Z), and PJHQ considered that ministerial approval was required. This was not received in theatre for six hours. In the event, the delay was of no significance because poor weather prevented Southern NFZ operations that morning, and it proved impossible to attack the missiles until 1550Z; they were destroyed by Tornado GR4s and F-16CGs. Yet the episode clearly demonstrated that some further targeting delegations were needed, and the following paragraph was therefore added to the Directive:

> Attacks against artillery, rocket or missile systems are authorised where there is a clear and direct threat against coalition forces on the ground (in other words, systems identified are operationally deployed; in a location where they are able to engage coalition ground forces; and when CBF(R-S)[12] is satisfied that there is a clear, direct and specific threat to the forces in question).

But changes in the ROE were another matter. From the MOD's perspective, UK forces sent to the Gulf for the contingency of Operation Telic deployed without ROE because their role was to *deploy* rather than *fight*. Telic ROE were said to be 'in a mature state and could quickly be finalised if ops started' but the forces concerned could only fight in support of their inherent right of self-defence in the meantime. Changes in ROE designed to smooth the transition from Resinate to Telic were not compatible with the government's position that no decision had been taken to go to war, and with its determination to observe the weapons inspection and United Nations processes before committing the UK to hostilities. Moreover, at the time, the precise legal basis for taking military action to disarm Iraq was still under discussion.

After thorough deliberations between the responsible MOD and PJHQ staff, the Secretary of State for Defence was therefore advised that no threat had been identified that required 'additional ROE to be developed for any of the three components in advance of offensive Telic operations'. Furthermore, despite suggestions that the US would use NFZ operations as a cover for preparing the battlespace prior to the launch of OPLAN 1003V, there was no clear evidence that they were doing so. Consequently, 'Op Telic and Op Resinate should remain

12. CBF (R-S) – Commander British Forces (Resinate South).

separate.' The rotation of Telic forces through Resinate for operational training purposes might be considered, but no firm decision on combining the two could be taken yet.

However, where ISR was concerned, the position was less clear-cut. In February, a Nimrod R1 was authorised to commence operations in the Gulf in support of Operation Telic, but 51 Squadron subsequently recorded that their missions, which began on 4 March, were conducted under the existing Operation Argentic/Resinate (South)[13] mantle. Meanwhile, the Canberra PR9s were also authorised to fly reconnaissance missions from Akrotiri in support of Telic rather than Resinate (see Part 3).

The UKACC remained far from content with the situation. As late as 28 February, he addressed a point brief to the NCC detailing alleged 'backward leaning' by the MOD regarding the transition from Operation Resinate to Telic. The revised Targeting Directive only reached the Gulf on 1 March but did 'better align UK ops and US intent on OSW' and there was apparently 'renewed acceptance by US leadership at PSAB that the coalition should not plan to attack a DMPI which had been declared by the UK as a "NO".' On 3 March, authority was received for aircraft deployed on Operation Telic to participate in Resinate (South). However, in the absence of Qatar's approval, this did not extend to the Al Udeid GR4s, and the UKACC clearly felt that the MOD might have done more to secure Qatar's co-operation. In the event, the detachment was unable to fly on Resinate until the 16th, which left minimal time for live operational training in theatre. Even their theatre familiarisation flying had to be confined to Qatari airspace.

Fortunately, most of the other aircraft in the UK Air Contingent could take full advantage of the changed situation when 24-hour operations began on the 4th. The CFACC's concept of operations now involved spreading a series of packages over each 24-hour period but conforming as closely as possible otherwise to established operating patterns, avoiding any dramatic increase in the number of Response Options and thus, in theory at least, not arousing excessive Iraqi alarm. According to one source, the intention was 'to provoke a tolerance of 2-3 day high sortie rates in Iraq over the next few weeks'. The US planners were warned that the CFACC attached the greatest importance to maintaining coalition and international support, and the targeteers were 'reined in'. This was welcomed at the ACHQ, as it promised to ensure a more measured approach to the transition from NFZ patrolling to major combat operations, assuming they were launched.

13. Argentic was the operation name applied to Nimrod R1 operations in the Gulf during Operation Resinate and earlier operations to patrol the Iraq NFZs.

The build-up of coalition forces, particularly in Kuwait, left them vulnerable to Iraqi attack; the Operation Resinate Targeting Directive was changed to permit strikes on threat weapons such as rockets and missiles.

In addition to the Tornado GR4s at Ali Al Salem and the F3s at PSAB, which were already involved in Resinate, the PSAB-based Nimrod R1, the VC10s and the E-3Ds were now included in the ATO. Given the advent of 24-hour operations, this raised obvious difficulties when the US proposed Response Option targets that the UK considered to be inconsistent with Resinate objectives. Clearly, mission-critical assets like the E-3Ds could not simply be withdrawn, as they had been when operations were only conducted for a limited period each day. The only alternative was for them to remain on task on the basis that they were not directly participating in the US attacks.

By 12 March, the Al Jaber GR7s were also involved in the operation. A lack of Saudi overflight clearance at first prevented them from participating, but they (along with the PR9s) were ultimately permitted to fly their first Resinate sorties on 16 March. During the month, the Ali Al Salem GR4s were involved in two Response Options against (on the 7th) a Long Track radar and (on the 8th) a Roland SAM, but no other RAF aircraft released weapons against Iraqi targets before the start of Operation Telic.

Little documentary evidence is available on the Iraqi reaction to coalition activity in this period, but the later testimony of an Iraqi Air Force general sheds at least some light on their perspective. The general supplied much information on Iraqi passive air defence measures, including the extensive denial and deception techniques employed to protect limited assets that were constantly exposed to patrolling coalition aircraft. Many assets were designed to be deployed on hard-stand platforms, while others were moved constantly in intersecting trenches. Iraqi military industries provided look-alike decoy weapon systems and aircraft painted with special coatings to produce convincing electronic signatures; destroyed and damaged equipment was cannibalised for parts and re-used to make decoys. Iraqi intelligence analysts were said to have worked closely with field commanders to coordinate denial and deception operations.

Coalition aircraft had proved very predictable, entry points into Iraqi airspace and patrol patterns rarely deviating over time. The Iraqis also tracked US satellites, RPAS flights and other coalition reconnaissance aircraft. Assets and decoys were deployed and moved accordingly. Dummy FO repeaters were used to considerable effect to conceal signals units from coalition aircraft. During January and February 2003, the coalition had targeted the FO repeaters over 20 times, but the general alleged that the optic cable and its repeaters were left undamaged and that only the dummies were hit. It was not until early March 2003, when coalition aircraft began targeting all signalling units in particular areas, that the FO cable was damaged.

At the ACHQ, the days preceding the outbreak of hostilities were dominated by last-minute planning for the opening phase of Operation Telic. Work on

clearing OPLAN 1003V targets started on 9 March and the UKACC also instituted table-top exercises to ensure that robust targeting and clearance procedures were in place. He himself participated in a CENTCOM VTC table-top exercise intended to war-game the early days of the campaign on the 12th. At the same time, ATOs were being prepared covering D-2 to D+4. This proved extremely difficult because of the prevailing uncertainty about how 1003V would begin – how the political and military processes would be synchronised, how A-Day would be coordinated with G-Day and how the end of Resinate would lead into the beginning of OPLAN 1003V.

A Master Attack Plan for the A-Day ATO was finally briefed to the CFACC on 13 March, but changes were being introduced into some of the other ATOs for this critical period as late as 18 March. In the meantime, A-Day and G-Day were compressed to such an extent that they were eventually scheduled to take place at the same time – on D+2. There were clearly some in Washington who desired the shortest possible period of live hostilities and who believed that, given the relative strengths of the coalition and Iraqi forces, extensive battlespace preparation was unnecessary. The CFLCC may also have considered that extensive preliminary air strikes, although desirable to degrade enemy ground forces, might also warn the Iraqis of the impending assault, giving them an opportunity to sabotage the all-important oil fields before coalition forces began their advance. He was apparently seeking to merge A-Day and G-Day as early as 19 February. There were also concerns that an air campaign designed to achieve shock and awe might undermine coalition information operations by causing civilian casualties and other collateral damage, and that the destruction of Iraqi infrastructure might significantly complicate the task of post-war reconstruction.

Ultimately, then, it proved necessary for the ACHQ to prepare a variety of Air Operations Directives to cover the range of circumstances in which hostilities might start. Not unexpectedly, much of this planning proved to be nugatory. The ROE and Targeting Directive employed during Telic were only finalised on 18 March (although drafts were available earlier), and HQ STC's Air Lessons report subsequently described the production of the Directive as 'long and tortuous'. More positively, however, both Ministers and legal advisers were made aware of the realities of high-tempo, high-manoeuvre warfare during the course of its preparation, and thus they agreed to accept that tight control over targeting from London was unrealistic. Far more extensive delegations were given to the NCC

than had characterised previous operations – a particular advantage when it came to the prosecution of Time-Sensitive Targets (TSTs).[14]

The UKACC duly adopted the Operation Telic ROE on 19 March at 1800Z, in line with the US application of the ROE for OPLAN 1003V. Nevertheless, air planning was again in a state of flux by that time, the CFC having initiated action to accelerate the ground plan from 48 hours to 24 hours from the start of Operation Telic, reportedly 'in anticipation of an early collapse of the Iraqi 51st Division in the south'. In other words, he now envisaged that G-Day would *precede* A-Day, which was still scheduled for the 21st. This had profound implications for A-Day, for a Master Attack Plan designed to contribute independently to the achievement of shock and awe could hardly be appropriate to a situation in which large-scale ground operations had already been in progress for more than 24 hours.

10. Part 1: Conclusion

The UK Air Contingent for Operation Telic comprised a broad range of capabilities. The precision attack role of the Tornado GR4 and Harrier GR7 remained of supreme importance, as did the AD role of the F3. And yet it is also notable that the US enthusiastically accepted the combat support capabilities offered by the RAF: as critical enablers or force multipliers, they were very highly valued. Consequently, in the autumn of 2002, the RAF was confronted by the prospect of its largest overseas operation since Granby. Several factors assisted the build-up. UK air operations had continued almost without interruption in the Gulf since 1991, and the RAF thus had far more knowledge and experience of conditions there, as well as close working relationships with deployed American forces and a number of Arab governments. Moreover, as air operations against Iraq were already being conducted under the auspices of Operation Resinate, there

14. Highly specialised procedures to attack fleeting targets, especially those that had potential for strategic impact, were employed during Operation TELIC. These TSTs attracted the highest priority for attack, and their execution involved dedicated coalition forces and, if necessary, the diversion of forces from lower priority tasks. Three types of TST were identified: leadership, WMD and terrorist. The fleeting nature of these targets meant that the Coalition had to develop a highly responsive process to enable rapid attack and to exploit available capabilities. A comprehensive review of coalition equipment and processes during the preparatory phase of the operation led to the formation of a dedicated TST Cell within the CAOC, responsible for controlling the quick prosecution of TSTs. The success of the cell relied on compressing the sensor-to-shooter cycle and depended on rapid decisions being communicated quickly to the attack assets, which were primarily aircraft, but included TLAM-equipped submarines and SF.

were bases in theatre that could accommodate more aircraft and personnel if required. Equally, the RAF was a far more mobile force in 2003 than in 1990 and was better prepared for overseas duties, and the six months available for planning Telic also eased the deployment task. By contrast, many units had been dispatched to the Gulf in 1990 at minimal notice in response to Iraq's unexpected invasion of Kuwait.

Nevertheless, for the RAF, the months preceding Operation Telic were characterised by some particularly complex questions relating both to operational planning and managing the transition from Resinate. Planning was constrained by a variety of uncertainties. Would the UK even participate in the prospective operation? Would military action be sanctioned by the UN? Most of all, perhaps, would Turkey permit an offensive against Iraq to be launched from her soil? The issue of UK participation (linked, of course, to the UN process) went to the heart of the UKACC's difficulties in coordinating UK operations with those of the US in the months before Telic, and uncertainty over Turkey's position also raised acute problems during the planning and deployment phases of the operation.

Yet it is not easy to see how events could have been managed differently. Whether or not there were genuine 'spikes' or shaping operations, some intensification of Operation Resinate activity in the months before Telic was inevitable given that the coalition had been pinned back in Southern Iraq since 2001; yet no substantial relaxation of UK ROE could have been sanctioned until the government had formally taken the decision to go to war, and that decision could not have come until the UN route had been exhausted. Equally, given the UK's status as junior partner in any coalition with the US, there was little option but to accept Washington's optimistic expectation of Turkish co-operation.

When the Turkish option unravelled, the consequences were serious in practical terms, upsetting a variety of deployment assumptions, but the RAF's enhanced expeditionary capability, together with the inherent flexibility of air power, ensured that the complications were not insurmountable. Once the UK Air Contingent's basing arrangements had been reorganised, it could play largely the role envisaged for it under the original operation plan.[15] By contrast, the UK Land Contingent was effectively removed from the coalition main effort and reassigned to the subsidiary task of securing south-eastern Iraq and neutralising resistance around Basrah.

However, the collapse of the Turkish option did undermine much of the original thinking behind OPLAN 1003V, and this certainly had a profound impact

15. The one significant loss was the Jaguar detachment, which was effectively grounded by the Turkish authorities at Incirlik following the onset of hostilities.

on the employment of the UK Air Contingent after the onset of hostilities. The effects-based strategy, with its emphasis on shock and awe and on 'overwhelming the Iraqi regime through a coordinated multiplicity of threats applied across a number of lines of operation' had by 19 March 2003 made way for a very different approach. There was to be no preliminary air campaign beyond such limited shaping as had taken place in the preceding months. Instead, a ground assault was to be launched more than 24 hours before A-Day, largely rendering the entire shock and awe concept redundant. And while the revised operation plan retained elements of the original 1003V, it essentially involved a conventional offensive by two US corps from the Iraq-Kuwait frontier to Baghdad. Coalition air power would overwhelmingly be employed in support of their advance.

PART 2: TORNADO GR4 AND HARRIER GR7 OPERATIONS

1. Introduction

The Royal Air Force committed some 48 offensive aircraft to Operation Telic, consisting of 30 Tornado GR4s and 18 Harrier GR7s. Of the GR7s, eight were based at Azraq, Jordan, and were primarily assigned to the task of countering potential Scud missile launches by Iraq; their story is considered in the third part of this study. The focus here is on the three RAF detachments committed to supporting the coalition main effort in southern and central Iraq – the GR4 detachments based at Ali Al Salem in Kuwait and Al Udeid in Qatar, and the GR7 detachment based at Al Jaber in Kuwait. Of these three detachments, the Ali Al Salem GR4s partly comprised aircraft formerly committed to Operation Resinate. The other two detachments deployed to the Gulf in their entirety in February 2003.

During the build-up to Telic, HQ STC broadly anticipated that the GR4s would make their principal contribution flying in the attack and Air Interdiction (AI) roles, although some CAS was expected. The RAF also thought that up to 40 per cent of GR7 tasking would involve attack or interdiction operations, despite their closer historical association with CAS. In the event, these predictions were not fulfilled. Instead, the defining feature of Operation Telic for all three detachments proved to be an early move into the CAS role, with the GR4s flying only two or three days of attack missions and the GR7s being tasked with CAS almost from the very outset. Other missions were certainly executed, including tactical reconnaissance, Suppression of Enemy Air Defences (SEAD), and Storm Shadow stand-off missile launches.

Yet CAS predominated and accounted for significantly more sorties than all the other roles put together; air operations in Telic will always be associated first and foremost with CAS and, for this reason, CAS missions are recorded in considerable detail in this narrative. It is important not only that the lessons of the operation should be identified, but that Telic's place in air power history – and more specifically in the history of CAS – should be clearly established. Before examining the course of air operations, however, it is necessary to consider the work-up and deployment phases of Operation Telic for each of the three offensive detachments.

A Tornado GR4 at Ali Al Salem.

A Harrier GR7 at Al Jaber.

2. The Tornado Combat Air Wing

The Tornado GR4 detachment based at Ali Al Salem in Kuwait during Operation Telic was drawn from Nos 31, 2(AC), 13 and 9(B) Squadrons, from RAF Marham, and from 617 Squadron, from RAF Lossiemouth. In total, the detachment comprised 18 aircraft and 36 crew, which were combined to form the Tornado Combat Air Wing. As the unit already located at Ali Al Salem for Operation Resinate, 31 Squadron inevitably took the lead role in the Combat Air Wing, the Officer Commanding (OC) 31 Squadron, Wing Commander PD Teakle, being appointed to command the wing.

The Combat Air Wing's tasking was more diverse than that assigned to the other RAF offensive detachments deployed during Operation Telic, particularly in the early stages of the operation. In addition to the basic attack, interdiction and CAS roles undertaken by most combat aircrew at some stage during Telic, the wing was charged with tactical reconnaissance employing the new RAPTOR pod, attack missions using the new Storm Shadow stand-off missile, and low-level scud-hunting (Counter-TBM) in western Iraq. The Combat Air Wing also flew some dedicated SEAD missions with ALARM. The reconnaissance role was performed by 31 Squadron aircrew; although nominally a SEAD unit equipped with ALARM, 31 Squadron had regularly conducted tactical reconnaissance missions during Operation Resinate. Storm Shadow operations were assigned to 617 Squadron crews, and 2 and 13 Squadron were responsible for the Counter-TBM task.

Although it is not clear precisely when the squadrons were officially warned of a potential large-scale UK air contribution to a possible future US-led invasion of Iraq, there was sufficient conjecture in the media by August 2002 to suggest that some such operation might be in prospect. Writing that month, 31 Squadron's diarist referred to the fact that the work-up for their next operational deployment came 'at a time when there is much speculation in the press about a larger military operation against Iraq.' During September and October, the Marham GR4 squadrons conducted extensive live bombing exercises out of Davis-Monthan Air Force Base, Tucson, Arizona, using the Goldwater ranges north-west of the city. The exercises, named Torpedo Focus, were designed to prepare the squadrons for the role of Expeditionary Duty Wing (EDW), which they were to take over from the Lossiemouth GR4 squadrons on 1 January 2003. This commitment included potential Joint Rapid Reaction Force Deployments but primarily involved GR4 tasking from Ali Al Salem under the auspices of Operation Resinate. Specifically, the exercise was intended to prepare 54 crews from Marham for EDW commitments so that they achieved proficiency in medium-level laser-guided

bombing with the Thermal Imaging Airborne Laser Designator (TIALD) pod in a desert environment by day and night, and practised the employment and delivery of heavy weaponry, including PW II, PW III and EPW bombs.

Torpedo Focus provided the GR4s with nothing less than a two-week smart weapons camp, with a range that boasted elaborate mock targets such as airfields, SAM sites and convoys. In the UK, opportunities for live precision-guided bombing were generally few; in previous operations, notably Kingower (Kosovo, 1999) and Granby (the Gulf War, 1990-91), some aircrew conducted their first ever live precision-guided munition (PGM) releases. Torpedo Focus thus offered the Marham squadrons an exceptionally valuable training opportunity, which they did not waste. No 31 Squadron expended their entire annual training entitlement of PW and EPW bombs during the exercise, and one 2 Squadron pilot, who was not yet night current, was able to release at least 10 PGMs. There was also ample scope for employing the GPS-guided EPW II, which was completely new to many aircrew, and even a number of 2,000 lb PW IIIs, which were dropped at the Chocolate Mountain range north of Yuma, California. Valuable lessons were identified. The exercise also offered an opportunity for practising the wing concept: it was divided into two consecutive deployments, the first shared by 31 and 13 Squadron, the second by 2 and 9 Squadron.

For 31 Squadron, which was scheduled to deploy to the Gulf at the beginning of January, the tempo of subsequent work-up activity remained high. In October there was limited involvement in Exercise Batus Run (with crews from 9 and 13 Squadron), which entailed CAS for 3 UK Armoured Division in Canada. In the UK, the squadron embarked on the full spectrum of pre-deployment work. In flying training there was a particular emphasis on night missions. On the ground, squadron personnel received lectures on the GR4's systems, its weaponry and its Electronic Warfare (EW) capability, along with regular intelligence updates from the Gulf. The OC 31 Squadron charged himself with ensuring that all squadron personnel were current in ground defence training, and that all pilot flight checks were current for the duration of the envisaged deployment. Similarly, all aircrew simulator training was to be current until the detachment end date, and aircrew were to be fully practised in war procedures in the Marham GR4 simulator.

In the first half of November, there was again a strong emphasis on night flying training – particularly electro-optical training – before the squadron was detached to RAF Lossiemouth to fly in Composite Air Operations (COMAOs)[16] in support of the Combined Qualified Weapons Instructor course. Unfortunately, poor

16. COMAOs involve multiple types of aircraft integrated into a single package of aircraft and systems to prosecute a specific mission or task.

weather led to the cancellation of most of the COMAOs, although the limited flying achieved was described by participants as 'extremely valuable, especially for the inexperienced Squadron aircrew who will shortly be deploying to the Gulf to fly operational COMAOs'.

Two of the other Marham squadrons, 2 and 9 Squadron, became involved in a further exercise after their return from Torpedo Focus in October. Entitled Taught Focus, this was designed to fulfil the requirements of the RAF's Training Policy for Deployed Operations and involved 'deploying' 16 aircraft and at least 24 aircrew to an austere operating environment on the other side of the airfield, with all command, operations and support elements functioning from a large temporary hangar. The concept was that the squadrons would achieve 24-hour operations during the flying phase of the exercise, based on three flying waves per day. All aircrew involved in Taught Focus were to be prepared to the normal Operation Resinate deployment standard. The exercise provided further valuable experience to the squadrons in operating as a wing from a location offering the bare minimum of prepared base facilities, but the planned flying programme was again badly disrupted by adverse weather.

December 2002 was the final month available to 31 Squadron for training and preparation before their departure to the Gulf. According to their record, it was by this time 'apparent to all Sqn members that the deployment … for Operation Resinate could develop into a much larger military operation against Iraq.' Almost all squadron engineering activity that month was geared to the deployment. The foremost aircrew training priority was to prepare a number of selected crews to use the RAPTOR reconnaissance pod. Poor weather again interfered with their progress, but relatively little flying training with the pod was ultimately required because the operation of RAPTOR, once airborne, was largely automatic; mission planning called for considerably more training effort. Preparations were otherwise heavily focused on maintaining aircrew currency with the TIALD pod.

By the end of the month, four crews were qualified to employ RAPTOR on operations, and squadron engineering personnel were also far more familiar with the system; all aircrew were rated Combat Ready (CR) for TIALD operations at medium altitude. On the ground, an Operational Response Team (ORT) from the Air Warfare Centre (AWC) briefed the squadron on Iraqi air defence threats, on the GR4's EW equipment, and on PGM, collateral damage and Law of Armed Conflict (LOAC)-related issues.

An advance party from 31 Squadron deployed from Marham to Ali Al Salem on 27 December, while the main party followed on 3 January; at first, the detachment comprised eight aircraft and aircrew, and the majority of the squadron's engineers. Operational flying began the next day. Squadron aircraft

were regularly made available for Response Options, flying in a holding pattern in Kuwaiti airspace pending tasking, but they were only required to attack Iraqi targets on one occasion in January (the 10th), when they destroyed two support buildings at Tallil airfield with laser-guided PW IIs. The squadron was primarily employed in the tactical reconnaissance role using RAPTOR to photograph such Points of Interest (POIs) as command posts, military storage areas, SAM sites, deployment areas, FO repeater sites, port facilities, airfields, lines of communication, and border observation posts. The pod had been hurriedly pressed into service without completing the normal programme of trials and tests, and neither its night (Infra-Red - IR) nor its data-link capabilities were available. Nevertheless, crews were immediately impressed by its ability to obtain high quality oblique images at long range, without alerting the Iraqis to the specific POI; the necessity for straight and level flight while the imagery was being gathered was rather less to their liking. All operational flying was conducted at a minimum altitude of 20,000 ft.

Originally, the first eight crews who deployed to Ali Al Salem were to be rotated back to Marham and replaced by other members of 31 Squadron halfway through the detachment, at the end of January. However, the looming prospect of large-scale operations against Iraq caused this plan to be revised well before the full UK Air Contingent was dispatched to the Gulf. PJHQ decided to raise the number of GR4s at the base from to 12 and to increase the number of aircrew correspondingly, while holding all deployed squadron aircrew in theatre. The reinforcement duly took place on 27 and 28 January. Soon afterwards, the OC 31 Squadron briefed personnel that he expected hostilities with Iraq to begin within a few weeks.

By this time, further augmentation was also in prospect. The Ali Al Salem Detachment Commander, Group Captain Simon Dobb, attended a conference at HQ STC on 17 January during which the Air Officer Commanding-in-Chief, Air Chief Marshal Sir John Day, supplied 'the strongest possible indication that UK forces would be committed to conflict in the near future.' It became clear subsequently that air operations would not be possible from Turkey and that more UK forces would consequently be deployed south of Iraq. By the end of January, Group Captain Dobb had been assigned responsibility for assuring that a force of 18 Tornado GR4s achieved FOC from Ali Al Salem by 15 February. The existing force was to be augmented from 2, 9, 13 and 617 Squadrons.

During December 2002, 2 and 13 Squadron had unexpectedly been drawn into preparations for Counter-TBM operations in western Iraq. These are described in more detail in Part 3 of this study, but they were basically designed to prevent the Iraqis from launching Scuds against Israel – the strategy they had employed in

1991 in response to Operation Desert Storm. Round-the-clock surveillance of western Iraq was to be undertaken by E-3Ds, JSTARS, PR9s and Predators, supported by dedicated attack assets such as B-1Bs, F-15s, F-16s, A-10s and RAF Harrier GR7s. The aircraft were to work closely with coalition SF on the ground. At first, planning envisaged medium-level surveillance and precision-guided bombing of targets, but the possibility that poor weather or cloud might impede medium-level operations had also to be considered. The Tornado GR4A, with its excellent low-level capability, the built-in Tornado Infra-Red Reconnaissance System (TIRRS), and TIALD, provided an obvious solution.

On 2 January, two GR4s along with Harrier GR7s from 3(F) Squadron were trailed out to Nellis Air Force Base, Nevada, USA, for a Counter-TBM exercise entitled High Fly. This was actually the third such exercise to take place since the autumn, but it was the first to involve the Marham GR4s. Before flying began, the participants were addressed by the CFC himself, who stressed the critical importance of their mission. Given the novelty of the task and the limited time available for rehearsal, only two of the three GR4 crews flew, while the third provided mission planning and other support. The exercise was conducted at night because it seemed most likely that the Iraqis would deploy their Scuds under cover of darkness, and the various participants employed the same 'kill-box' grid system that had been developed for possible future operations over Iraq. Real and mock Scuds and their support vehicles were released to roam the desert, and aircraft were tasked to named areas of interest where the presence of missiles was suspected.

At first, there was little tasking for the GR4s: clear weather allowed the medium-level plan to work well. But the weather deteriorated after a few days, and their low-level capability then came into its own. Their mission was challenging, to say the least. While airborne, aircrew would typically receive possible target locations, where they would attempt to find and identify the Scuds. Having done so, they would either attack the target directly using 1,000 lb dumb bombs or cluster bombs, or else pass its location to other assets from the Counter-TBM force. In the cockpit, this all added up to a very heavy workload – particularly in the night low-level environment. Nevertheless, after two nights of successful search and destroy missions, the GR4 crews were formally incorporated into the Counter-TBM concept of operations.

After the exercise, the Marham team remained at Nellis for a further week to gain more experience against Scud targets, to refine attack procedures, and to train the aircrew who had not taken part in the live-flying exercise. Following their return to the UK, the team was enlarged to include seven crews. Throughout the first three weeks of February, they flew low-level night sorties and developed procedures and techniques with somewhat improvised facilities – an inflatable

tank mounted on the back of a flatbed truck, which was driven around Sculthorpe airfield, Norfolk, and the surrounding countryside. A squadron leader from within the Counter-TBM team provided simulated airborne command and control, and ground teams and air traffic control personnel also became involved. Using a mobile phone and a GPS receiver, it proved possible to simulate broadly the tactics developed for Counter-TBM tasking during the exercises at Nellis.

For the other GR4 aircrew, the more general training regime continued. The best training opportunities fell to 9 Squadron during a long-planned and regular exercise in Cyprus at the end of January. On the basis of the latest information on potential roles for the squadron in Iraq, the exercise focused on medium-level employment of TIALD, CAS, PW II and PW III laser-guided bombing, and defensive tactics against SAMs. The experience was enhanced by close liaison with members of a Royal Marine Tactical Air Control Party, who were in Cyprus to conduct their own pre-Gulf training. The squadron also practised using the RBL755 cluster bomb.

Back at Marham, the GR4 squadrons conducted TIALD and night flying training, and undertook some Forward Air Control (FAC) training at such ranges as Spadeadam, Otterburn and Warcop. Ground training briefs covered kill-box interdiction, combat recovery procedures, and the latest intelligence on Iraq, and included further AWC lectures on trials and tactics appropriate to a multi-threat SAM environment. There were also opportunities to practise AAR from USAF KC-135 tankers. Previously, RAF aircraft had been unable to refuel from KC-135s because they employed a refuelling system fundamentally different from the UK probe and drogue, involving a boom extended by the tanker into a receptacle on the receiving aircraft. However, by late 2002, the GR4s could refuel from the KC-135 if a short adapter hose was fitted to the end of the boom, although this solution was allegedly 'very unforgiving, with receiver ac often tending to have the end of their refuelling probes snapped off'.

In the weeks preceding their deployment to the Gulf, the Marham GR4 squadrons' flying programme was badly disrupted. Many training sorties were cancelled because of poor winter weather. Serviceable aircraft were in short supply, some having deployed to the Gulf while others were in Cyprus. Few TIALD pods were left at Marham for training purposes. Other aircraft had to undergo preparations and modifications pending their departure to Kuwait. Engineering personnel worked flat out to accelerate the process, but their efforts were hampered by the temporary loss of some staff to Operation Fresco (UK military involvement in combating the effects of the fire-fighters' dispute). The squadrons fell back on flight simulators to practise potential wartime flying scenarios.

The first groundcrew from 9 Squadron and 2 Squadron deployed to the Gulf on 5 February, while the first aircrew (from 9 Squadron) flew to Cyprus on the 10th and on to Ali Al Salem the next day. The remainder followed on the 26th. In the meantime, on 12 February, the OC 2 Squadron briefed his aircrew to expect to deploy on the 24th; then, on the 19th, he briefed them again. They now learned to their surprise that the bulk of the squadron – six crews including the OC himself – would deploy to Qatar. Only the two Counter-TBM crews would be based at Ali Al Salem together with the three Counter-TBM crews from 13 Squadron. The respective deployments occurred between 24 and 26 February.

A small specialist team from 617 Squadron had also arrived at Ali Al Salem. They were to conduct missions with the RAF's new conventionally armed, long-range (250 km), stand-off, precision air-to-ground missile, known as Storm Shadow. Storm Shadow was a hugely valuable addition to the RAF's offensive arsenal, providing a unique stand-off capability not previously available. The missile could be deployed in daytime or night-time, in most weather conditions, and was designed for use against high-value (and thus probably heavily defended) hardened static targets, such as command and control centres, bunkers, missile sites and airfields.

Storm Shadow was a so-called 'fire-and-forget' weapon. Initial planning for its employment was undertaken by the Storm Shadow Central Mission Planning Facility (SSCMPF) at PJHQ, Northwood. Target coordinates for the missile were programmed on the ground before flight; after launch, it found its way to the intended target autonomously, enabling the launch aircraft to keep well clear of danger from enemy air defences. It navigated by digital terrain profile matching as well as GPS and inputs from an inertial measurement unit, which together provided exceptional precision. During its final approach to the target, an automatic target recognition system compared the actual scene, viewed by a high-resolution imaging IR sensor, with the programmed and memorised scene. When a feature match was identified, the target would be acquired and the programmed aim point selection tracked and used as the reference for the missile's terminal guidance. As the missile closed in on the target, this acquisition process would be repeated with higher resolution data to refine the aim point; tracking would then continue against this refined aim point until the precise target location was identified. The designated target could be positively identified in this way, ensuring extremely high terminal accuracy. The missile comprised two sub-munitions – a precursor charge and a follow-through penetrator warhead. The precursor charge was designed to weaken target exterior structures and remove any soil covering; the follow-through warhead would then penetrate inside the target, detonating after a pre-selectable fuze delay.

Storm Shadow missiles loaded on to a GR4 at Ali Al Salem.

Missile loading.

Storm Shadow was designed in response to SR(A) 1236 and dated back to the early 1990s, but a production contract was awarded to Matra BAe Dynamics (subsequently known as MBDA) for the missile in February 1997; at that time, an in-service date of 'late 2001' was envisaged. The first flight of the missile on the Tornado GR4 occurred in May 2001, but the project was beset by the usual delays, and subsequent estimates of the in-service date slipped back into 2003. However, by mid-2002, considerable progress had been made with Storm Shadow, including the first Service Evaluation Trial firing of the missile on 28 June. The AOC 1 Group (and future Operation Telic UKACC – Air Vice Marshal Torpy) therefore took steps to accelerate its introduction, expressing himself 'very keen to deploy Storm Shadow as quickly as possible (particularly given the possibility of contingency operations)'.

By the beginning of October, HQ STC was seeking authority to procure a limited number of missiles early under Urgent Operational Requirement (UOR) procedures. Specifically, it was proposed that some 20 operational weapons be obtained by December, followed by an additional 30 by April 2003. The concept – in the event of hostilities – was essentially to employ development missiles in a live operational environment in the same way that the first development TIALD pods had been employed in the Gulf War in 1991. The UOR received formal endorsement on 22 October.

The Storm Shadow UOR afterwards became a major focus of attention for the MOD, PJHQ, HQ STC and 617 Squadron, which was selected as the first squadron to be equipped with the missile (although a Storm Shadow Central Training Facility – SSCTF – had in fact been established at RAF Marham). In October, their commanding officer described the missile's introduction as 'the most important task facing the sqn during the coming year'.

During November, more than 80 per cent of the squadron's weapons trade were trained to load and unload Storm Shadow. Upgraded stores management system components and new specific-to-type software was installed on two aircraft to prepare for the first familiarisation sorties, which began towards the end of November after the necessary Service Deviation had been received. The basic aircrew training facility at Lossiemouth was the Storm Shadow missile simulator, which was used in conjunction with Ground/Air Training Missiles (GATM) loaded on to the modified aircraft. By the end of the month, six aircrew held Limited Combat Ready status for the development missile, and the OC 617 Squadron could record: 'We now have the capacity to fly and launch SS. This

provides us with the biggest single capability enhancement in the history of the Tornado GR Force.'[17]

During December, 617 Squadron flew further Storm Shadow training sorties with GATMs, while their Operations Support officer received mission planning training at the SSCTF at Marham. In the meantime, HQ STC, through the AWC's Strike Attack Operational Evaluation Unit, finalised plans for Service trials of Storm Shadow – Trial Dazed – at China Lake, Nevada. Although originally scheduled for December, Trial Dazed was repeatedly postponed due to poor weather and aircraft unserviceabilities, and it was not until 8 January 2003 that the first launch finally took place. The record states that 'After a brief ten-minute low-level flight, the missile was seen to impact the target to the delight of all personnel who were watching the event.' The trial subsequently continued into February.

Back at Lossiemouth, more aircraft were modified to carry the new missiles, and the Storm Shadow team continued training with the GATMs. However, given the nature of the weapon, it is hardly surprising that mission planning arrangements absorbed much of the remaining effort devoted to the Storm Shadow UOR before the start of Operation Telic. From 6 to 10 January, the OC 617 Squadron and four other members of the Storm Shadow team attended a training conference with MBDA covering the integration of Storm Shadow mission planning software with the Tornado Advanced Mission Planning Aid (TAMPA). This qualified them to undertake residual mission planning tasks at squadron level, although the actual missile target programming remained the task of the SSCMPF at PJHQ. Early in February, they attended a further briefing, this time at the SSCMPF, to discuss the missile planning concept of operations and potential targets in the event of a conflict with Iraq. At HQ 1 Group, weapons staff worked to establish that TAMPA, once deployed, could receive electronic data from the SSCMPF. Steps were also taken at HQ STC to ensure that all necessary logistics support was available at Ali Al Salem to sustain Storm Shadow operations, if they were required.

Ultimately, some 30 missiles were produced by MBDA under the Storm Shadow UOR, 10 to an Initial Operational Capability standard, 20 to a FOC standard. The 617 Squadron Storm Shadow team deployed to Ali Al Salem on 15 February and began to prepare for operations by organising two full end-to-end testings of the CONOPS. This involved receiving missile mission data files sent from the UK, mission planning, uploading two missiles on to an aircraft, loading mission data into the aircraft and the missiles, and finally conducting an air test with full in-flight systems checking. The first test occurred on 25 February and

17. SS – Storm Shadow.

highlighted some potential problems, which were addressed in the second test on the 27th. The tests then continued intermittently until the start of Operation Telic. By 13 March, the ACHQ's plan for using Storm Shadow involved the launch of two initial waves against low collateral damage targets, after which the accuracy of the new missile would be assessed using all available BDA. If Storm Shadow fulfilled accuracy expectations, the remaining weapons would be launched.

By the end of February 2003, the Tornado Combat Air Wing at Ali Al Salem had reached its full complement of 18 aircraft and 36 crews. A new wing badge combined elements from the insignia of all the squadrons involved into a single design – the knotted ropes of 2 Squadron, the Dagger and Lynx head of 13 Squadron, the bat of 9 Squadron, the gold star of 31 Squadron and the lightning flashes of 617 Squadron. The additional aircraft and aircrew were supplemented by extra operations and support staff, and by ground units. These included 1 Squadron RAF Regiment, which was responsible for base defence, 16 Squadron RAF Regiment, which provided GBAD in the form of Rapier missile fire units (for short-range air defence, augmenting the medium-range American Patriot missile batteries), 5131 (Bomb Disposal) Squadron, and 4 Tactical Survive to Operate (Tac STO), which conducted NBC and Collective Protection (COLPRO) training and exercises for UK base personnel and the continuous review of the UK's force protection posture at Ali Al Salem. Detachment personnel numbers increased from 498 on 28 January to 1,249 exactly one month later.

The aircraft at Ali Al Salem were progressively rotated to replace GR4s that had been deployed early without the main Operation Telic upgrades, which chiefly comprised chaff/flare grab handles in the rear cockpit, covert Night Vision Goggles (NVG)-compatible lighting suites and a new pale grey paint scheme. A Royal Engineers (RE) Headquarters and 48 Field Squadron (RE) were sent to Ali Al Salem to construct additional facilities, such as a new explosive storage area, additional aircraft parking areas on the flight line, a 'tent city' for 750 personnel, power and ablution units, and a field kitchen with a capacity for 500 personnel. Work was also needed to improve the base medical centre and force-protection facilities, such as bunkers, and to erect perimeter fencing. There were numerous maintenance tasks, including the reconstruction of the flight line and its blast barriers, and portacabins were also erected to provide larger administration and operations rooms. The base's communications infrastructure had to be significantly enlarged, and a so-called Sensitive Compartmented Information Facility (SCIF)[18] installed to provide intelligence support.

18. This is the modern translation of the acronym; some contemporary sources refer to Secure Compartmented Information Facility.

RAF officers at Ali Al Salem using the TAMPA mission planning aid.

A Combat Air Wing GR4 with its TIALD pod on clear display; despite its limitations, TIALD was of critical importance to GR4 and GR7 operations.

A Rapier SAM system operated by 16 Squadron RAF Regiment at Ali Al Salem.

RAF personnel often posed in front this US Patriot launcher, but Patriot operations at Ali Al Salem were later marred by a tragic ‘blue-on-blue’.

In addition to the Combat Air Wing, many other coalition units were stationed at Ali Al Salem. Fixed-wing elements included USN P-3 Orions and USAF MC-130s; the very much larger rotary-wing force included US Marine Corps (USMC) CH-46s and CH-63s, and the Lynx, Gazelle, Chinook and Puma helicopters of the UK Joint Helicopter Force. In total, there were eventually more than 250 helicopters and 50 fixed-wing aircraft at Ali Al Salem. To coordinate British and American activity, a UK air operations cell was established in the central US base command centre.

The dramatic increase in the number of aircraft based at Ali Al Salem created two particular problems. The first was Air Traffic Control (ATC). While the Kuwaiti system had functioned effectively enough during the relatively small-scale Operation Resinate, it was now overwhelmed. The USMC therefore assumed responsibility for ATC, but this created its own difficulties for the Combat Air Wing. As one RAF officer put it:

> US controllers are trying to impose US style helicopter-friendly ATC procedures on the Tornados despite the well-established procedures the RAF has used at Ali Al Salem for the last six years or so. This is rapidly becoming a source of major friction, causing take-offs to be delayed and markedly increasing the workload and stress on the aircrews.

Fortunately, soon afterwards, new airfield take-off and landing procedures were agreed with the USMC, and the ATC service around the base then improved considerably.

The other problem was Foreign Object Damage (FOD) – always something of a hazard at Ali Al Salem. With large numbers of helicopters scattering dust and debris across the main runway, it now threatened to assume unmanageable proportions; engine problems repeatedly grounded the GR4s and other fixed-wing aircraft operating from the base. In February, some 22 FOD reports were raised following the issue of a Local Engineering Instruction to set a baseline standard and monitor FOD by mapping engine compressors.

The base authorities initiated a series of countermeasures. Pilots were instructed to minimise the use of reverse thrust and to employ aerodynamic braking techniques where possible; the distances between aircraft were maximised while they were taxiing, 90-degree angles were maintained between aircraft lining up for take-off, and both formation line-ups and pairs take-offs were prohibited.

The rotary-wing presence at Ali Al Salem was one of the main causes of FOD.

Among the various efforts to reduce the FOD problem, this was one of the more labour-intensive.

Finally, there were efforts to extend the periods available for sweeping the runway, although this was inevitably a difficult task given the number of aircraft and the intensity of operations at the base. Subsequently, the senior US and UK executives agreed to reserve the main runway exclusively for fixed-wing aircraft and to use a parallel taxiway for helicopters. The USMC dispersed their helicopters well away from the main runway, and sweepers were sent to clear it from both ends at least an hour before the GR4s were scheduled to take off. Together, these initiatives helped to reduce the number of engine rejections to manageable proportions. In March, a further improvement resulted from runway and taxiway repairs undertaken by 48 Field Squadron – apparently without interruption to the base's flying programme.

The general pattern of operational tasking from January to March 2003 has already been described. In February, the GR4s participated in only a single strike against Iraqi targets – the Ababil-100 SSMs deployed into the southern NFZ on the 11th. The primary task remained reconnaissance with the RAPTOR pod. Although this was conducted under the auspices of Operation Resinate, it was abundantly clear by this time that many of the tasked POIs were of relevance to plans for a possible invasion of Iraq. Although the pod continued to acquire excellent imagery, it had been deployed to the Gulf before its formal acceptance into service, and it proved temperamental. To guard against RAPTOR or aircraft unserviceabilities, reconnaissance missions were normally flown by two RAPTOR-equipped aircraft, with a further two GR4s providing cross cover (effectively, looking out for any potential threats) and a fifth acting as a spare.

In March, before Operation Telic began, the Combat Air Wing continued to hold Response Option duty intermittently, but the GR4s were only tasked on two occasions: on the 7th, they attacked a Long Track radar, on the 8th, a Roland SAM. The reconnaissance task remained the priority for operational flying, and the GR4s gathered imagery from across southern Iraq, although they focused particularly on the Basrah area, Nasiriyah, and the territory immediately north of the Kuwaiti border. Otherwise, opportunities for both operational and training flying were limited. More and more aircraft crowded into the Gulf so that airspace became extremely congested; Harrier GR7s based at Al Jaber took over some of the RAF's Operation Resinate tasking; flying was periodically disrupted by bad weather, including dust storms and thick cloud, and there were the usual aircraft unserviceabilities to contend with, exacerbated by residual FOD-related problems. Gaps of three days between sorties were common for most aircrew, resulting in both skill fade and some loss of morale.

With such a wide variety of tasking facing the Combat Air Wing, their training requirements were very broad. Some aircrew lacked recent operational experience

in theatre, and they therefore received priority in the assignment of any Operation Resinate flying available. There was also a need for a larger pool of RAPTOR-qualified personnel. It was essential to familiarise aircrew with the various GR4 upgrades introduced under UOR procedures for Operation Telic, but more routine training requirements, such as TIALD operation, simulated attack profiles and night flying could not be neglected either. The 2 and 13 Squadron aircrew involved in Counter-TBM operations also needed low-altitude flying training in a desert environment.

Inevitably, given the few opportunities for flying available, only a limited amount of this training activity could actually be undertaken, but the most urgent demands were addressed. Beyond specialised roles, such as Storm Shadow, Counter-TBM, and reconnaissance with RAPTOR, there was some uncertainty as to how the GR4s would be employed after hostilities started. A period of planned attacks and interdiction-type tasking was expected initially, but it became increasingly clear that some CAS was also highly likely. The arrival of 16 Air Assault Brigade in Kuwait produced some valuable opportunities for cross training but also showed that the Army had little understanding of how different targets and their surroundings appeared from the air as opposed to the ground. They were also unfamiliar with the capabilities and limitations of RAF equipment. Training sorties were flown in Kuwaiti airspace in late February and early March that simulated the kill-box operations later conducted over Iraq, and there was limited scope for rehearsing Strike Co-ordination and Reconnaissance (SCAR).[19]

Ground training included extensive briefing for all aircrew on the Operation Telic Special Instructions (SPINS) covering airspace management, tasking and procedures for CAS. Other briefs dealt with new weapons such as EPW III, Storm Shadow, and ALARM II – a modified version of the ALARM missile with a so-called 'miss-inhibit' facility, which stopped the warhead from detonating if the weapon failed to detect any SAM radar emissions. RAPTOR ground training covered mission planning with TAMPA, and start-up procedures: RAPTOR had a tendency to overheat on the ground before take-off and one remedy was to delay switching on the pod until the very last minute. There were also final preparations

19. Airborne visual reconnaissance and directed air strikes. SCAR differed from AFAC or GFAC-generated CAS by not being tied to a ground commander for the selection of targets; it did not require detailed integration with surface forces. Rather, SCAR was concerned primarily with Air-generated interdiction targets in specific geographic areas. The SCAR aircraft – normally an attack aircraft – was supplied with a detailed tactical picture and tasked to a particular area where it would loiter and coordinate strikes by other aircraft, sometimes marking targets with lasers or talking attack aircraft on to targets.

for Storm Shadow and Counter-TBM operations, the latter including the start of daily video conferences that involved representatives of all units committed to the Counter-TBM campaign. Practice mission planning began with the aim of resolving any potential problems before the first live missions were flown.

When Operation Telic subsumed Operation Resinate, the first major changes to affect the Combat Air Wing concerned the allocation of airspace and the tasking schedule. The Gulf area was divided into kill-boxes measuring 30 minutes north by 30 minutes east, and each box was then subdivided into nine equal squares resembling a telephone keypad. Operations were planned into individual kill-boxes, with set rules for entry and exit. The only exception concerned the RAPTOR missions, which were cleared into a series of linked kill-boxes at a set altitude. If a kill-box was declared 'open', aircraft were permitted to engage enemy forces within it. However, any attack had to be subject to a collateral damage assessment by the aircrew and to their application of LOAC. Exit and entry corridors into Iraqi airspace were introduced, the eastern corridor passing through Kuwait and entering Iraq to the east of Basrah. A central corridor extended from Kuwait to Tallil, while a third, western, corridor ran from Kuwait into the Saudi/Iraqi border area.

3. The Al Udeid Wing

The second Tornado GR4 wing to be deployed on Operation Telic operated from Al Udeid air base in Qatar and comprised 12 aircraft and 24 aircrew drawn from 12(B) Squadron, 617 Squadron and 2(AC) Squadron. It was commanded by the OC 12 Squadron, Wing Commander ML Roberts. The largest single element was 12 Squadron, which provided 12 crews and effectively led the detachment; 617 and 2 Squadron each provided six crews. During Operation Telic, the wing flew overwhelmingly in the KI/CAS role and predominantly employed PW II or EPW II bombs.

The pre-Telic work-up undertaken by 2 Squadron has already been described. The two Lossiemouth squadrons had both operated from Ali Al Salem under the auspices of Operation Resinate during the second half of 2002: 617 Squadron had handed over the Operation Resinate commitment to 12 Squadron at the end of August. They could both therefore boast a considerable reserve of recent live precision-guided bombing experience, although some of 617 Squadron's more senior aircrew were posted elsewhere soon after their return. Back in the UK, 617 Squadron seem to have embarked on a programme of routine training, with the only obvious preparation for possible hostilities being the accelerated introduction of Storm Shadow. In the Gulf, 12 Squadron flew almost daily tactical

reconnaissance missions throughout September and October, as well as being regularly tasked with Response Options, but they also resumed routine training on their return to the UK in November. It was only in December that a discernible shift occurred in flying training towards TIALD work and CAS; ground training featured lectures on TIALD and CAS procedures, as well as on GR4 weapons and EW.

In January 2003, both squadrons sought to embark on a more typical operations work-up although, as with the Marham squadrons, poor weather to some extent hampered their efforts. They continued to develop the core skills of medium-level TIALD operations, operational low flying and night flying. There was practice weaponry training at the Tain and Garvie ranges, EW training at Spadeadam, low and medium-level CAS and electro-optical work with NVGs. Some crews had the opportunity to conduct CAS training with the British Army in Germany, and most were able to make use of a new GR4 simulator to fly war profiles.

Throughout December, the two Lossiemouth GR4 squadrons had to work on the assumption that they would be deploying as part of an 18-aircraft detachment to Incirlik, in Turkey, despite the continuing uncertainty over the Turkish government's willingness to provide basing. It was only in mid-January that the decision was taken to send a site reconnaissance team to Al Udeid to establish its potential as an alternative. The team arrived in Qatar on the 24th, and quickly determined that Al Udeid was suitable for GR4 operations; ramp space for the detachment was available alongside the USAF and RAAF units already operating from, or deploying to, the base. The government of Qatar apparently signified a general willingness to accept coalition aircraft, although there were, nevertheless, strong host-nation sensitivities that had to be observed. On the same day, the Turkish option folded, so the reconnaissance team was instructed to remain at Al Udeid; they became, in effect, the activation party for a new GR4 DOB, which was placed under the command of the RAF Lossiemouth Station Commander, Group Captain SJ Hillier.[20] Difficulties obtaining host-nation agreement to the deployment subsequently led to the reassignment of six aircraft to Ali Al Salem, leaving the Al Udeid aircraft strength at 12. At Lossiemouth, 12 Squadron was briefed to expect deployment to Al Udeid on 10 February.

A few additional personnel from Lossiemouth joined the advance party in Qatar during the first half of February, but the main deployment was ultimately delayed until the 18th. In all, 10 specially prepared GR4s set off for Al Udeid from

20. Later Air Chief Marshal Sir Stephen Hillier, Chief of the Air Staff from 2016 to 2019. Having piloted Tornado GR1s in the first Gulf War (Operation Granby), Hillier won the DFC for service in the Gulf on Operation Bolton in 1998-99.

RAF Marham on the 18th with AAR support from a single VC10; they routed via Cyprus, where they linked up with two more aircraft that had deployed a few days earlier. Unfortunately, their onward flight to Qatar was then blocked by diplomatic clearance problems and they were forced to remain at Akrotiri until the 26th; two GR4s were delayed there a further day by unserviceabilities and finally deployed on the 27th. Some training flying was possible during the intervening period. Nevertheless, for the (predominantly 12 Squadron) aircrew, who might in other circumstances have welcomed an unexpected sojourn in Cyprus, the hold-up was a source of considerable frustration. At the same time, some detachment aircrew found themselves waiting in Qatar for a week with no aircraft to fly.

Yet even if they had reached Al Udeid in accordance with their original deployment timetable, it is doubtful that they would have been able to start flying. The Royal Engineer Field Squadron (53 Air Support), which was responsible for essential construction for the GR4 detachment, only started work on 20 February, and the critical enabling unit – the Tactical Communications Wing – did not receive its equipment until the 21st, and did not begin working until the 22nd. Other supplies only began reaching Qatar by sea on the 23rd; freight had then to be transported to Al Udeid by night-time road convoys, with escorts provided by the host nation, by the US and by RAF Police. At the base, the major tasks included the creation from scratch of an operations centre (slowed by the delayed arrival of various deployment pack-ups, including TAMPA and the DOB intelligence cell pack-up), and the construction of an explosive storage area and second-line engineering facilities. In addition, the USAF decided to build new ramp space for the GR4s, which was scheduled for completion on 1 March (although a temporary location was available in the meantime). To accommodate the DOB's 600 or so personnel, the USAF supplied air-conditioned shelters and tents, and full messing facilities.

By the time the GR4s arrived, through a monumental effort, construction of the operations area was largely complete, but the facility could not yet offer UK secure voice or data communications capabilities. However, the detachment did have access to US secure communications, and it was possible on this basis to begin training and theatre familiarisation flying. On 28 February, the plan was to mount two waves of six aircraft, after which the daily rate would rise to three waves, but the host nation then insisted that the GR4s should not leave Qatari airspace, as we have seen. The senior detachment executives and the UKACC had hoped for training over the UAE and Oman, and operational flying for Resinate.

During the first half of March, the detachment consolidated its position at Al Udeid, completing outstanding infrastructure work – particularly the installation of secure communications in the operations building – and introducing 24-hour

staffing patterns. On the eve of hostilities, some weapons holdings remained at a level slightly below projected requirements for the first week of war, but the estimates (200 PW/EPW II) proved excessive. Moreover, while the DOB was also short of certain items of COLPRO equipment, Qatar's southerly location ensured that Al Udeid was far less directly threatened than coalition bases in (say) Kuwait.

There was, of course, ample ground preparation, with briefs being provided on intelligence, EW, and coalition measures to avoid fratricide, and there were several air raid and NBC exercises. But flying opportunities were both limited and repetitive. Flying around 16 sorties per day, aircrew could conduct some medium-level TIALD work, as well as practising KI/CAS procedures and AAR, and familiarising themselves with Qatari airspace and the route north towards Kuwait (which the USAF had christened the 'Ocean Parkway'), but they could not venture any further. The Qataris also suspended flying training completely on 3 March as a noise abatement measure during a conference of Arab nations, and on 9 March after an airborne GR4 suffered engine problems and was forced to jettison its under-wing tanks in the desert.

Finally, on 16 March, they agreed to detachment participation in Operation Resinate missions over Iraq, one of which was then flown on the 18th. Due to various unserviceabilities, only four of the eight tasked aircraft entered Iraqi airspace to undertake a simulated attack. Next day, the DOB and Detachment Commanders briefed personnel on the coming war, and preparations began to strike the first targets assigned to the Al Udeid GR4s by the ATO.

4. Harrier Force South

Harrier Force South was created from 4(AC) Squadron and 1(F) Squadron and was based at Ahmed Al Jaber air base in Kuwait. The detachment initially operated 10 Harrier GR7s but was enlarged to 12 aircraft during Operation Telic. The wing consisted of 14 pilots from 4 Squadron and 10 from 1 Squadron – 24 in total. Other personnel comprised 10 more officers, 37 SNCOs and 121 Other Ranks, predominantly from 4 Squadron. Both GR7 squadrons were normally designated 'offensive support', under which mantle they operated in the attack, interdiction or CAS roles. However, in Operation Telic they were tasked overwhelmingly with CAS, although a few tactical reconnaissance missions were also flown with the new Joint Reconnaissance Pod (JRP) during the final days of the operation. Their principal munitions were PW II laser-guided bombs, designated by the TIALD pod, and the recently procured American Maverick IR-guided air-to-ground missile; the GR7s also flew with 1,000 lb and 540 lb free-fall bombs and RBL755 cluster bombs.

The GR7 squadrons were apparently warned of the potential for future hostilities in Iraq in September 2002. Writing that month in his squadron's Operations Record Book, the OC 4 Squadron, Wing Commander Andy Suddards, referred to the 'storm clouds brewing around Iraq'. The squadron was then focused on maintaining day CR work-ups, night currency, tactical leadership development and the employment of TIALD. There were also CAS exercises in South Wales, Cornwall and Germany, where the squadron flew in support of 1 UK Armoured Division.

No 1 Squadron, which was at that time responsible for aircraft carrier support duties, meanwhile received the first clear intimation of possible operations against Iraq during an exercise with HMS Ark Royal. In response, the OC, Wing Commander Norton, recommended that training be redirected towards land-based offensive activity, and this was ultimately agreed. The second half of the exercise was therefore cancelled, and 1 Squadron then embarked on rapid preparation for medium-level day and night operations. CR work-ups for less experienced pilots were shelved to allow those with more experience to refamiliarise themselves with the attack role. There were opportunities to employ Maverick training rounds to refresh pilots with the unfamiliar switch layout associated with the missile, and the squadron flew CAS sorties by day and night in support of 16 Air Assault Brigade over Salisbury Plain.

The two squadrons continued their CR work-ups in October and undertook further CAS training. This included Exercise Fast Moving, which involved the division of South Wales into kill-boxes into which aircraft were tasked to undertake CAS. No 1 Squadron conducted another CAS exercise with 16 Air Assault Brigade and flew both CAS and interdiction sorties during a Joint Maritime Course at the end of the month. Their OC subsequently remarked that 'Procedurally and tactically the Sqn's CAS abilities are now well sharpened,' although there had been few opportunities to attack representative CAS targets. However, he was concerned about the squadron's ability to achieve 'correct battlefield identification of tactical-sized targets'. In addition to attack training, both 1 and 4 Squadron detached pilots to RAF Coltishall during the month to qualify in the use of the JRP, which had been integrated into the GR7 during the summer. They found the pod 'easy and reliable'.

One of the main problems confronting both squadrons during the pre-Telic work-up was a shortage of TIALD pods. Having been designated lead Harrier squadron for Operation Telic because of the strategic importance of their prospective role in the western Iraqi desert, 3 Squadron received priority in the allocation of pods (and also TIALD-capable GR7s). The other squadrons rarely had more than one pod available, so that unserviceabilities often halted airborne

TIALD training completely. There were also very few opportunities for pilots to drop live PW II bombs designated by TIALD. This was a significant limitation where GR7 training was concerned, for PW II would invariably prove to be the weapon of choice after the outbreak of hostilities in March 2003. Training with Maverick was possible, but the system did not provide video replay until December; sortie debriefs were therefore limited, and important lessons were often missed. Consequently, the general capacity of both 1 and 4 Squadron to employ PGMs did not advance very far in September and October, although 4 Squadron apparently benefited from some TIALD and Maverick training during a joint exercise with the French Air Force in the latter month.

In November, there was a marked improvement in TIALD reliability, and the two squadron commanders were evidently more satisfied with the progress of PGM training. The month also witnessed the clarification of their likely role in the event of hostilities with Iraq. They were advised that they would probably deploy to Batman in Turkey, assuming that the Turkish government's agreement was forthcoming. They would be assigned to the support of a British ground offensive southward from the Turkish border towards Mosul and Tikrit. Their primary tasking would be CAS, while interdiction was chiefly assigned to the Tornado GR4s.

Throughout November and December, training continued to focus on aircrew day and night CR work-ups, CAS, and PGM capabilities – predominantly at medium level. Also, like the GR4s, the GR7s were introduced to AAR from USAF KC-135s. Towards the end of the year, the flying training programme was hampered by poor weather and reduced aircraft availability. This resulted largely from the embodiment of modifications for Operation Telic, such as the long-awaited Maverick video replay capability, wiring for JRP and the provision of secure voice communications. As with the GR4s, again, the modification programme was slowed by the diversion of engineering personnel to Operation Fresco. Nevertheless, while these factors conspired to limit flying training, there was still useful preparation to be conducted on the ground. The OC 4 Squadron commented in December that conceptual training had featured prominently, and that the GR7 force had benefited from several important briefings, including the AWC's latest updates on Iraqi GBAD.

As plans evolved to combine 1 and 4 Squadron into a single wing at Batman, attention turned to the potential structure of the force. The initial concept envisaged a straight 50/50 split between the two squadrons. However, while 4 Squadron had experienced a prolonged and stable period of training on the core capabilities that would be required over Iraq, 1 Squadron's year had been interrupted by a variety of exercises, detachments and carrier-borne duties that had

not provided dedicated offensive training opportunities. In terms of pilots, the squadron had also been under-strength for much of the year. With only 10 aircraft scheduled for deployment, this division appeared artificial to the OC 1 Squadron: in his words, it 'was inherently wrong and destroyed the unity of command that is one of the basic principles of war'. He therefore agreed with the OC 4 Squadron that the whole of 4 Squadron should deploy, with 1 Squadron providing expertise wherever there was a shortfall. The squadron ultimately contributed the 10 pilots and about 20 ground personnel, including 12 engineers.

By December, there were growing doubts about the availability of Turkish basing for the GR7 squadrons, and attention turned to the possibility of locating alternative airfields to the south of Iraq. The squadron movement timetables also became a source of concern, for the GR7 deployment plans were heavily dependent on sea-borne transport. Increasingly, it seemed possible that there might not be enough time to deliver all essential equipment and supplies into theatre before hostilities began. Ultimately, it became clear in mid-January that the Batman option was no longer viable, and a base reconnaissance team led by the Station Commander of RAF Cottesmore, Group Captain (later Air-Vice Marshal) MJ Harwood, therefore flew out to Kuwait to investigate the possibility of squeezing the GR7 detachment into Ali Al Salem alongside the RAF GR4s. Finding the airfield full, they turned their attention to Al Jaber, which was already occupied by a USAF detachment. The base appeared ideal, and the Kuwaitis quickly agreed to accommodate the GR7s there. The Turkish option collapsed completely on 23 January and Group Captain Harwood's initial survey of Al Jaber ended the following day. On the 29th, he returned to the base as DOB Commander and began to initiate preparations for the GR7 detachment, which was now christened Harrier Force South.

Meanwhile, back at Cottesmore, the work-up continued at a frenetic pace, with a particular emphasis on night flying and on bringing several of the less experienced pilots to night CR status. The focus on day and night CAS was maintained through training at Otterburn range and exercises with 1 UK Armoured Division in Germany, and with 3 Commando on Dartmoor. The two squadrons also practised Urban CAS, using the Stanta range near Thetford, and the KI/CAS procedures that would be employed in the event of war, and they briefed 16 Air Assault Brigade on KI/CAS and on the capabilities that the GR7s could provide. Using realistic flying profiles and the draft SPINS prepared for Operation Telic, GR7 pilots practised medium-level laser-guided bombing using TIALD, and both medium and low-level bombing with Maverick. EW training was undertaken at Spadeadam and at the Spaces range off the north-east coast. Some limited operational low flying also took place, primarily because medium-level LOAF

manoeuvres[21] designed to defeat surface radar threats could force aircraft down to low level. The squadron engineers laboured night and day to sustain this flying programme, while continuing to prepare aircraft for deployment to the Gulf, assembling support equipment and loading ISO containers. Pre-deployment ground training included an intensive pilot ground school, briefs from DIS, a CSAR refresher course on conduct after capture, a variety of refresher briefings, and Individual Readiness Training.

An advance party of 13 personnel from RAF Cottesmore reached Al Jaber on 3 February and began to formulate arrangements for operating the GR7 detachment alongside several other coalition units, including USAF F-16s and A-10s, USMC F-18s and AV-8Bs, CSAR C-130s and Blackhawks, and Kuwaiti F-18s. Domestic accommodation was at first provided by the USAF and consisted of single rooms for pilots in the US secure compound, tents and two large recreation halls. An area was also designated for the construction of the DOB headquarters. A Royal Engineer Field Squadron, 34 Field Squadron (Air Support), also deployed to Al Jaber and ordered tents for 500 personnel, allowing the detachment to vacate the recreation halls in the second week of March.

The DOB Commander spent several days negotiating with the Kuwaitis to secure their formal approval to base the detachment at Al Jaber and a location on the base from which to operate. They eventually agreed that the GR7s should occupy an area around three hardened aircraft shelters (HAS) (which still bore significant scars from the Gulf War of 1991) on the south-east side of the airfield. Work on construction of the site began on 9 February. Concurrently, the DOB headquarters and operations facilities were established along with elements of the Tactical Communications Wing on a single site in Rubb shelters and tents using a plan first conceived and tested during an exercise at RAF Wittering during October 2002. The basic DOB communications infrastructure was erected over the following two weeks. Initial operating problems with classified CIS had largely been overcome by early March.

For the two GR7 squadrons back at RAF Cottesmore, there was much uncertainty over the precise date of their deployment, which inevitably caused administrative problems as well as considerable stress for personnel. It also proved very difficult to maintain flying training in the week or so prior to departure. Nevertheless, an advance party eventually set off for Al Jaber on 14 February.

21. LOAF is the name assigned to an aggressive three-dimensional manoeuvre in response to SAM threats.

The Al Jaber DOB under construction.

Harrier GR7s on a newly constructed hardstanding, photographed from one of the HAS.

Aircraft shelters being erected on the hardstanding.

The final result: valuable protection from the elements.

Both the main party and the trail of 10 GR7s (plus one supporting Hercules, two Tristars and two VC10s) departed on the 22nd, the trail reaching Al Jaber on the 23rd after an overnight stop at Akrotiri, while the main party arrived in the early hours on the 25th. They duly received arrival and welcome briefs from the DOB and base commanders, and briefs on ROE, CSAR and the Operation Resinate SPINS. The detachment began familiarisation flying on the 26th but, like the GR4s, they found flying training hampered by the prevailing shortage of airspace; it proved difficult to give pilots enough flying hours. No slots were available over the Kuwaiti training ranges because of the number of aircraft in theatre, but the GR7s managed to train in so-called Military Operating Areas (MOAs), which were divided into high and low sections. Training focussed on high-level Maverick and unguided weapons profiles, and on TIALD work, and there were some opportunities for CAS with British troops. CAS also featured prominently in a number of conferences and meetings primarily involving the 1 and 4 Squadron Ground Liaison Officers (GLOs).

Logistically, the deployment was inevitably a challenging one. The precise requirements of the DOB for equipment and supplies were subject to several revisions during February, which were not easily accommodated by staffs in the UK. The Logistics Supply Centre at HQ STC employed a modular system to support RAF deployments, the modules being packages of manpower and/or equipment based on capability and sized in relation to defined operational tasks. However, despite the obvious attractions of such a system from an organisational perspective, it was found to be inflexible in practice. The problems were such that it was ultimately necessary for an officer of squadron leader rank to fly back to the UK to negotiate changes.

Difficulties also arose in the identification and tracking of personnel and equipment arriving in theatre; the tendency for RAF personnel to be automatically routed from Kuwait City airport to Ali Al Salem was noted in the first section of this study. The challenges were magnified by the inherent weakness of the UK armed forces' communications infrastructure. The RAF detachment at Al Jaber eventually formed an Air/Sea Point of Disembarkation (APOD/SPOD) clearance team of five UK Mobile Air Movements Squadron (UKMAMS) personnel. According to the detachment record, the team 'made a tremendous contribution to distributing resources in theatre, not only for RAF Det AAJ but other DOBs in Kuwait as well'.

A more intractable problem arose in predicting the arrival dates of supply ships in theatre and identifying their cargoes accurately in advance. The late arrival of one ship containing the majority of GR7 munitions and ISO containers ultimately delayed the start of operational flying from late February to early March. Chaff

and flares arrived just before the GR7s flew their first Resinate missions on 7 March, but they took to the air that day without Sidewinder missiles. There were severe shortages of medical stores and desert clothing, and the DOB was still awaiting essential force protection personnel and equipment in mid-March. Some COLPRO equipment had yet to arrive when the Operation Telic 'execute' order was received on the 18th. Without regular US assistance on a generous scale, the logistical problems would have been worse.

Harrier Force South spent the period from 7 to 19 March flying Operation Resinate missions. Fully loaded aircraft were tasked with conducting strike familiarisation and the reconnaissance of a variety of possible targets in anticipation of Operation Telic, employing the kill-box system. Occasionally, they rehearsed KI/CAS-type procedures, with tasking provided by a SCAR aircraft, and there were a few simulated attacks. On one occasion, the GR7s were tasked with a Response Option, but poor weather in the target area prevented any release of weapons; at this stage, the detachment did not possess any EPW II bombs, which would have allowed precision bombing of the target through cloud. The experience of entering enemy airspace was nevertheless valuable for all the GR7 pilots and particularly for those who had not previously flown in a combat zone.

By 18 March, when the Operation Telic ROE were issued, the Al Jaber detachment comprised 449 personnel. Within this total, the largest element was Harrier Force South itself, numbering 192. The second largest was the Royal Engineer Field Squadron, which numbered 56 personnel – a reflection to the scale of the task involved in setting up the DOB. The GR7s in theatre comprised four that were TIALD-capable, three that were EPW II-capable, and three that were Maverick-capable. All the aircraft were JRP-capable, although none had ever been fitted with a pod. The detachment was initially allocated just four TIALD pods from the 11 possessed by the RAF's Harrier Force (five had been assigned to the Azraq detachment), but this proved inadequate. After a visit to Al Jaber in mid-March, the UKACC intervened in support of efforts to secure a fifth.

5. Combat Air Wing: 19-23 March

The start of Operation Telic on 19 March did not immediately produce a substantial change in tasking for the Combat Air Wing. Their first Telic mission was another RAPTOR reconnaissance over Basrah involving four aircraft. One GR4 withdrew with radio problems, but the other three entered Iraqi airspace and covered all 20 tasked POIs. That night, the US launched an intelligence-led 'decapitation strike' with TLAMs and F-117s against a target in Baghdad in an unsuccessful attempt to kill Saddam Hussein. The Iraqis responded on the 20th by

launching SSMs against Kuwait, one of which exploded harmlessly to the west of Ali Al Salem while the other was intercepted by a Patriot missile. There were two further attacks during the afternoon. At the base, coalition personnel took to their bunkers; the training devoted to force protection over the preceding weeks paid handsome dividends. One GR4 mission planned for that day was cancelled when the crew were forced to take cover just as they were boarding their aircraft, but flying otherwise continued. A RAPTOR mission duly covered all 20 of its assigned POIs around Basrah and the Al Faw peninsula.

Later that day, a Response Option involving 617 Squadron aircrew was tasked against an FO cable repeater vault at Numaniyah. This was a target from which important lessons were learned. Coordinates for the vault had been produced by US targeteers, using the digital point positioning database known as 'RainDrop', and these had been incorporated into the Response Option planning documentation supplied to the Combat Air Wing. But one of the wing's few trained RainDrop operators knew that the US targeteers worked to greater margins of error than their British counterparts and ordered his staff to check all US-derived coordinates for Combat Air Wing GPS-guided weapon attacks. This first paid off when the coordinates supplied for the Numaniyah target proved to be inaccurate; CENTCOM issued revised coordinates soon afterwards. These were subsequently employed during the mission of 20 March, allowing GPS-guided EPW II bombs to be released on to the target, which was destroyed. During the mission, the aircrew spotted at least two oil fires, suggesting that the Iraqis were setting oil wells alight ahead of any coalition offensive into southern Iraq.

It was the third mission that day which marked a new departure for the Combat Air Wing: this was the first Counter-TBM mission over western Iraq, searching for Scud missiles. Under the basic CONOPS for Counter-TBM operations, the GR4s were to fly to the Kuwait/Saudi Arabia/Iraq border point and then along the Saudi/Iraqi border to a refuelling track within Saudi airspace. Having refuelled, they would then enter Iraq to be tasked individually by E-3Ds, B-2s, JSTARs, or SF (which began to infiltrate western Iraq on the 19th) to POIs in planned search boxes, which they would then reconnoitre flying at low altitude, relying heavily on the GR4's terrain-following radar. They would then refuel again before investigating a second set of POIs and repeat the process subsequently for a third set. Afterwards, they would remain with the tanker for the rest of the on-task period, before making the hour-long transit back to Ali Al Salem. Total sortie lengths of an exhausting six to seven hours were expected, with each aircraft receiving up to 22 tonnes of fuel from the tanker. Normally, two aircraft would cover the first on-task period of four hours, before being replaced by two more for a similar period. The aircrew involved had to be available around the clock in case

cloud cover prevented USAF aircraft from executing their missions at medium level.

Effective surveillance was fundamental to the Counter-TBM concept. Missions were always flown in Tornado GR4As so that crews could employ the integrated TIRRS; otherwise, they used TIALD and NVGs (on the rare occasions that light conditions permitted). If the GR4s located a Scud being prepared for launch, they were to attack immediately from low altitude with free-fall 1000 lb bombs. Hence, they flew in a new and unconventional configuration comprising a TIALD laser-designating pod and unguided munitions. Formal authorisation for this unusual fit was extensively delayed, and only some frantic last-minute email and telephone exchanges between the Gulf and the UK ultimately ensured that the Counter-TBM team received the necessary verbal go-ahead from the UKACC before Telic began.

On the 20th, using TIALD, one of the GR4s assigned to Counter-TBM located a suspect vehicle at only its second POI. The vehicle, thought to be a Scud launcher, was parked under a road bridge. The aircraft made several passes without achieving positive identification, so the crew called in USAF F-16s to assess the target. Operating at medium altitude, they were no more successful; the vehicle was subsequently reallocated to a JSTARS for monitoring.

The GR4 returned to the scene after tanking, but there was no change in the situation. At the end of its on-task period, the aircraft flew back to Ali Al Salem, suffering a cabin pressurisation failure on the way and being forced to delay its landing due to another missile alert at the base. Eventually, after the suspect vehicle emerged from its hiding place, it was formally classified as a Scud launcher. According to the mission record, 'F-16s were tasked to destroy it but lost contact with it.' Although this was frustrating for the British aircrew, their success in locating the launcher was a source of considerable satisfaction. A second Counter-TBM mission that day did not locate any Scuds or launch equipment.

A-Day – the start of the Operation Telic air campaign, began on the night of 21 March. Coalition planning had originally envisaged a 48-hour delay between the initiation of Telic and the start of what were termed 'decisive operations'. Such was the UK NCC's understanding of the plan as late as 19 March:

> Phase 2 Shaping Operations will begin with precursor activity that consists of a surgical SF and air campaign designed to convince Iraqi forces and key regime figures to capitulate. The air operation is theatre wide, initially focussed at key C2[22] nodes

22. C2 – Command and Control.

> and then fielded forces that threaten the coalition … Key to this phase is a tactical pause, which allows Iraqi forces to capitulate and make local ceasefire arrangements – this is a major theme of the information campaign. D-Day is 19 Mar. H Hr is 191800Z Mar 03. The UK land and maritime contingent will contribute to these precursor operations through a series of tactical actions, which will secure the port of Um Qasr, the KAA waterway and, importantly, the oil infrastructure in the Al Faw peninsula. These actions are designed to prevent an environmental disaster and ensure that rapid humanitarian aid can be delivered through a vital port facility … Assuming that the regime continues to offer resistance, Phase 3 decisive operations will quickly commence, probably on 21 Mar. This phase envisages US armoured and mechanised forces driving north to Baghdad under the cover of a substantial but carefully targeted air campaign.

In the event, the CFC decided to advance the ground timetable so that G-Day commenced at 1530Z on 20 March; ground operations had thus been in progress for more than 24 hours by the time the air campaign started. General Franks' actions are usually said to have been motivated by Iraq's response to the decapitation strike – a response that posed a genuine threat both to the southern oil wells and coalition forces in Kuwait. Yet the documents clearly demonstrate that he was seeking to accelerate the initiation of large-scale ground and air operations against Iraq before the strike was approved and executed.

G-Day was duly brought forward, but A-Day remained scheduled for the evening of the 21st. By that time, V US Corps was driving north-west along the western bank of the Euphrates River, while 1 Marine Expeditionary Force (1 MEF) and 1 UK Armoured Division concentrated on securing southern areas of Iraq, including the port of Umm Qasr, the Rumaylah oilfields, the Al Faw Peninsula, and the area around the city of Basrah. Responsibility for this area would then pass to 1 UK Armoured Division, freeing the bulk of 1 MEF to follow V Corps as far as Nasiriyah, where they were to cross the Euphrates and advance north.

The consequences for the air campaign were indeed profound. Fears that a campaign designed to achieve shock and awe might cause collateral damage and undermine coalition information operations had already weakened support for the concept. But surprise would also be fundamental to the achievement of shock and awe, and there was clearly little chance of securing surprise more than a day after the initiation of large-scale ground operations. It was also possible that the ground campaign would make unforeseen demands for air support. UK representatives in

the CAOC raised these points with senior American planners as early as 19 March – when it first became clear that General Franks was determined to bring G-Day forward – but their arguments were ignored. Not until the 21st was it decided to reduce the number of DMPIs targeted on the first night of the air campaign by nearly 50 per cent.

A-Day witnessed the first employment of two additional Combat Air Wing capabilities, both of which were also new RAF capabilities. The first was Storm Shadow, while the second was ALARM II. They were employed as part of a far broader coalition effort designed to degrade Iraq's IADS and particularly the Baghdad Super-MEZ, so that coalition air power could be brought to bear more effectively in support of V Corps and 1 MEF as they advanced on the Iraqi capital. On A-Day, which was coincidentally the 60th anniversary of 617 Squadron's formation, crews flew two separate Storm Shadow missions involving four aircraft (pairs) and eight missiles.

Their first targets, programmed some weeks before, were an air defence sector headquarters and an Intercept Operations Centre (IOC) and radar facility at Kirkuk. The weapon release points were further inside Iraq than the 617 Squadron aircrew had originally expected, just west of the Super-MEZ and within range of several Iraqi quick-reaction alert airfields, but the importance of the targets was such that the risks had to be accepted. The mission was planned so that each aircraft from the pair would attempt to release one missile on to each target; in this way, both targets would still be hit if one aircraft became unserviceable.

Pushing into Iraq, both aircraft were threatened by ballistically launched SAMs. The threat forced one pilot to follow the established evasive tactics – jettisoning external fuel tanks, executing a LOAF manoeuvre, and dispensing chaff and flares. The second GR4 also performed a LOAF manoeuvre. The two aircraft then flew on to their weapon release point. One successfully launched both missiles, but one of the two missiles carried by the second GR4 malfunctioned and shut down. The other missile launched normally, but this meant that the Kirkuk sector headquarters was only targeted by a single weapon. The GR4 that jettisoned its external tanks afterwards ran extremely short of fuel, but no tankers were close enough to assist and the aircraft therefore diverted to Ar'ar airfield in Saudi Arabia to refuel on the ground, returning to Ali Al Salem a few hours later.

The second Storm Shadow mission that day was less eventful. Targeting another IOC and air defence sector HQ facilities at Taji, the mission was again planned on the basis that each aircraft would release one missile on to each target. In transit, the aircraft witnessed ballistic SA-2 and SA-3 launches, but the crews judged that there was no need for evasive action, proceeded to their release points and launched their missiles. Their first launch actually occurred three seconds

before the first launch against Kirkuk, and hence the crew, Flight Lieutenants RJ Chevli and AJ Reardon, were credited with the first operational Storm Shadow release, as well as the first impact.

The ALARM II missions flown on A-Day by 9 Squadron aircrew are less well documented but were clearly mounted in support of coalition bombing operations. The first ALARM formation, involving four aircraft each carrying five ALARM IIs, entered Iraqi airspace and released a total of 17 missiles against air defence radars in the Baghdad area, employing the miss-inhibit facility. The fact that nearly all the SAMs launched on A-Day were ballistically guided suggests that the desired effect in terms of 'soft' kills was achieved by SEAD missions such as this, although the precise results of the ALARM II launches are not known. More negatively, the aircrew reported afterwards that communications with their assigned ABCCC platform had been non-existent above the 32nd parallel. The second mission (involving two aircraft) entered Iraq, but the bomber wave was delayed by 45 minutes, and the GR4s eventually returned to Ali Al Salem without releasing any weapons, as no tankers were available for AAR. The Combat Air Wing also mounted a single tactical reconnaissance mission over the Basrah area on 21 March, which covered 13 out of its 15 assigned POIs.

The period 20-21 March thus witnessed live operational employment of almost all the principal Tornado Combat Air Wing capabilities – interdiction with EPW II, tactical reconnaissance with RAPTOR, Counter-TBM, Storm Shadow, and SEAD with ALARM II. There were some minor problems to iron out, along with the inevitable equipment unserviceabilities, but the experience of this opening phase of Operation Telic served in general to prove the efficacy of the Combat Air Wing concept. On 22 March, the wing was tasked more intensively than on A-Day: although no Counter-TBM operations were mounted, there were three RAPTOR missions, two Storm Shadow missions, two attack/interdiction missions and a single ALARM mission.

The RAPTOR tasks (over locations including Najaf, Al Amarah, Tallil, Basrah and Taqaddum) were badly disrupted by poor weather. Of 40 POIs assigned to the first two missions, only four were covered; the third mission covered nine POIs before being retasked, only for one aircraft to suffer a Radar Homing and Warning Receiver (RHWR) failure. As the GR4s were at this time prohibited from flying without cross cover, both aircraft then returned to base. The first Storm Shadow mission was uneventful: the two GR4s involved transited to their planned release points and launched a total of four missiles against the Baghdad Air Defence IOC and Taqaddum Air Defence IOC and radar facility. The second mission, involving four aircraft carrying a total of six missiles, targeted command and control and operations bunkers at Asad air base, and a command and control bunker at

Taqaddum. One aircraft returned to base without launching because of a missile motor failure so that, while four missiles were released against the Asad targets, only one was launched against Taqaddum.

The two interdiction missions (two pairs) both exploited the new all-weather GPS-guided capability of the EPW II, releasing all their weapons. One targeted Ababil SSMs (the type still being launched against Kuwait at this time) in the Baghdad area; post-attack BDA located the weapon impact points, but there was no trace of any missiles. The other destroyed a brigade headquarters building at Sarabadi barracks.

Sadly, it is for the single ALARM mission that the Combat Air Wing's activities on 22 March will always be remembered. The mission comprised two GR4s flying with the call-signs Yahoo 75 and 76, operating in the SEAD role as part of a package that included other GR4s (the second EPW II mission), B-2s, EA-6Bs and F-16CJs. Yahoo 75 and 76 each released four of their five ALARMs. On their return they were approaching Ali Al Salem when a US Patriot battery misidentified Yahoo 76 as a hostile incoming Anti-Radiation Missile (ARM) and launched against it. The GR4 RHWR had only a limited ability to detect Patriot target acquisition or missile guidance, but Yahoo 75 recorded receiving Patriot indications and SA-2 missile guidance warnings, and then saw a missile being launched in their direction. The GR4's Sky Shadow ECM system was neither programmed nor capable of defeating Patriot missile guidance, and tactical manoeuvres would also probably have failed against the missile. Nevertheless, Yahoo 75 initiated evasive action, and the crew then observed a missile detonation above them and to their left. Yahoo 76 had been shot down; the 9 Squadron crew, Flight Lieutenant Kevin Main (pilot) and Flight Lieutenant Dave Williams (navigator), were killed.

The Station Commander of RAF Marham, Group Captain RI McAlpine, was then holding the position of Chief of Staff, Operations, at the ACHQ; he recorded the events as follows:

> I was in the 'crow's nest' of the Combined Air Operations Centre when news came through from the Warlord at Ali Al Salem that one of our GR4 aircraft was overdue. Almost simultaneously, I was listening to the US Army Colonel responsible to the US Air Commander for Patriot operations reporting that a Patriot had successfully engaged an incoming missile over north-west Kuwait. When I correlated the place and timing my heart sank. When I told the Colonel we had an aircraft overdue and that the time and place of his reported intercept could not exclude the possibility that the Patriot

> battery had shot down a GR4, the colour drained from him. His initial satisfaction turned to abject horror as, slowly but surely, the pieces of information coming in suggested that a tragic blue-on-blue might indeed have occurred.

At Ali Al Salem, news that the Patriot had engaged an incoming missile likewise coincided with the disappearance of Yahoo 76. Operation Jackstay, the procedure for rescuing downed aircrew, was declared, and the Joint Survival Recovery Co-ordination Centre at PSAB scrambled US CSAR assets from Al Jaber, which duly located the crash site.

A combination of factors led to the tragedy; there was no single explanation. From the RAF's perspective, the critical cause was the failure of Yahoo 76's Identification Friend or Foe (IFF) equipment. The aircraft should have been 'squawking' IFF Modes 1, 2, 3, C, and 4 during the early stages of the sortie and Mode 4 throughout its entire duration. Before take-off, the groundcrew at Ali Al Salem had entered the appropriate IFF codes and conducted the usual checks to ensure that the IFF was serviceable; moreover, the RAF Rapier unit at Ali Al Salem, which normally monitored aircraft taking off from the airfield for IFF Mode 1, did not report any problem. Hence, it seems clear that Yahoo 76 took off with all IFF modes functioning properly.

And yet, while the formation leader, Yahoo 75, ran a positive IFF check with the Ali Al Salem Control and Reporting Centre (CRC) on behalf of both aircraft at this time, the CRC's confirmation was apparently based only an interrogation of Yahoo 75's IFF. Yahoo 76 did not demand an independent IFF check and appears to have been considered friendly by the CRC by association with the lead aircraft. This was in full accordance with extant standard operating procedures, but the CRC's subsequent call of 'Sweet' seems to have been interpreted by Yahoo 75 *and* 76 as applying to both aircraft.

A US E-3 radar subsequently reported only an intermittent IFF Mode 2 response via data-link from the vicinity of Yahoo 76 for a short time before it crossed the 32nd parallel northbound into Iraq. Otherwise, Yahoo 76 does not seem to have responded to IFF interrogations throughout the sortie. Sadly, they were not alerted to this fact by either the airborne or ground controllers. The GR4's Accident Data Recorder convinced the subsequent RAF Board of Inquiry that the navigator did not disable the IFF either accidentally or consciously; on the contrary, he made all the appropriate switch selections at the correct times. Only minutes before the shoot-down, he told the pilot: 'I've got 2 and 4 on.' Soon afterwards, the navigator confirmed the IFF had all modes and codes on when he said, 'OK, squawking everything.' It was ascertained later that a failure of the

IFF's internal power supply fuse would have resulted in a total system loss without illuminating the relevant cockpit warning caption, and it was thought possible that the some such fuse failure had disabled Yahoo 76's IFF. However, this would not necessarily explain why the aircraft was reportedly squawking Mode 2 for at least part of the sortie.

Had the IFF been functioning, the Patriot battery would not have engaged Yahoo 76 but, at the same time, the IFF's failure should not alone have left the aircraft vulnerable to such lethal misidentification. The fact that it did so had also to be addressed in subsequent investigations. The Patriot system identified hostile missiles using a range of criteria programmed into its computer. These were predominantly based on the many different anti-radiation missiles in service worldwide and were therefore very broad; additionally, one concerned the presence or otherwise of a valid IFF return in mode 1, 3 or 4. There is no doubt that some of the criteria were too general and that they should have been based specifically on the characteristics of known threats from Iraq; they were modified immediately after the incident. The American Board of Inquiry into the shoot-down remarked that,

> This step should be taken prior to the onset of hostilities. In future conflicts, a rehearsal with all tactical directors should occur which includes threat capabilities and characteristics, as well as friendly aircrew tactics.

The battery operators themselves appear to have been responsible for one of the critical failings in this respect. A preliminary software test had required the Patriot system to demonstrate a capability to intercept the AS-17 ARM – a weapon that was not in the Iraqi inventory. In the test, a track could be identified as an ARM with an approach angle as low as 10 degrees. Following the test, the system should have been reset to prevent ARM identification being based on a track approach angle lower than 20 degrees, but the Patriot crew omitted to do so. Yahoo 76 would not have been classified as an ARM if the correct 20-degree setting had been employed.

An undetermined element in the misidentification of Yahoo 76 as an ARM was the role of its Skyshadow ECM equipment. One of Skyshadow's techniques involved fooling threat radars into overestimating target speeds; the Patriot crew afterwards reported that the radar track they had believed to be an ARM was apparently moving at speeds significantly above the maximum that a Tornado GR4 can achieve. Another factor was that Patriot crews were at that time cleared to categorise as ARMs tracks with Radar Cross-Sections (RCS) of up to 10 square

metres. In fact, no ARM could have produced an RCS of anything like this size, and the limits were subsequently reduced.

Apart from the programmed criteria employed to identify hostile missiles, the ROE required the Patriot operators to determine that the ARM was directly threatening their unit. If they decided that it was, they were cleared to engage it in self-defence without authorisation from any higher authority in the command chain. In ideal circumstances, aircraft returning from missions over Iraq would have been routed around friendly GBAD. Unfortunately, in the early stages of Operation Telic, airspace constraints were such that returning aircraft were having to fly directly over the Patriot battery that shot down Yahoo 76. This contributed to the battery operators' belief that they were being directly targeted.

Furthermore, the ROE permitting self-defence actions against ARMs took no account of the total inactivity of the Iraqi Air Force following the onset of hostilities. It was afterwards concluded that the Patriot ROE had at this time been too loose. Once again, they were immediately tightened after the shoot-down, autonomous self-defence engagements of ARMs and cruise missiles being prohibited altogether.

In the hands of thoroughly trained and experienced Patriot operators equipped with the Recognised Air Picture (RAP) and in close contact with higher command echelons, the ROE might have proved sufficiently robust to save Yahoo 76. For example, the missile launch occurred 10 seconds after the radar contact was categorised as an ARM, whereas the crew actually had about one minute to decide whether to engage. Although Patriot training emphasised the need to fire early, more experienced operators might have delayed launching their missiles for longer, and the radar contact would then probably have been reclassified as its flight path changed. However, according to the US Board of Inquiry, the battery crew was 'ill-trained and inadequately equipped'.

> The fundamental construct of PATRIOT autonomous and independent operating modes requires IFF and engagement determinations to be made with little or no outside C2 and at the lowest possible level. These identification and engagement decisions are tasked to the most junior officers and NCOs, the Tactical Control Officer (TCO) and the Tactical Assistance Officer (TCA), who can act without sufficient outside cross-checking of their conclusions … The investigation also highlighted deficiencies in training, and a lack of situational awareness and enemy order of battle within PATRIOT crews.

A GR4 carrying ALARM in the Gulf during Operation Telic.

ALARM: the RAF's last dedicated SEAD missile.

Specifically, the TCO and TCA had only demonstrated the basic skills necessary to begin training with their assigned Patriot crew (so-called Table 4 certification) in November 2002 and December 2002 respectively. They had obtained minimum-level certification for conducting combat operations as late as February 2003, shortly before their deployment to the Gulf. Moreover, they had done so with only the most rudimentary understanding of the detailed characteristics of Iraqi threats and of how the Patriot system detected, classified, identified and engaged them. Furthermore, their battery was only partially equipped at the time of the engagement: some of its communications suite was still in transit. It did not have its own digital communications, nor was it co-located with a battery command post. Its sole voice communications comprised an FM radio link with a sister battery, which did possess voice and data links to and from their battalion headquarters.

On identifying the apparent ARM, the TCO had radioed the sister battery, which had contacted the battalion headquarters, which had in turn contacted the CRC. Procedurally, there was no requirement for the TCO to seek higher approval to engage an ARM in self-defence, so it is possible that there was in fact some uncertainty that the track was indeed an incoming ARM. Radar operators at the CRC, the battalion headquarters, and the sister battery, all of whom possessed the full RAP (provided by facilities like the Global Command and Control System and the Air Defence System Integrator) did not detect the reported ARM contact. Nevertheless, within seconds of reporting the contact and without direction from any other authority, the TCO took the decision to launch. It should be added that the engagement took place in a tense situation: the battery had successfully engaged an incoming SSM two days before, and that night there were renewed fears of SSM attacks from the Basrah area. The Patriot crew was also on heightened alert following news of a suspected ground attack on US forces at the nearby Camp Virginia.

The RAF inquiry into the loss of Yahoo 76 produced recommendations that chiefly concerned the Tornado GR4's IFF system. Clearly, the failure modes, reliability and serviceability of the system required the most careful investigation. It was also recommended that a positive challenge and response IFF check be completed after take-off between every aircraft and an appropriate control authority, and that the Tornado IFF installation be modified to ensure that the cockpit warning was activated in the event of a power failure, and in all other failure modes. The US recommendations were more far-reaching and deserve to be quoted in full:

> The modern battle space presents a new dynamic in complex combined/joint operations. Lessons learned in this environment can be costly and life threatening. Independent and autonomous operations significantly reduce higher echelon command and control (C2) at points when lives can be quickly lost … Current autonomous and independent operations Tactical Standard Operating Procedures (TSOP) significantly inhibit track deconfliction and IFF, and call into question the wisdom of continued autonomous and independent operation of PATRIOT battery elements. The PATRIOT community must address and, where necessary, repair … interoperability, battery communications, C2 in general, and, in particular, C2 in these degraded communications environments.

Commander CENTAF was directed to coordinate with the Commander ARCENT to conduct a joint review of air defence artillery procedures, particularly as they applied to friendly protection and to the use of Patriot missiles in autonomous and independent battery operations.

6. Al Udeid Wing, 20-23 March

The Al Udeid Wing lacked the variety of specialised capabilities possessed by Combat Air Wing, but its experience during the first few days of Operation Telic was in most respects very similar. First there was the transition to war over 19/20 March (many detachment personnel witnessed the return to Al Udeid of the F-117s involved in the decapitation strike against Saddam Hussein), then participation in A-Day on the 21st, then two or three days of tasking against fixed targets – chiefly Iraqi air bases and army barracks. Poor visibility and forecast weather conditions led to the cancellation of the wing's first Operation Telic mission on 19 March, but two missions were flown against artillery positions in the Al Faw Peninsula area on the 20th, with two aircraft releasing EPW II bombs in GPS mode.

On A-Day, the Al Udeid Wing's principal targets were operating surfaces at Qayyarah West airfield, the main Iraqi Air Force Mirage F-1 base; two four-aircraft formations carrying EPW III bombs participated. This was a long and arduous mission, requiring the GR4s to remain airborne for 5½ hours (including 2½ hours in Iraqi airspace), to fly a total distance of 2,060 nautical miles, and to refuel before and after attacking the target. Poor weather conditions and turbulence hampered air-to-air refuelling, leaving some aircraft awaiting tanking with

considerably less than the minimum planned fuel levels; the formation also experienced very poor communications with the ABCCC E-3 during their transit north to the target. Nevertheless, six of the eight GR4s reached Qayyarah West (the others returned to Al Udeid with unserviceabilities), and all targeted DMPIs were subsequently assessed as hit, the main runway and taxiways at the northern end of the airfield being severely cratered. In the target area, the GR4s encountered AAA and unguided SAM fire, but they were not directly threatened. The other targets that day were military and security force barracks at Ramadi, which were thought to be weapon storage areas. They were successfully attacked by another formation of four GR4s with EPW IIIs.

On 22 March, the Al Udeid Wing was chiefly tasked against Republican Guard barrack complexes north-west, west and south-east of Baghdad, in support of the coalition objective of disrupting or degrading the Iraqi regime's command and control and its security forces. One of the Iraqi bases belonged to the 26th Republican Guard Force Command (RGFC) Special Forces Brigade, which specialised in counter-SF and counter-insurgency operations. The first two formations – each consisting of four aircraft – accurately bombed their targets, only one GR4 failing to reach the target area because of a main computer failure.

The third mission, against Sarabadi Republican Guard barracks, was more eventful. Flying towards Samawah – over an area thought to be free from significant SAM threats – one of the four GR4s (call-sign Vandy 71) suddenly received SA-3 missile-guidance indications on its RHWR, accompanied by an audio warning. The pilot dispensed chaff and initiated a LOAF manoeuvre but then spotted a missile launch. The SAM passed within 50 metres of the GR4 and detonated slightly behind it; the explosion was near enough to rock the aircraft. Two further missiles were fired, but Vandy 71, having jettisoned all stores, managed to fly clear of the area. The crew at first thought that the aircraft had been hit and was losing fuel, and they even considered ejection, but Vandy 71 ultimately remained airborne and diverted safely to Ali Al Salem. Subsequent inspections showed that the GR4 had not sustained any damage. A second aircraft from the formation also came under attack and was forced to jettison its external fuel tanks. The mission was then aborted.

In the final mission that day, four aircraft were dispatched at very short notice to join a large US package attacking targets in Baghdad. The GR4s were to bomb an underground bunker, which was believed to house a SAM storage and research facility; they were to employ the new EPW III bomb – the very first operational use of the weapon. Despite the efforts of the detachment engineers and armourers, it proved impossible to launch the mission on schedule. All four aircraft eventually took off, but one aborted with pressurisation problems and the other three were

late to reach their designated tanker, so that only two refuelled. The third aircraft returned to base. Of the remaining two GR4s, one had to jettison a malfunctioning bomb in a lake south-west of Baghdad (to allow the other bomb to be released). Three EPW IIIs were thus ultimately dropped, and subsequent BDA showed that the attack was successful. The aircrew witnessed little Iraqi GBAD activity in the Baghdad area, but they observed a SAM fired from within Kuwait hitting an airborne target during recovery. The leader of the formation, Wing Commander Roberts, believed that he had seen a Patriot missile shooting down an aircraft. Tragically, it soon transpired that he was correct.

7. The Transition to KI/CAS

For the Combat Air Wing, the immediate challenge on 23 March was to ensure that the loss of an aircraft and two respected aircrew did not jeopardise the successful execution of ongoing operations. It did not, for the wing mounted nine missions that day. As the Ali Al Salem DOB commander put it, 'The contribution of Flt Lts Main and Williams was commemorated with dignity, and the response of all Det personnel was magnificent, merely stiffening the resolve of all to continue their efforts in support of the air offensive.'

Three interdiction missions were planned, predominantly employing EPWII bombs, although one EPW III was also carried. The targets included the Shaykh Mazhar divisional and brigade headquarters (base of the Republican Guard Medina Division's 10th Armoured Brigade), a small-arms bunker and vehicle storage building at Al Kut barracks and an ammunition depot at Karbala, which was believed to be an actual or potential WMD storage facility. On the same day, the wing also flew three RAPTOR missions, but these were hampered by equipment unserviceabilities. Operating as pairs, the RAPTOR aircraft were again placed at a disadvantage by the ruling that RAF aircraft should only fly with cross cover. Hydraulic and RHWR failures during the first and second missions forced all four tasked aircraft to return to base; none of the assigned POIs was covered by the first mission and only three were photographed by the second. The third covered 14 POIs between Karbala and Baghdad but missed another seven because of intense AAA fire in the area concerned.

There were also two Counter-TBM missions in western Iraq. One aircraft encountered SA-8 indications but was not directly threatened, and no Scuds were found. During the return transit to Ali Al Salem, an aircraft from the second mission was locked on to by a USAF F-16 for about a minute, but the fighter was then called off by the responsible ABCCC aircraft. Shortly before landing, one of the GR4's 'oil pressure low' warning lights illuminated – a clear sign that the

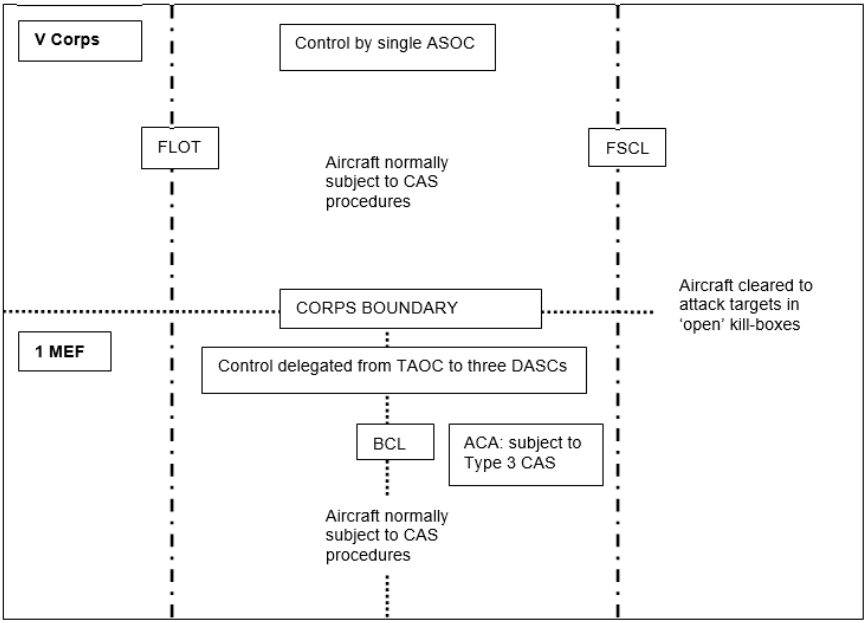
aircraft were being operated to the limits of their endurance during these unusually long sorties.

The one further offensive mission signified the beginning of a new phase in the air campaign for the Combat Air Wing. This was the first of the many KI/CAS missions flown from Ali Al Salem. On the same day, the Al Udeid GR4 wing also commenced KI/CAS operations.

KI/CAS was a USMC concept, which was adopted by the CFACC for Operation Telic. Outside a Fire Support Co-ordination Line (FSCL), some distance beyond the Forward Line of Own Troops (FLOT), aircraft were cleared to attack any targets they could find in their assigned kill-boxes, assuming they were open. If they were closed, aircraft could only attack under positive direct control, normally from a Forward Air Controller (FAC). Inside the FSCL, kill-boxes were automatically closed unless opened with the agreement of the CFLCC. In the absence of such agreement, they were subject to three types of CAS, all of which necessitated positive direct control of the aircraft. Type 1 required the terminal controller to have sight of both the aircraft and the target – a rare occurrence during Operation Telic; Type 2 required the terminal controller to have sight of either the aircraft or the target, while Type 3 enabled air strikes to take place when the terminal controller could see neither aircraft nor target.

Within this overall concept, V Corps and 1 MEF operated the system somewhat differently. The Marines established an intermediate line between the FLOT and the FSCL known as the Battlefield Co-ordination Line (BCL). The area between the BCL and the FSCL was labelled the Airspace Co-ordination Area (ACA) and was normally subject to Type 3 CAS. On the V Corps front, a BCL was not instituted and, while both Type 2 and Type 3 CAS were conducted inside the FSCL, V Corps were evidently slower to approve Type 3 CAS (between the FSCL and the FLOT) than 1 MEF (between the FSCL and the BCL). The delay was partly caused by the fact that the V Corps Air Support Operations Centre (ASOC) managed all air tasking in the V Corps area, whereas the 1 MEF Tactical Air Operations Centre (TAOC) delegated tasking to three divisional sub-centres, known as Direct Air Support Centres (DASCs). However, for reasons not fully explained by the documents, it also appears that V Corps periodically established a FSCL significantly deeper than 1 MEF's. Although, in theory, this would have given V Corps greater control over the aircraft tasked in their support, it would also have increased the volume of air operations that the ASOC had to manage, stretching their resources to the limit.[23]

23. There are irreconcilable contradictions in the sources on this point. Responding to the accusation that their FSCL had been too deep, the V Corps ASOC maintained that for only



In considering the problems that were encountered with KI/CAS during Operation Telic, it is important to remember that, with the exception of some Harrier GR7 tasking over Kosovo, all RAF offensive operations in the post-Cold War period involved attack or interdiction (and a limited amount of SEAD with ALARM). Even over Kosovo, weapons were often released against planned secondary targets or areas rather than observed fielded forces. Moreover, although referred to as CAS, missions were not flown in coordination with ground forces or under the direction of Ground Forward Air Controllers (GFACs), and assets referred to as Airborne Forward Air Controllers (AFACs) were really providing SCAR. In truth, in March 2003, the RAF had not flown any real operational CAS missions since the Falklands War of 1982. From the first Gulf War onwards, offensive tasking had very largely been restricted to strikes on planned targets in specified (usually fixed) locations.

eight hours during the entire war was the FSCL greater than 50 NM deep, while for only three days during the war was the FSCL greater than 30 NM deep. By contrast, Harrier Force South referred in one after-action report to the 'extraordinary depth' of the FSCL and quoted a figure of 120 NM.

Pre-strike and post-strike imagery of the Taji air defence facility – a Storm Shadow target on 21 March 2003.

Far more typical targets for the RAF in Operation Telic.

The principal munitions carried by the GR4s and GR7s – 1,000 lb PW IIs and EPW IIs – were well suited to such operations. Quite reasonably, crews had come to expect extensive mission planning and pre-briefing on their targets, and target folders containing up-to-date photographs, intelligence and other mission-specific information. Other issues – rigorous and detailed collateral damage assessments, LOAC, and weapon-to-target matching – would also normally have been addressed well before take-off.

KI/CAS could hardly have been more different. Missions were normally preceded by a general pre-briefing from a GLO, but aircraft would otherwise simply be dispatched to a kill-box to await any tasking that became available. While airborne, they might then be re-tasked to another kill-box, often at a considerable distance from their original destination. Specific targeting information normally only emerged during transit to the target area so that reliable communications and close coordination with tasking agencies were of fundamental importance. After that, aircrew had still to locate the target, positively identify it, apply their Targeting Directive (which included a collateral damage estimate and the application of LOAC) and (if there was an option) select appropriate weaponry.

For aircrew lacking any operational experience of KI/CAS, this was a considerable challenge and, predictably enough, the Iraqis sought to complicate the task still further. They quickly introduced unconventional tactics, using civilian vehicles to attack coalition forces, and hiding among the civilian population. Military assets of all kinds were concealed or dispersed, only fleetingly being brought out of hiding for use; they were also regularly moved between different hide sites, usually at night or under cover of bad weather, and well inside the ATO targeting cycle. Hide sites themselves effectively exploited the cover afforded by terrain or vegetation, or else were deliberately located in residential areas or near mosques, schools or hospitals, which it was known the coalition would not attack.

US operations in Afghanistan had demonstrated the importance of CAS, and HQ STC and HQ Land had been attempting to improve CAS procedures and training since 2001; there had, in particular, been some intensification of training in the months preceding Operation Telic. Yet it did not entirely prepare aircrew for the techniques, tactics and procedures that would be applied in the Gulf. Few realistic targets were available on UK ranges and there were no opportunities for training with US tasking agencies; all CAS training was conducted on a purely national basis with British ground forces. Furthermore, the rapidity of the transition from interdiction to KI/CAS came as something of a surprise; the various RAF force elements arrived in the Gulf expecting a longer period of

tasking against static or interdiction-type targets. As one squadron commander put it, 'The rapid change to CAS caught everybody out, and it took some time before the JFACC and the JFLCC[24] got back into any form of harmony.' Finally, it should be remembered that the Harrier was normally favoured over the Tornado as a CAS platform in 2003 and that, while good communications have always been essential for CAS, the Tornado's communications were notoriously weak.

During the Combat Air Wing's first KI/CAS mission on 23 March, four aircraft were initially tasked against two Republican Guard positions, but they were passed updated target coordinates of enemy positions by a GFAC while airborne. One aircraft then attacked and destroyed a self-propelled artillery vehicle with a single EPW II bomb, and a second was tasked but did not release any weapons because of a malfunction during the target run. The same aircraft was then locked up by an SA-3 and forced to jettison fuel tanks and perform a LOAF manoeuvre; the SA-3 indications duly ceased. The other two aircraft were not tasked.

The Al Udeid Wing was sent to the Karbala area, but the two tasked formations experienced a variety of problems, including SAM and AAA threats, airborne changes of assigned kill-boxes and tasking agencies, communications failures and difficulties satisfying ROE criteria. In the end, of eight aircraft involved in the wing's first two KI/CAS missions, only two released weapons, one on an Iraqi signals site and the other on a tank.

8. Tornado GR4 Operations, 24-27 March

From 24 March, operations against fixed targets declined (although they by no means ceased altogether) and the air campaign became largely directed towards the attrition of the Baghdad Super-MEZ and KI/CAS in support of V Corps and 1 MEF. The second of these activities was critically dependent on the first, for coalition aircraft had to enter the Super-MEZ to provide KI/CAS for the two US corps; there could be no better illustration of the direct relationship between control of the air and the successful prosecution of land warfare. The condition of the Iraqi IADS at this time was assessed in a report by the AWC. There had been no opportunity to attack the Super-MEZ before Operation Telic began, and only limited resources had been assigned to the task since A-Day. Therefore, it is hardly surprising that the AWC's assessment was rather pessimistic, warning that some 48 of Iraq's 69 strategic SAMs[25] had yet to be located. Moreover, while the strikes

24. By JFLCC he apparently meant the Combined Forces Land Component Commander.
25. Strategic SAM systems are long-range systems usually located in fixed sites and provide barrier, area, and point air defence coverage. The long range and transportability of some

conducted on 21-22 March had saturated the IADS and degraded parts of its infrastructure, any damage to the Iraqi communications architecture had largely been surmounted during the following day. The effectiveness of Iraq's air defence capability apparently remained largely consistent:

> Slight increases and degradations in the last 24 hours are a function of radar and SAM deployment choices by the Iraqis, rather than strike effects by the coalition. EW cover remains broadly unchanged. HF radar activity was noted for the first time since 21 Mar 03, thereby increasing AD effectiveness in all AORs.[26] SAM coverage remains consistent in all areas with the exception of the south where there has been an increase.

However, the AWC had reason to believe that the continuous relocation of SAM systems was creating significant logistical and maintenance problems for Iraqi air defence batteries.

With the aim of removing the threat of the Super-MEZ once and for all, the CFACC launched what became known as Operation Horseshoe. Operation Horseshoe involved the deliberate targeting of Iraqi air defence assets: it was not merely a matter of the suppression but of the *destruction* of enemy air defences – not SEAD but DEAD. Central to the entire concept was the USAF RQ-4A Global Hawk RPAS, with its capacity to provide commanders with near-real-time high-resolution ISR imagery, allowing coalition aircraft to be launched against enemy targets within minutes of their location. Operating from high altitude, Global Hawk's performance was weather dependent. Nevertheless, the USAF later disclosed that the system had located 13 full SAM batteries, 50 SAM sites, 300 SAM canisters and 70 SAM transporters. It had located more than half the TSTs associated with coalition air operations against the Iraqi IADS.

Operation Horseshoe made steady progress. On the 25th, multiple SAM radars and missile launchers were attacked by F-18s and F-16s. EA-6Bs, B-1s, B-52s and B-2s became involved on the 26th and 27th. On the 28th, the UKACC noted that while the Iraqi IADS retained an offensive posture and a willingness to employ imaginative tactics, there were positive signs that EW and SAM capabilities were being degraded. The next day, he noted further signs of degraded EW and impaired

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strategic SAMs mean they can provide air defence coverage over the forward edge of the battle area at various stages of a conflict *and* threaten friendly airborne platforms well into friendly airspace.

26. AOR – Area of Responsibility.

communications within the IADS; DEAD operations targeted Spoon Rest radars and SAMs of various types on the 30th. RAF aircraft were not involved in these operations, but they certainly benefited from their success.

On the ground, V Corps encountered little resistance. Avoiding Nasiriyah, they advanced rapidly up the Euphrates to Najaf, and some units were soon pushing further north towards Karbala. More determined opposition faced 1 MEF in Nasiriyah but they had crossed the Euphrates by 25 March and were moving north along two roads, one to the east of the river, one running northwards towards Al Kut.

The progress of both formations then slowed. The CFC subsequently took the view that, while their rate of advance had been impressive, they had focused too much of their effort on seizing ground rather than destroying enemy forces. It became clear that V Corps' and 1 MEF's extended lines of communication were vulnerable to attack by Iraqi irregulars and other units that had been bypassed, and that measures had to be taken to ensure their security. Iraq's best Republican Guard divisions were also known to be defending the southern approaches to Baghdad; it would have been unwise of the CFLCC to launch a major ground assault against these formations while his supply lines were under attack, and neither corps was at first strong enough to do so. Finally, poor weather intervened, central and southern Iraq being hit by violent and prolonged sandstorms between 24 and 26 March.

The deteriorating weather impacted on air operations, too. On 24 March, the Combat Air Wing's reconnaissance activities were restricted to a single RAPTOR mission – again between Karbala and Baghdad – which imaged just 5 POIs out of 27. Nevertheless, two Counter-TBM missions were flown (with one aircraft refuelling four times from a Tristar to ensure that all its tasked locations were covered) and there were three offensive missions. The first of these involved three aircraft and targeted an air defence IOC at Salman Pak, south-east of Baghdad, which was associated with Iraq's early warning radar chain; the aircraft each carried three EPW IIIs, five of which were ultimately dropped. The results were not observed as the formation had to leave the target area before the detonations, but BDA afterwards suggested that the attack was successful. A notable feature of this mission was the absence of Iraqi surface-to-air fire in what might have been considered a high-threat environment for the GR4s. One aircraft did receive brief SA-3 target-tracker warnings on its RHWR and responded by manoeuvring and by dispensing chaff, but there was otherwise surprisingly little sign of the Baghdad Super-MEZ.

The second mission involved KI/CAS. The formation at first received tasking against an SSM north of Basrah, which was attacked with a single EPW II. It was

then directed by a GFAC to strike Iraqi armoured vehicles in berms and in the open in the vicinity of Qalit Salih. This was on the River Tigris, well to the east of 1 MEF's axis of advance, and it is therefore unclear which coalition ground formation the GFAC represented. Two particular problems were encountered in executing this task, which are best recorded in the words of the aircrew themselves.

> a. CAS at medium level (FL 200) using laser-guided weapons was problematic because it was extremely difficult to positively identify (PID) targets. This stems from 2 main problems: firstly, the fidelity of the Thermal Imaging Airborne Laser Designation (TIALD) pod is not sufficient to PID targets, and secondly, the quality of the image on the navigator's TV tab in the rear cockpit is extremely poor. Thus, the aircrew are almost totally reliant on the instructions from the GFAC to locate the target and the GFAC's ability to PID. To improve the image quality on the TV tab the aircrew can descend to a lower altitude, but this increases the surface-to-air threat to the aircraft.
>
> b. The other problem concerns using EPW for GPS attacks when the GFAC is responsible for the target coordinates. In a number of cases the coordinates passed to the aircrew were not accurate enough for GPS attack, and the weapons missed their intended target. The TIALD pod is also unable to produce accurate enough coordinates for the use of GPS weapons.

These were significant issues that would further complicate the KI/CAS task for much of Operation Telic. On this occasion, presumably after difficulties positively identifying the targets, one aircraft successfully released laser-guided EPW IIs against a military vehicle inside a berm, but the third GR4 was compelled to bomb on GPS coordinates supplied by the GFAC. These proved to be inaccurate, and the bombs missed the target.

The third offensive mission of the day again involved KI/CAS and an experience that would also become all too familiar during Operation Telic. After one aircraft ground aborted with RHWR problems, the other three entered Iraqi airspace to await airborne tasking, but none was forthcoming. The formation subsequently returned to Ali Al Salem with all their weapons. In total, the Combat Air Wing mounted six missions on 24 March.

The Al Udeid Wing was meanwhile entirely tasked with KI/CAS but experienced even greater frustration. The wing's four planned missions on 24

March were intended to comprise 16 sorties, but only two aircraft ultimately released weapons. The first mission – reduced from four to two aircraft by unserviceabilities – failed to contact the V Corps ASOC and returned to base. Two aircraft from the next formation were compelled to abort in the air, one by an equipment problem and the other by a SAM attack, which forced it to jettison its under-wing tanks, and the remaining aircraft were not tasked. The third mission did receive tasking and severely damaged a Ba'ath Party headquarters building near Samawah, which was being used as a sniper position, but the fourth suffered one ground and two air aborts, so that the single aircraft remaining serviceable had to recover to Al Udeid.

On 25 March, the Combat Air Wing again flew six missions. The weather had deteriorated further, completely halting reconnaissance activity, and only one Counter-TBM mission was flown. The five offensive missions that day were divided between interdiction, KI/CAS and SEAD. The first combined SEAD and interdiction tasks, but equipment problems forced two aircraft to return to base; the other two GR4s released ALARMs near three SAM sites. A second SEAD mission involving four aircraft executed the final Combat Air Wing ALARM releases of Operation Telic. Two further missions were assigned nominal targets but were primarily dispatched into Iraqi airspace for airborne tasking. One of these obtained target coordinates from V Corps for Iraqi artillery positions north of Karbala, which were successfully attacked using EPW IIs in GPS mode. The second was left untasked while in transit and therefore struck its planned target – an ammunition storage building – which was destroyed.

The final mission was launched at very short notice in response to intelligence suggesting that a popular uprising was taking place in Basrah. Crowds hostile to the Iraqi regime had allegedly taken to the streets, and Iraqi forces were said to have deployed to quell the disturbances. British ground troops became involved, and it was decided to launch an air attack against the Ba'ath Party headquarters in the city in support of the uprising. Four GR4s were scrambled to execute this mission although, on take-off, their crews had no idea of the intended target. Once airborne, they split into two formations to aid deconfliction. One pair (call-sign Musket 65-66) was passed through five different tasking agencies before being returned to the original controller, who duly issued a set of target coordinates. However, it was evident from his voice that he was unsure of their accuracy and the crews therefore requested confirmation. Ultimately, it transpired that the coordinates plotted out in Iran.

While awaiting confirmation of the coordinates, Musket 66 received SA-2 target tracker and then missile guidance indications on its RHWR. The pilot performed LOAF manoeuvres and jettisoned the GR4's under-wing tanks, but the

warnings continued. A few seconds later, the crew saw a large bright flash close to the port underside of the aircraft's nose. They heard an explosion and felt the resulting blast, but Musket 66 fortunately emerged undamaged. The Joint Intelligence Centre at PSAB later determined that the explosion was either a ballistically launched SAM or else a lightning strike; thunder and lightning had been reported throughout southern Iraq that day. The two GR4s left the area, but the crews were still waiting on correct target coordinates when they were advised that the Ba'ath Party HQ had been destroyed by a USAF formation in the meantime.

The other pair of GR4s also received inaccurate target coordinates and spent some time awaiting their correction. After learning that the headquarters had been destroyed, they proceeded to a planned target in the Karbala area – revetments within the Khan Al Mahawil Republican Guard barracks – and released all their EPW IIs in GPS mode.

The Al Udeid Wing's operations on 25 March were largely based on pairs formations and only one 'four-ship' was flown. The wing was entirely tasked with KI/CAS but suffered another exasperating day, and no aircraft released weapons. The main problem was the weather, which compelled at least eight of the GR4s to return to base. The others aborted with equipment malfunctions or because they were not permitted to fly as singletons at this stage of the operation.

By this time, there was genuine concern at the higher levels of the coalition air command chain about the number of aircraft assigned to KI/CAS that were returning to base with their bombs. The UKACC complained of 'poor control of assets by ASOC V Corps' and noted that aircraft operating in support of 1 MEF were more likely to be allocated targets. As V Corps drove rapidly north, some aircraft also found themselves operating beyond the effective range of the ASOC's communications. But work was already ongoing to improve KI/CAS procedures, and provision was also being made for aircraft to attack planned alternate targets. These tended to be fixed targets with pre-determined GPS coordinates, such as headquarters, barracks and depots, to which troops or equipment might have been dispersed. So-called 'bomber boxes' were also introduced, where aircraft could release unguided weapons against low collateral damage targets.

On the 25th, despite the obvious risks, AAR, JSTARS and RC-135 Rivet Joint tracks were all moved forward to the Saudi/Iraqi border to improve the intelligence supply and on-station time for KI/CAS assets. By the 26th, five tanker tracks had been established *inside* Iraqi airspace. The V Corps ASOC was also directed to review KI/CAS procedures and so reduce the number of aircraft left untasked. Some improvement in the ASOC's performance was already evident, assisted by changes in the flow of aircraft into the V Corps AOR.

The next day, the weather was no better, and the Combat Air Wing executed just five missions. The planned RAPTOR tasking south-west and south-east of Baghdad was cancelled, but the GR4s flew a back-up reconnaissance mission for 1 UK Armoured Division north of Basrah. This was the first of many such operations. The division had struggled to secure the services of coalition air reconnaissance assets, in part because they did not understand coalition command and control procedures for requesting ISR support. Among other things, they tended to ask for large tracts of imagery rather than specific air reconnaissance products, and they frequently submitted reconnaissance requests at very short notice. Moreover, after a few days, their chances of obtaining airborne ISR were further reduced by the fact that their operations around Basrah did not represent the coalition main effort. The two US corps were invariably given priority. Presented with this problem, the Combat Air Wing (and later Harrier Force South) offered 1 UK Armoured Division an alternative, national tasking route that bypassed the normal coalition ATO machinery if spare capacity was available.

The other four missions all involved KI/CAS, but only one aircraft was allocated a target by a GFAC. Four aircraft flew a KI/CAS mission in the Baghdad area but were then retasked to perform reconnaissance. However, for the reasons already described, they were unable to positively identify their POIs without descending below the normal minimum-operating altitude of 15,000 ft. Clearance to do so was at first supplied and then withdrawn because of known SAM threats in the area, which included Roland and SA-8, but the formation was already flying at 10,000 ft by this time. Fortunately, the GR4s were not engaged and were able to climb safely away. They were afterwards denied clearance to attack a planned secondary target near Baghdad because no SEAD support was available, so they returned to Ali Al Salem with their weapons.

The remaining two missions involved the Counter-TBM crews, who had been stood down because of the weather. They were in the middle of supper when they were called to the operations room to receive immediate tasking against an Iraqi convoy advancing south from Baghdad towards coalition forces. Notwithstanding a Scud alert, which proved to be a false alarm, two pairs of aircraft took off and proceeded to a holding area over Iraq, but it then transpired that the convoy had yet to be positively identified and that no target coordinates were available. The GR4s were still holding when they began to run short of fuel and, in the absence of AAR, they were forced to return to base – ‘a hugely frustrating and disappointing result for all the hard work, especially by the armourers’, according to their diarist. Although initial reports had suggested that the Iraqi convoy consisted of about 50 large vehicles, this figure was later revised down to fewer than 20. Once again, the Al Udeid Wing had no opportunity to attack any targets.

Half their planned sorties were lost to unserviceabilities on the ground or in the air, three GR4s were forced back to base by poor weather, and three more – assigned to KI/CAS in support of V Corps – were not tasked.

On 27 March, the transition towards KI/CAS continued: three of the Combat Air Wing's four offensive missions that day involved KI/CAS, and there was just one interdiction strike on an ammunition storage facility at Qubaysah, which coalition intelligence had linked to possible WMD-related activity. The first KI/CAS mission was the most eventful of the day and perfectly illustrated the complex parameters within which the Operation Telic air campaign was conducted. Four GR4s were tasked to an area west of Baghdad. After refuelling from a VC10 en route, they divided their target area into two, and one pair then attacked ammunition storage facilities in the east – at Muhammadi airfield – achieving three direct hits and setting off large secondary explosions. Then they turned back towards Kuwait.

They were still in transit when poor weather closed all the Kuwait air bases. The two GR4s then attempted to refuel but became caught up in an Iraqi SSM attack, which was countered by Patriot launches. One aircraft was actually locked up by a Patriot and forced to take evasive action. The missile attack caused all coalition tankers to retreat south, and ground control radar coverage was suspended in the meantime. The GR4s tried to use their radars to locate a tanker and eventually put out a call on an emergency frequency. This produced one response, but the location supplied by the tanker proved incorrect. With barely 15 minutes of airborne time remaining, the GR4s turned north again (back towards Iraq) and at last located a KC-10, from which they refuelled. The other two aircraft, having failed to obtain any tasking, returned to base slightly later and therefore encountered fewer problems during their transit.

The second KI/CAS mission involved a pair of GR4s, which received tasking from UK ground forces north of Basrah. One aircraft bombed Iraqi artillery pieces using laser-guided EPW IIs. The other KI/CAS formation was tasked by a GFAC against Iraqi armour at Diwaniyah. Despite significant surface-to-air fire and SA-8 indications in the area, they proceeded with the attack but discovered once again that they had been supplied with inaccurate target coordinates. Fortunately, it proved possible to revert to laser-guidance, and they successfully bombed five armoured vehicles.

AAR was critically important in Telic: here, two RAF GR4s are refuelling from a USAF KC-135.

An RAF Tristar of 216 Squadron refuelling a US Navy EA-6B Prowler.

Apart from the offensive operations, two reconnaissance missions were flown that day south-west and south-east of Baghdad. The first pair covered 42 out of 44 tasked POIs, and the film afterwards revealed some 26 SA-6 Transporter Erector Launchers (TELs) and a suspected Scud missile in the Baghdad area; coalition aircraft struck the TELs a few hours later. The second pair covered all 26 POIs and fulfilled some further tasking for 1 UK Armoured Division around Basrah.

The day was marginally more successful for the Al Udeid Wing, for three of the planned eight pairs formations released weapons. One mission attacked a secondary target – the Ramadi Republican Guard barracks – while two others struck a Republican Guard fuel depot at Numaniyah, achieving at least five direct hits. The remaining missions experienced broadly the same problems encountered on the 26th. A blunt personal account from one of the aircrew illustrates the weakness of coalition KI/CAS procedures at this time.

> A night mission, tanking was successfully completed against a Tristar, and the pair offered their services for CAS. The standard comms, which have been a pain in the arse, seem to work and finally the pair are given a target in An Najaf, the Ba'ath Party HQ! All of their six EPWs are required and they start to prosecute the attack. This attack is aborted by the FAC as the ground personnel cannot decide if it is the correct building or not. The pair then returned to the tanker to refuel. [They] feel that this could finally be their night as the last FAC they were with seemed on the ball … Upon reaching the target area [again] the formation was handed over to a FAC, unfortunately not the one we were working with [before]; indeed it seems our luck is down...

This particular mission ended when one of the aircraft was forced by a missile threat to jettison its under-wing tanks.

9. Harrier Force South, 19-27 March

The experience of Harrier Force South differed from that of the two Tornado GR4 wings in one significant respect: they were assigned to KI/CAS almost immediately. They flew just four interdiction missions on 19 and 20 March before the transition occurred. A message from the ACHQ conveyed the news thus:

> The early start of the Ground War has completely screwed the ATO O[27] plan, hence it has not been released yet due to a rapid re-plan. The change in focus is now very much on KI/CAS in support of the Army/MEF. You are surging to 18 sorties over a 22 hr period. Your tasking will be to find tanks etc … and kill them.

On the 20th, the OC Harrier Force South, Wing Commander Suddards, issued a statement of intent, which declared:

> Army Co-operation is in the 4 Sqn name but it is also imbued in 1 Sqn ethos. To do this difficult job well requires a full understanding of what the land units are trying to achieve and how best to assist them. It requires enormous flexibility, a keen ability to assess risks and benefits, and an affinity with those we are supporting. Army units get the rough, dirty, extremely scary end of the deal – our job is to both protect them and clear their path.

Nevertheless, the challenges involved were formidable. Over the next four days (21-24 March inclusive), Harrier Force South mounted 38 missions that typically comprised one TIALD/Paveway aircraft and one Maverick aircraft. Flying patterns varied slightly, but the limited availability of TIALD aircraft and pods ensured that they hardly ever put more than two pairs into the air at any one time. Missions were therefore flown throughout the day (although nominally in four waves), from the early hours through to late evening. Yet only 12 missions released weapons in this period. The targets were mainly vehicles, including tanks and Armoured Personnel Carriers (APCs), and artillery pieces around southern locations such as Basrah, Tallil and Nasiriyah; one attack was mounted on a revetted area near Najaf on the 23rd while another targeted artillery north of Hillah on the 24th – an illustration of the rapidity of V Corps' advance.

On the same day, the GR7s also attacked surface vessels in Basrah harbour, which were believed to be minelayers. Although this was one of the rare occasions when both imagery and target coordinates were made available to the pilots before take-off, the mission was still extremely taxing because the DMPIs were grouped around a 'no-strike' object, and the two aircraft had to make several passes at

27. ATO O was the ATO for 21 March – the first day of the air campaign.

10,000 ft to determine the correct targets and execute successful Maverick strikes against them.

Older and simpler than the GR4s, the Harriers were rather less prone to equipment unserviceabilities, but their relatively low strike rate reflected broadly the same problems with KI/CAS that the other detachments experienced. Typically, the GR7s would hold over southern Iraq in a 'stack' awaiting tasking from the responsible controlling agencies, which was only intermittently forthcoming. When they *were* tasked, problems repeatedly arose with target location, positive identification and clearance. The time absorbed by this process – from holding through to final clearance to attack – was regularly so protracted that aircraft were unable to strike Iraqi targets before running short of fuel. To quote Harrier Force South's record:

> The efficiency of the airborne coordination and allocation of assets was poor. The radios were extremely busy, the commcard[28] confusing and the ASOC and DASCs' ability to handle the weight of ac numbers limited. Consequently, the weapon expenditure rate was frustratingly low. As there was little onboard cueing, TIALD was of crucial importance … We were very much on our own in trying to find targets.

Unfortunately, the wing possessed only the four TIALD-capable aircraft (although the fifth pod arrived on the 20th), and TIALD often lacked the resolution necessary for positive identification of small tactical targets from medium level, in any case. In daylight, the GR7 pilots could also employ their gyro-stabilised binoculars, but the maximum effective altitude for their use was around 15,000 ft and their utility was limited at that height. For example, while they might help pilots to determine that a vehicle was military, they were not strong enough to allow identification of the type of vehicle under observation; moreover, their capability could be reduced even further by environmental factors, such as cloud cover or sandstorms.

After dark, pilots were restricted to NVGs or their TIALD or Maverick IR displays for target identification. It is thus not surprising that the GR7s regularly took the risk of descending to altitudes of between 5,000 and 8,000 ft in the hope of locating or positively identifying Iraqi forces. Like the GR4s, they found that GPS target coordinates were rarely available. Thus, although Harrier Force South

28. Commcard is an abbreviation of Communications Card, listing the frequencies assigned to different agencies.

was enlarged to 11 aircraft by the addition of an EPW II-capable GR7 on 22 March, it was only occasionally possible to employ the weapon in GPS mode. Moreover, when GPS coordinates *were* provided by tasking authorities, they frequently turned out to be inaccurate or were supplied in the wrong format.

Of the eight missions launched on A-Day that did not release weapons, only two were not actually tasked, but two more were unable to locate their allocated targets, and the weather precluded positive identification in two further instances. One pair received airborne tasking against an S-60 anti-aircraft gun in the Basrah area but then failed to establish communications with the appropriate controlling authority, and another blamed poor TIALD resolution for their late identification of a target, which again prevented weapon release.

On the 22nd, an absence of tasking or timely clearance to attack accounted for three missions, and two more were unable to achieve positive identification of assigned targets. Further communications problems with a controlling agency prevented one mission from locating a target, and poor weather conditions apparently stopped an attack in another instance. On the 23rd, three missions were sent by tasking agencies to revetted areas that turned out to be empty, a fourth was unable to find the allocated target, and a fifth could not positively identify the target, partly because of the weather and partly because of the limitations of the GR7's sensors. One mission did not receive tasking from a ground agency. On the 24th, two missions were untasked (in one instance partly because of communications failures), one was unable to locate its assigned target, and a fourth was frustrated by a combination of equipment unserviceabilities and delays obtaining target clearance.

Over the next two days, operations by Harrier Force South were largely prevented by the weather. Some nine missions were planned for the 25th but only two released weapons – against tanks, vehicles and a command post in the Basrah area. One mission was not tasked, and the remainder were frustrated by weather conditions or cancelled on the ground. On the 26th, a GR7 mission successfully attacked a TST – the Ba'ath Party headquarters at Zubayah (south of Baghdad) – with three EPW IIs released in GPS mode, but operations that day were otherwise a fiasco. Initially, at short notice, the ACHQ requested maximum support for a KI/CAS task in the Karbala area. The GR7s, which had previously been allocated to the support of 1 MEF, were therefore reassigned to V Corps and four pilots were at the out-brief when the CAOC announced that they would not be needed, as abundant assets were already available. The GR7s were then passed back to 1 MEF, who promptly requested a scramble. However, poor weather in the target area prevented two missions from releasing ordnance and a third was not tasked. Ultimately, five GR7 missions were cancelled on the ground that day.

Armourers waiting to load Maverick missiles on to a GR7 at Al Jaber.

One of the all-important TIALD-capable GR7s; the pod is visible to the right of the fuselage.

A GR7 and one of the Al Jaber Patriot batteries.

A GR7's IFF codes being carefully checked before take-off.

It was during this period that the use of alternate targets began, and AAR and ISTAR tracks were moved forward into southern Iraqi airspace (see above). These developments, together with rapidly improving weather, enabled all eight GR7 missions flown on 27 March to release weapons against fielded forces, armoured and other vehicles, and artillery, as well as fixed targets like ammunition depots and barracks. The target locations included Al Amarah and Al Kut to the east, and Karbala, Hillah and Diwaniyah – south of Baghdad. For the first time during the operation, the GR7s flew with unguided 540 lb bombs. They were not weapons of first choice but the GR7's maximum PGM load of two munitions left some carrying capacity available for non-precision ordnance. The 540 lb bombs were generally only used after the PGMs had been expended.

10. Tornado GR4 Operations, 28-31 March

By 28 March, a more-or-less formal pause in the ground offensive had been called; V Corps was strengthening its presence around Karbala, threatening Baghdad from the south, and 1 MEF was advancing on Al Kut, but both formations were still struggling to secure their lines of communication. At the same time, there were continuing reports of Iraqi Republican Guard divisions deploying to the south of Baghdad. The coalition had planned that ground operations against these divisions would begin on 29 March, and the CFC was allegedly determined to maintain or even accelerate this timetable. But the UK Chiefs of Staff were advised on the 28th that the date had been postponed, and it finally slipped back to the beginning of April to allow V Corps and 1 MEF to marshal their resources for the forthcoming battle.

Meanwhile, British ground forces were also employing a cautious approach towards the final capture of Basrah, occupying positions just outside the city, collecting intelligence, mounting periodic reconnaissance missions into the suburbs and opening a dialogue with sympathetic Iraqis in the area. This posture was not entirely to the liking of the Secretary of State for Defence, who expressed himself 'keen that we do not adopt a static approach to Basrah'.

However, given the forces available to the UKLCC and the anticipated strength of Iraqi resistance, there was little alternative. On 30 March, the Head of Sec (Iraq) at the MOD summarised Basrah's position in coalition strategy as follows:

US Commanders (General Franks and McKiernan)[29]

- Are clear that their main effort is Baghdad, and that they do not have the forces to fight on two fronts at once;
- Do not see Basrah as being of strategic significance;
- Do not believe the fall of Basrah would in itself improve the prospects for the fall of Baghdad;
- Judge the main priorities for UK Div as being the maintenance of control over the southern oilfields, the security of the lines of communication and the retention of Umm Qasr;
- Would not currently be prepared to provide additional forces for operations to secure entry into Basrah; and
- Are unlikely to review their position until after the planned major engagement with the Republican Guard forces, which may not take place for several days.

Yet the pause in ground operations did not have entirely negative consequences. On the contrary, it provided an unexpected and valuable opportunity for coalition air power to target Iraqi forces defending the southern approaches to Baghdad. The Iraqis attempted to establish layered, concentrated air defences to protect key formations like the Medina Division. One report records the deployment of units equipped with SA-18s, MSA-2s, Rolands and AAA, providing the capability to use so-called 'SAMbush' tactics. Yet their impact appears to have been limited. By the time the ground offensive resumed, the Iraqis had suffered such extensive attrition from the air that they could no longer offer significant opposition.

On 28 March, the Combat Air Wing executed their first Storm Shadow launches since the 22nd against cable switch banks at Taji and Taqaddum airfields. Two missiles were released against each target. Otherwise, the day was predominantly devoted to KI/CAS, and there were two more RAPTOR missions,

29. McKiernan was the Combined Forces Land Component Commander.

which covered 67 out of 68 POIs – predominantly south-east of Baghdad and along the River Tigris.

In the KI/CAS missions, the Combat Air Wing flew with the RBL755 cluster munition for the first time in Operation Telic. RBL755 was initially deployed by a formation of four GR4s, which received tasking from a US Predator against several Iraqi armoured vehicles along a tree line south of Diwaniyah. After a USN F-18 designated the target area with a phosphorous bomb, three of the four GR4s released RBL755s into the target area. Another mission received tasking against military equipment in berms near Iskandariyah, which was successfully executed by two aircraft with laser-guided EPW IIs.

A third mission was directed by an F-18 AFAC to attack an ammunition storage facility at Al Kut. After the failure of two attempts to strike the target with laser-guided EPW IIs (once because the designating aircraft was forced to take evasive action while the bomb was in flight), RBL755s were released over the area. The fourth mission involved four aircraft tasked as one element of a deep-strike package designed primarily to attack the 14th Mechanised Brigade of the Republican Guard Medina Division around Hillah, south of Baghdad. Although this task was chiefly assigned to Apache helicopters preceded by dedicated SEAD aircraft, fixed-wing ground-attack assets were positioned nearby. The Apaches were to pass targets of opportunity back to them via an AFAC, and the fixed-wing aircraft were also responsible for preventing the Iraqi brigade from dispersing to urban areas. Ultimately, one of the GR4s released EPW IIs against Iraqi armour and artillery.

The Al Udeid Wing's experience was again less satisfactory. While the original plan was to dispatch 16 aircraft against Iraq, only four ultimately released weapons. In the first mission of the day, two aircraft attacked Iraqi armour in a compound at a Republican Guard divisional headquarters near Suwayrah, using RBL755. Later, two aircraft were tasked against Iraqi supply vehicles in woodland north of Haswah (south-east of Baghdad) and dropped three EPW IIs. Of the remaining twelve sorties, five were lost to unserviceabilities, four air aborted because AAR was not available, and three were unable to obtain clearance to attack targets.

On 29 March, the Combat Air Wing mounted seven missions for some 20 sorties. Four aircraft were involved in another Storm Shadow attack, three carrying missiles. Of these, two (with two missiles each) were tasked against targets within the Baghdad Ministry of Defence, and one (with a single missile) targeted a switch bunker at Kirkuk airfield. Recent intelligence had apparently indicated that the Iraqi regime's communications were showing signs of significant degradation, and the Storm Shadow strikes were designed to accelerate this process. The wing

executed four other offensive missions and targeted artillery and accompanying vehicles in a compound near Nasiriyah, an armoured vehicle near Baghdad, and military equipment in revetments near Al Kut. In the final mission, four aircraft attacked a secondary target – a barracks at Shaykh Mazhar, south-east of Baghdad – using GPS-guided EPW IIs.

There were also three reconnaissance missions. The main areas of interest were the south-western approaches to Baghdad, Baghdad itself, and Numaniyah, on the Tigris. One pair covered 15 out of 22 POIs, the shortfall resulting from a potential SA-2 threat, and afterwards fulfilled further ad hoc tasking near Basrah for 1 UK Armoured Division. The other two missions covered 38 of 42 POIs despite further challenges from Iraqi GBAD.

The availability of the Shaykh Mazhar barracks and other secondary targets that day at last created more opportunities for the Al Udeid Wing. Some eight aircraft attacked ground targets, but not one strike was directed by a FAC. Using RBL755 and EPW II, four GR4s successfully bombed vehicles and a headquarters building at the barracks after finding that no KI/CAS tasking was available, and four more attacked the headquarters of a Special Republican Guard AAA unit, using EPW II. The wing also employed ALARM for the first time in Operation Telic near known SA-2 and SA-3 missile engagement zones.

On 30 March, the Combat Air Wing flew eight missions (four reconnaissance and four KI/CAS), but experienced one of its least rewarding days since the beginning of Operation Telic. Poor weather and equipment unserviceabilities prevented much of the RAPTOR tasking (planned to cover an area south of Baghdad) from being completed. The first and third pairs to fly did not cover any POIs, while the second only covered one (although it also fulfilled tasking in the Basrah area, presumably for 1 UK Armoured Division). The final mission completed most of its tasking before suffering a pod failure.

Of the offensive missions, the first involved the 2 Squadron crews primarily assigned to Counter-TBM,[30] who were briefed to transit to an area slightly north of Tallil for potential tasking around Samawah. However, before taking off, difficulties arose with the GR4s' GPS systems and EPW II bombs: the bombs gave out unserviceability readings and the aircraft systems refused to operate beyond civil GPS standards rather than the more accurate military standard. The problem

30. There had been no Counter-TBM tasking for the GR4s since the 25th, partly because of weather conditions and partly because AAR had been unavailable. In the absence of any clear and immediate Scud threat, the CFACC decided to relax Counter-TBM flying somewhat so that tankers could support other operations. He nevertheless expected more intensive Counter-TBM flying to be renewed as US ground forces closed on Baghdad.

was eventually solved, but this particular mission was flown with EPW IIs that were only capable of operating in laser-guided mode; they lacked the all-weather capability that EPW II normally provided.

Once airborne, the two GR4s found their intended tasking agency overwhelmed by the number of aircraft available, but they managed to obtain tasking from an ABCCC aircraft, which directed them to an area north of Hillah (south of Baghdad). The targets were described as BM-21 rocket launchers in an orchard, but it transpired that the Hillah area was covered by dense cloud. With GPS guidance, an attack might have been possible, but laser-guided bombing was out of the question. After two unsuccessful attempts to identify the target (involving descent below 10,000 ft and the deployment of flares and chaff) the GR4s ran short of fuel and returned to base. The other two GR4 missions that took off from Ali Al Salem held for two hours near Bagdad but did not receive any tasking. Another SAM threat forced one aircraft to jettison its weapons and under-wing tanks.

Predictably enough, the poor weather that so frustrated the Combat Air Wing's efforts on 30 March had a similar impact on the Al Udeid GR4 Wing. Although the wing planned another 16 sorties, only one aircraft released weapons against a secondary ground target south-east of Baghdad. Further EPW II strikes were again partly prevented by a lack of target coordinates. One squadron diarist recorded:

> Warhawk[31] again has no tasking for us and after another visit to the tanker the crews try Tropical[32] to see if the Marines need any help. Wg Cdr Poole and Flt Lt Housley and Flt Lt Coe and Sqn Ldr Humphreys are vectored over to the east of Iraq, where an artillery duel is raging. We are given a priority one tasking to take out some artillery pieces. When trying to get the co-ords for the EPW II it becomes clear that we will not be dropping, as they do not have any!

Difficulties also arose with the operation of ALARM that day. At first, the plan was to release ALARMs in 'direct mode' (using programmed coordinates) near a possible SA-2 site, in support of a USAF B-2 mission. There was, however, some potential for collateral damage, as the site was near to an Iraqi school. The legal adviser at the ACHQ maintained that the release could be sanctioned only if intelligence on the position of the SA-2 was sufficiently recent to support the

31. Warhawk was a US Army tasking agency.
32. Tropical was a USMC tasking agency.

reasonable belief that it had not been moved in the meantime. Furthermore, if ALARM was to be used in direct mode, he argued that it should be subject to the same target clearance processes that applied to other PGMs, as opposed to the processes that normally applied to ARMs (which provided for rather more delegation).

Discussions with the Al Udeid Wing then disclosed that the original intelligence report had referred to the presence of multiple-rocket AAA rather than SA-2s in the proposed target area, and so the ALARM release was not approved. The UKACC reversed this ruling the following day, but ALARM was not used again during Operation Telic. Indeed, it was never again employed operationally by the RAF.

The last day of March witnessed a further six Combat Air Wing missions. Improved weather allowed the reconnaissance aircraft to cover 53 out of 60 POIs around Nasiriyah, Numaniyah and the south-eastern approaches to Baghdad. The offensive tasks executed that day were also more successful. The first formation, assigned to KI/CAS, was directed by a FAC to a field south of Al Kut, where they attacked Iraqi artillery vehicles from the Republican Guard's Baghdad Division. Aircraft from the second mission, having reached their assigned kill-box, failed to contact any tasking agencies, but they ultimately identified and attacked armoured vehicles from the Iraqi 3rd Republican Guard Tank Regiment north of Baghdad. Apparently, they were being moved to reinforce the southern approaches to the city. The third mission was an attack on air defence headquarters buildings at Iskandariyah and a security force facility at Nasariyah, and the fourth similarly targeted two separate sites, including the Shaykh Mazhar barracks. The records state that both formations of four aircraft released their EPW II bombs successfully using both GPS and laser guidance.

Unfortunately, the same degree of success once more eluded the Al Udeid Wing: only two aircraft released weapons – against a compound containing military vehicles south-east of Baghdad – and several missions were aborted because of unserviceabilities. Between 27 and 31 March (inclusive) the Al Udeid GR4 Wing planned some 74 offensive sorties, which resulted in only 20 weapon releases (27 per cent). Since the beginning of KI/CAS operations on 23 March, 122 planned sorties had led to just 24 weapon releases (20 per cent). Of these, only a handful had taken place through the application of Type 1, 2 or 3 CAS procedures. The majority of successful attacks had been directed against alternate and predominantly static targets.

11. Harrier Force South Operations, 28-31 March

The more intensive tasking levels first achieved by Harrier Force South on 27 March continued over the following days. From 28 to 31 March (inclusive) the wing planned another 38 missions (76 sorties), and weapons were released by 24 of the missions flown (32 sorties) – double the strike rate achieved on the first four days of the air campaign. Apart from the improved weather, two particular factors probably explain the increase. First, although operations in support of V Corps continued (and despite discussions with the ASOC intended to streamline tactics and procedures) the Harrier pilots quickly learnt that they were more likely to receive tasking from the 1 MEF DASCs. The personnel of the Marine Corps' Tactical Air Control Centre, which was located at Al Jaber, may perhaps have helped by supplying useful advice on working with the DASCs.

Second, the wing succeeded in obtaining more alternate targets, which were regularly attacked if no dynamic KI/CAS tasking was available. Their Mission Support Cell (MSC), with assistance from the DOB Intelligence Cell, expended considerable efforts on identifying secondary targets. This involved careful study of future ATOs to establish the location of assigned kill-boxes, and close liaison with the 1 MEF Deep Strike Cell – also conveniently based at Al Jaber. If the location of possible targets was confirmed by the Deep Strike Cell, the OC MSC (who was also the 4 Squadron GLO) would attempt to match the information with any available imagery of the areas concerned. If the secondary targets were fixed, he could also clear the Collateral Damage Estimate (CDE) with the CAOC, so relieving the pilots of this responsibility.

Alternate targets were also identified by 1 UK Armoured Division's Air Cell. At least two Iraqi divisions to the north of Basrah had been bypassed by the main coalition advance and continued to threaten British forces around the city. At first, these formations were not attacked from the air because of the priority attached to the V Corps and 1 MEF offensives; however, after a few days, they were assigned as alternate targets to aircraft that had not been tasked further north and were returning to base with unexpended ordnance.

On 28 March, Harrier Force South mounted 10 missions, half of which attacked the usual array of ground targets, as well as the Shaykh Mazhar barracks. In the final mission that day, a pair of GR7s was included in the deep-strike package that targeted the Medina Division's 14th Mechanised Brigade (see above) and released PW II, Maverick and RBL755 munitions against Iraqi tanks. No targets were available for two other missions, and the remaining three were frustrated by a combination of airspace congestion and communication problems.

On the 29th, there were nine planned missions, but this figure was reduced to eight when one pilot air aborted with a Zeus (ECM) failure and his wingman joined another pair. Six missions released weapons, four against fixed targets – a military assembly area at Al Amarah, a compound near Hillah, and POL storage facilities near Karbala. Artillery located to the north of Basrah was also attacked. One mission air aborted with the second Zeus failure of the day, and another was unable to locate any targets.

On the 30th, nine missions were planned and five ultimately attacked Iraqi forces. However, of these, it is possible that only one was actually tasked with KI/CAS in support of the main offensive – a strike on military vehicles to the west of Baghdad. Three formations bombed Iraqi targets to the north of Basrah – vehicles and a Frog 7 missile site – and there was also an attack on a television tower at Samawah. Of the remaining missions, one was flown in direct support of 40 Commando near Basrah but was not called on to intervene, one was thwarted by another Zeus failure, and there were no targets for two others.

The next day, nine missions were planned. Yet another Zeus unserviceability reduced the total to eight, with one formation comprising three aircraft, but a further mission (which did not feature on the ATO) was flown in response to another short-notice request for support from 40 Commando. Seven missions released ordnance. The pilots who supported 40 Commando achieved a 70-minute 'bed-to-airborne' time only to hold for 45 minutes due to a breakdown in communications between units on the ground, who were at first unaware that their late request for air support had been fulfilled. Ultimately, one of the two GR7s attacked fielded forces to the east of Basrah, hitting a road junction and an armoured vehicle with two PW IIs.

Of the other missions, it appears that only one was tasked by the V Corps ASOC (against a tank near Hillah). Five others attacked tanks and military vehicles between Basrah and Al Amarah, away from the main axes of advance, and two attacked alternate targets comprising barracks and storage buildings in the Ramadi area. Two missions could not to positively identify targets and did not release any weapons.

12. Tornado GR4 Operations, 1-6 April

The final three days of March witnessed 24-hour air operations against Iraqi forces south of Baghdad; from 29 to 31 March, more than 70 per cent of all coalition air sorties were flown in support of the CFLCC. Four Republican Guard divisions – Medina, Baghdad, Hammurabi and Al Nida – were relentlessly attacked. Although the RAF detachments experienced mixed fortunes in this period, the overall impact

on Iraq's most capable ground formations was considerable. CENTCOM calculated that the Medina division had been reduced to around 30 per cent of its original strength since the beginning of the air campaign, while the Hammurabi was down to just 23 per cent. The precise figures may never be known. Nevertheless, by the actual attrition inflicted and by preventing assembly, movement, reinforcement and supply, coalition air power rendered the Republican Guard and other formations south of Baghdad incapable of effective resistance. The 1 MEF offensive south-east of the city began on 1 April (with continuing large-scale air support), and V Corps' attack commenced the next day. On the 3rd, PJHQ's VTC with the NCHQ recorded their progress with evident satisfaction and some surprise:

> Very successful day in rate of closure to southern outskirts of Baghdad. Question is where has the enemy gone? It is not certain if they have withdrawn, been destroyed or deserted. Probably a combination of all three.

The next day, the UK Chiefs of Staff were advised that 'The RG resistance around the city had melted away.' The anticipated set-piece battle with the Republican Guard failed to materialise.

Operation Horseshoe, the CFACC's DEAD campaign, was also making progress. In fact, by this time, the CFACC had started to suspect that the capability of the Super-MEZ had been overestimated by coalition intelligence, for the Iraqi IADS had rarely presented much direct threat to the many aircraft that had been tasked over the Baghdad area. By 31 March he was referring to Baghdad and its environs as a 'threat area' rather than a MEZ, although the ACHQ view was not quite so optimistic. On that day, some 38 air defence weapons or radars were destroyed; by 2 April, as the Chiefs of Staff noted, 'The air defence system was beginning to show signs of significant degradation.' The number of operational strategic SAMs was now assessed at between 20 and 35, and there was 'increasing evidence of EW cover being degraded over Baghdad'. The number of surface-to-air missile firings, which had averaged around 175 per day since 19 March, suddenly slumped to about 75 on 4 April and declined rapidly thereafter.

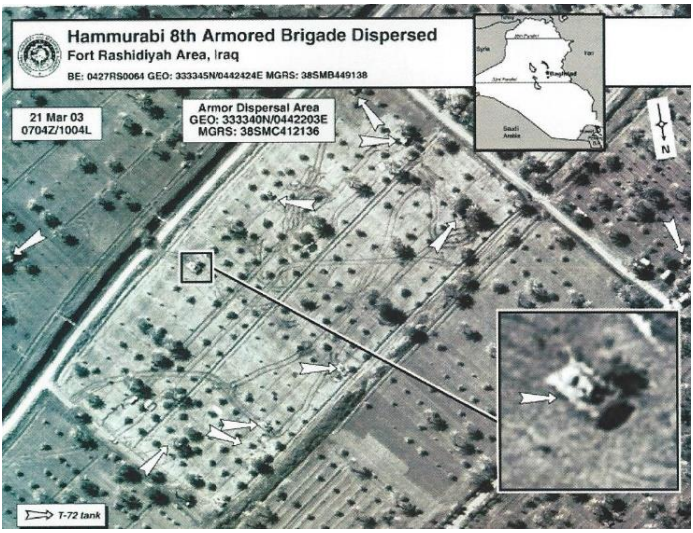
By 29 March, the V Corps ASOC had moved north to Tallil, in southern Iraq, to improve communications with forward areas. Nevertheless, despite what the UKACC referred to as 'process improvements in KI/CAS', things were still 'far from perfect'. Over the course of 30 and 31 March, he visited Ali Al Salem, Al Jaber and Al Udeid, and found the GR4 and GR7 detachments 'frustrated by the

execution of KI/CAS missions'. On 1 April, he convened an operations and tactics seminar on KI/CAS at the ACHQ and recorded:

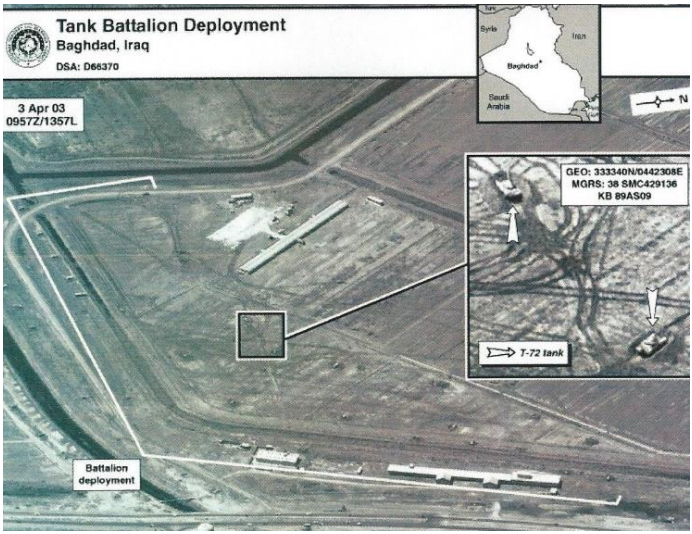
> The areas that require particular attention are communications (aircraft are frequently passed to 10-15 different agencies before reaching the correct controller),[33] the V Corp ASOC's performance, availability of kill-box imagery and the prioritisation and flow of aircraft between the MEF and V Corps, and individual kill-boxes. We also need to sharpen up the ISR process so that imagery from the likes of RAPTOR and PR-9 is rapidly exploited for TST and dynamic tasking. At the moment, far too much time is lost in the ISRD,[34] when a simple phone call from the detachment to the CAOC floor could at the very least direct aircraft into areas of known military activity.

Combat Air Wing operations in April began with another reasonably successful day, most aircraft releasing weapons against Iraqi ground forces, including Republican Guard armour and vehicles; several secondary targets were also attacked. The regulations regarding singletons had by this time been relaxed. Therefore, when one GR4 from the final pair aborted with an unserviceable Skyshadow pod, the other continued alone and eventually received tasking from a ground agency against two tracked vehicles. These were duly located, but it appeared on closer inspection (using the TIALD pod) that they were wheeled rather than tracked, so the crew opted not to attack. They were then re-tasked under the direction of an AFAC against a communications vehicle, which they destroyed with a single PW II despite a considerable barrage of AAA in the target area. Otherwise, two reconnaissance missions were largely tasked to the south of Baghdad and covered all their tasked POIs with SEAD support from USAF F-16s. It subsequently transpired that the second mission had largely imaged an area already occupied by coalition troops – a reflection of their rapid progress and the difficulties involved in coordinating airborne ISR activity with the ground offensive.

33. It is not clear whether this means that aircraft were actually being directed to so many different agencies or whether crews were themselves switching between agencies in the search for tasking. Experience had already taught many aircrew to 'tout for trade' across the various agencies when tasking was not initially forthcoming.
34. ISRD – the Intelligence, Surveillance and Reconnaissance Division of the CAOC.



The Iraqis began dispersing their armour as soon as hostilities began to reduce its vulnerability to air attack.



Republican Guard divisions were observed from the air as they deployed to defend the Iraqi capital.

The Al Udeid Wing meanwhile experienced a more successful day, striking an array of tactical targets south-east of Baghdad using PW II and RBL755. The first mission, sent to a kill-box, apparently spotted targets without the assistance of a FAC; the second mission operated under the direction of a USAF F-15E, which was functioning as SCAR commander.

On 2 April, the practice of dispatching KI/CAS missions with planned alternate targets was suspended for two reasons. First, the instantaneous fuze settings normally employed for KI/CAS were often inappropriate for fixed targets, such as buildings. Second, although all the secondary targets selected met the requirements of coalition Targeting Directives, their destruction was of declining military value; indeed, there were strong arguments for leaving facilities such as barracks intact for use by coalition troops in subsequent stabilisation operations.

In the offensive missions that day, the Combat Air Wing was again substantially tasked with KI/CAS to the south of Baghdad. Although several aircraft were not allocated targets, others struck Iraqi armour as well as a generator building at a Republican Guard barracks at Ramadi. The GR4s also also hit tactical targets in revetments north of Basrah. The presence of a residual Iraqi air defence threat was again underlined during one of the Basrah missions, when two aircraft were forced into evasive manoeuvres by an incoming SA-9. Three reconnaissance missions were flown to the south and west of the Iraqi capital and achieved full coverage of their 60 POIs. All three missions executed additional tasking for 1 UK Armoured Division.

Again, the Al Udeid Wing was less fortunate, executing just two attacks against Iraqi military vehicles in a complex east of Baghdad. Unserviceabilities forced five aircraft to abort their missions, three were tasked over central Baghdad but were unable to identify targets because of an Iraqi smokescreen, and the remaining two aircraft returned to base after jettisoning their under-wing tanks while evading a SAM attack.

Target identification problems and SAM threats were beyond the wing's control, but the GR4's poor serviceability rate at Al Udeid was a major cause of concern. Two particular factors were responsible. First, the wing was attempting to mount 12 sorties per day with 12 aircraft, and each sortie was, on average, about five hours long because of Al Udeid's southerly location. Inevitably, such intensive flying over long distances imposed a considerable burden on both aircraft and engineers. Second, the GR4 ramp occupied an exposed area of the base, where there were no shelters or sunshades to protect aircraft from the elements. Sand and dust ingress posed major problems, but heat-related equipment failures were equally troublesome. Direct sunlight and ambient temperatures reaching 40 degrees centigrade took their toll on some of the GR4's more sensitive

systems, and crews were instructed to keep the more troublesome equipment switched off until they crossed the Iraqi border.

The next day, the Combat Air Wing generated another 10 missions. The three reconnaissance pairs covered 55 out of 56 POIs (which reportedly included 'SAM sites, terrorist facilities and barracks') to provide imagery for SF and BDA for Storm Shadow strikes, and one pair again executed additional tasking for 1 UK Armoured Division. Four of the five offensive missions involved KI/CAS in the Baghdad area against fielded forces, military vehicles, and ISO containers, which were targeted with the help of both airborne and ground FACs. The fifth mission was a straightforward attack to crater the runway at Tikrit airfield, which was apparently still usable at that time; four GR4s were involved, armed with EPW II. A BDA report stated afterwards that 'The airfield is assessed as being unserviceable to fixed-wing aircraft as there are no longer any unobstructed or uncratered major operating surfaces over 700 metres in length.'[35]

The other two missions flown on the 3rd involved Counter-TBM over the western Iraqi desert. An aircraft from the first pair was forced to return to base with an air conditioning failure, so all the planned POIs were covered by a single GR4, which refuelled four times. Subsequently, another low oil pressure warning compelled the crew shut down their starboard engine in accordance with standard emergency procedures, and they recovered to Ali Al Salem on the port engine alone. This was the second such engine failure to occur during a Counter-TBM mission and once again illustrated the demanding nature of the operational task. The Al Udeid Wing meanwhile executed attacks on Iraqi targets at Taji airfield and bombed military equipment in berms and in the open to the north-east of Baghdad under SCAR direction.

As V Corps and 1 MEF closed on Baghdad and Iraqi resistance crumbled, the coalition air forces were confronted by the prospect of the FSCL being extended north of the Iraqi capital and with virtually all fires short of this line having to be coordinated and controlled. Baghdad was carefully mapped and divided into zones; each zone was then sub-divided into sectors, and GPS coordinates were produced for every building. The tactics appropriate for Urban CAS over Baghdad now became the focus of attention for both the GR4 and GR7 detachments.

35. The documents do not identify any specific risks associated with Tikrit airfield at this time. The CFACC was clearly still intent on eliminating any residual threat from the Iraqi Air Force in early April, but there were also concerns to the effect that the Iraqis might use conventional aircraft to deliver chemical or other munitions in suicide attacks. On the other hand, Tikrit was Saddam Hussein's home town and a regime stronghold, and it may therefore have been considered advantageous to impede Iraqi movement to or from the area.

At the same time, the UKACC became concerned that the procedures formulated to manage the flow of aircraft into the restricted battlespace would not sufficiently address the increased risk of blue-on-blue engagements, mid-air collisions and collateral damage. This latter problem was particularly worrying because the smallest PGM in the UK inventory was the 1,000 lb PW/EPW II. Although this could be very accurately released against a single building, the subsequent explosion seemed likely to cause at least some damage beyond the immediate boundaries of the target. In short, PW/EPW II was not especially suitable for employment in an urban environment. The search for a prompt solution led to proposals for using inert bombs, and the ACHQ submitted a request for these weapons as a matter of the highest priority on 3 April.[36]

The following day, the Combat Air Wing employed its full range of capabilities for the last time: 11 missions were divided between RAPTOR (2), Storm Shadow (1), Counter-TBM (2) and KI/CAS (6). The two reconnaissance missions covered 37 out of 42 POIs south and west of Baghdad, one pair missing three POIs after taking evasive action in response to a SAM threat. Some of the imagery revealed Iraqi military vehicles, which were soon afterwards attacked by US aircraft. The Storm Shadow mission targeted a SIGINT substation in Baghdad and a cable switch bunker at Kirkuk airfield. After transiting to a release point in the western desert, the GR4s duly launched three missiles. There were no encounters with Iraqi GBAD, but they experienced numerous radar indications on their RHWRs, and US Patriot systems caused particular concern by repeatedly illuminating the formation. Despite the various changes in ROE and operating procedures, the previous day had witnessed a second Patriot blue-on-blue, this time involving a USN F/A-18, which had allegedly been misidentified as a TBM while flying at only 505 kts.[37] After the final GR4A Counter-TBM missions of

36. As a matter of historical record, it should be noted here that inert bombs have in the past demonstrated a tendency to bounce unpredictably on impact in a manner which could itself produce collateral effects. This was not appreciated in theatre and did not in the event become an issue during Operation Telic.

37. The published summary of CENTCOM's investigation into the shoot-down (released in December 2004) stated that a Patriot missile battery mistakenly identified the plane as an Iraqi SSM (not an ARM) and notified the relevant air defence headquarters, which also mistakenly designated the flight path of the F/A-18 as a missile track. Seconds later, another Patriot battery located closer to the front line also detected the aircraft and also mistakenly determined that it was a missile. The second battery decided that it was the missile's target, together with the military unit it was defending. Operators at the two batteries and at the headquarters were reportedly 'confident that they were all detecting the same hostile missile, that their detection was accurate, and that this missile was a direct threat to US

Operation Telic were flown that day, some of the aircrew previously engaged in Storm Shadow, Counter-TBM and ALARM tasking were trained to use RAPTOR and incorporated into the cadre of aircrew assigned to reconnaissance.

Of the KI/CAS missions on the 4th, one pair was not tasked but the others successfully attacked a range of tactical targets south of Baghdad with PW IIs. The final mission recorded significant surface-to-air fire over Baghdad, including up to 30 ballistic missile launches, but this would prove to be the final flourish of the Iraqi IADS. Six of the GR4s launched by the Al Udeid Wing released weapons against artillery, armour and fielded forces around the Iraqi capital, mainly under GFAC or AFAC direction. A single formation tasked both to the south and west of Baghdad refuelled three times to reach the two target areas, both aircraft taking on 16 tonnes of fuel while airborne.

On 5 April, Combat Air Wing tasking was confined to reconnaissance and KI/CAS in the Baghdad area. Serviceability problems with the RAPTOR pod caused by rising ambient temperatures resulted in both reconnaissance missions being flown by single aircraft but all the assigned POIs were covered, as well as separate tasking for 1 UK Armoured Division and some impromptu BDA for another formation. The KI/CAS missions were flown by eight pairs, and nine aircraft ultimately struck a range of Iraqi tactical targets. The Al Udeid Wing GR4s executed three strikes within the Abu Hayyah barracks north of Basrah.

That day, the 3rd US Infantry Division (part of V Corps) captured Baghdad International Airport (formerly Saddam International Airport) and made their first incursions into the south-west of the city, encountering only limited opposition. Their experience was completely at odds with prior intelligence assessments and other predictions, which had anticipated that Saddam would pursue a so-called 'fortress Baghdad' strategy. Between them, V Corps and 1 MEF now extended a cordon around the west, south and east of the Iraqi capital. By the 8th, all routes out of Baghdad had been secured and the outer cordon was effectively in place. In the meantime, elements of the 3rd Division mounted a raid into the city centre,

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forces'. In this instance, the headquarters ordered the missile launch from the forward battery; the launch was not autonomous, as the launch against the RAF GR4 had been. The summary did not explain how or why the Patriot operators mistook the radar signature of the aircraft for that of a much faster missile, but the forward location of the battery would have left them with little time to retrieve or scrutinise amplification data before taking the decision to fire. The US Department of Defense unclassified Report of the Defense Science Board Task Force on Patriot System Performance (January 2005), also refers to the fratricide incidents. Its statement that 'Our combat identification capability embodied in the Mode IV IFF system performed very poorly' would seem to imply that the F/A-18, like the GR4, was not squawking Mode IV IFF at the time of its misidentification.

and a lack of serious resistance then persuaded the divisional commander that they should remain there.

From the air perspective, tasking over Baghdad now declined considerably; the UKACC stressed the importance of managing aircrew expectations accordingly. Yet coalition operations in northern Iraq were now intensified. On the ground, they had started on 26 March, when 954 paratroops from 173 Airborne Brigade were dropped on to Bashur Airfield; further elements of the brigade were airlifted into Bashur in the following days. Coalition SF were also infiltrated – the so-called Joint Special Operations Task Force North (JSOTF-N) – partly to link up with Kurdish forces in the Kurdish Autonomous Zone. Coalition aims in the north remained consistent. The objectives were to safeguard Iraq's oil fields around Kirkuk, uphold her territorial integrity (not least by preventing precipitate action by the Kurds) and further her military defeat. This was to be achieved partly by preventing forces in northern Iraq from reinforcing Baghdad or its southern approaches and partly by conducting both kinetic and information operations against those forces, either to destroy them or persuade them to surrender. Tactics were crude but logical, involving demonstrations of coalition firepower followed up by mass leafleting and attempts by SF to open negotiations with Iraqi commanders.

As the airborne and SF units lacked heavy weapons, they were largely dependent on air power for fire support, which was consistently provided by the USAF and USN. B-52s performed immense leafleting drops over fielded Iraqi forces, calling on them to lay down their arms. The CFACC also decided to target Tikrit from the air independently. As the city was Saddam Hussein's spiritual home and a base for other members of his government, he argued that these strikes would signify to the Iraqi people and members of the armed forces the coalition's determination to remove the regime. Hence, as air tasking in support of V Corps and 1 MEF began to slacken, operations over northern Iraq gathered momentum. Approximately 29 per cent of the air effort in the 5 April ATO was assigned to the north.

This change of emphasis produced a limited amount of additional tasking for the RAF detachments. On 6 April, the Combat Air Wing executed four KI/CAS missions in the Baghdad area, but there were also three interdiction missions around Tikrit. One of these targeted a Frog-7 SSM storage facility near the city itself. The others struck barracks complex in the town of Ad Dawr, which was linked by coalition intelligence to regime-controlled paramilitary forces. The aircraft carried pre-determined GPS coordinates for these buildings and were therefore able to employ EPW II in GPS mode, which was fortunate as at least one pair found the target area obscured by cloud.

GR4s parked in the open at Al Udeid during Operation Telic.

Of the four pairs tasked with KI/CAS, only two aircraft released weapons. One destroyed what was described as a TST in Batra Ul military complex, while the other – under the direction of a ground tasking agency – targeted a tower or crane at the Abu Ghurayb presidential building. An aircraft from the second KI/CAS formation suffered an engine failure north of Baghdad and jettisoned stores and under-wing tanks before limping back to Ali Al Salem. The two reconnaissance missions were originally tasked over Baghdad and to the south and west of the city, but one was reassigned to northern Iraq while airborne; all 30 POIs were covered. Only one serviceable GR4 was available for the other mission, which lost some POIs because of poor weather in central Iraq, but the aircraft successfully captured additional imagery for 1 UK Armoured Division in the south. Of the 10 aircraft launched by the Al Udeid Wing, six released weapons against the usual array of tactical targets at locations to the south and north-west of Baghdad. They also executed a further strike on the Tikrit airfield runway, which the CFACC was determined to keep closed.

13. Harrier Force South Operations, 1-6 April

At the beginning of April, a major problem confronted Harrier Force South: their four heavily tasked TIALD-capable aircraft became due for scheduled maintenance. This involved grounding each of the wing's most valuable assets for a period of three days. Clearly, it would be extremely difficult in these circumstances to maintain the established practice of generating at least one TIALD aircraft for virtually every mission launched. Provision existed for delaying certain maintenance tasks through the issue of a so-called Contingency Operations Engineering Authority, which the wing now sought, but HQ STC refused their request despite considerable argument. On both 1 and 2 April, two non-TIALD missions actually flew, but heroic efforts by the wing engineers afterwards ensured that all GR7 pairs continued to include at least one TIALD-capable asset. On 9 April, an additional TIALD GR7 and a sixth pod arrived at Al Jaber.

As with the GR4 wings, Harrier Force South continued to experience regular tasking during the first days of April, after which there was a sharp reduction as US ground forces tightened their grip on Baghdad and the number of alternate targets fell. On 1 April, the nine planned missions were ultimately reduced by unserviceabilities to seven, five of which released weapons. Three missions executed attacks in support of V Corps west and south-west of Baghdad, but two of these involved alternate targets. In one instance – late in the evening – two PW IIs were dropped by GR7 ZG479 on buildings in a military compound near Ramadi, but no explosions were observed. The other two formations were once again employed against Iraqi forces north-west of Basrah.

The next day, of nine missions flown, six released munitions. The first involved time-sensitive tasking against a SIGINT building in Basrah and required two TIALD/PW aircraft. Immediately after landing from its previous mission, ZG479 was therefore turned around and reloaded; by the time the pilot (the OC Harrier Force South) had been debriefed and the failure of his weapons to detonate had been confirmed, ZG479 was once more in the process of launching. Again, the two PW IIs released on to the target failed to explode. Fortunately, the second aircraft then destroyed the roof of the building and the all-important SIGINT antenna with another PW II. Afterwards, the GR7s executed a further attack on Iraqi military vehicles north of Basrah using unguided 540 lb bombs. Two more missions were flown against ground targets between Basrah and Al Amarah that day and there were two attacks on Iraqi ground forces further to the north-west, one in Najaf in support of V Corps and one east of Baghdad for 1 MEF.

Harrier Force South mounted only two missions on 3 April to complete tasking for the 2 April ATO. The first did not locate any targets, but the second bombed three suspected Ababil 100 missile sites south-west of Basrah. One aircraft dropped RBL755s, while the other (ZD437) released two PW IIs, which again failed to detonate. Otherwise, 3 April was a 'down' day. The wing engineering personnel had been working flat out in steadily increasing temperatures (and without air conditioning) to maintain a flying rate of 18 sorties per day with 11 aircraft, which typically included at least nine sorties per day with the four TIALD aircraft, and they clearly needed a break. The Harrier Force South Form 540 records:

> All work stopped including the Primary Star programme. This gave personnel a well-needed rest from the bombing period, where a constant 12hr shift rotation was in force. Personnel were intensely worked and on their last legs. On a general basis people slept most of the 24hrs off to catch up on the sleep deficit. No entertainment programme was required!

On 4 April, Harrier Force South mounted eight missions, five of which attacked Iraqi targets. On three occasions, the GR7s received KI/CAS tasking, twice in support of 1 MEF; there was another attack on ground forces near Al Amarah, and one mission destroyed part of the Ba'ath Party headquarters at Shatrah, well to the south, using two PW IIs. ZG479 participated in the strike on the Ba'ath Party headquarters without any recurrence of the earlier PW II problems. However, in the only KI/CAS attack executed in support of V Corps that day, its first PW II – aimed at Iraqi tanks – did not explode. The aircraft would not participate in another mission until 10 April.

The problems with PW II were comprehensively investigated, but it proved impossible to replicate the failure involving ZG479 on the ground. The wing engineers thoroughly checked the weapons stations and the stores management computer and performed a complete functional system test, and the aircraft once again released munitions successfully towards the end of the operation. Where ZD437 was concerned, one bomb was found to have dropped without arming due to a failure of the fusing unit on the launcher, while the other had not detonated either because of a loading error or because one of the bomb's components had malfunctioned.

On 5 April, as V Corps and 1 MEF closed on Baghdad, the Harrier Force South strike rate declined significantly. Of the nine missions launched, only one attacked ground targets, employing PW II and Maverick against six Iraqi vehicles in a

compound north of Baghdad. Six missions were completed the next day but just three aircraft were tasked against ground targets. The GR7s struck artillery near Hillah, presumably in support of V Corps, and demolished a guardhouse building east of Basrah for British ground forces.

14. Tornado GR4 Operations, 7-15 April

A combination of poor weather and reduced tasking made 7 April the Combat Air Wing's least productive day since 30 March. The four KI/CAS missions were notable chiefly because they involved the wing's first carriage of inert (concrete-filled) EPW II bombs, although only one mission was tasked against targets – two clay buildings occupied by Iraqi troops. The weapons were dropped accurately, but the GFAC was not satisfied and called in a second strike with conventional high explosive. The reconnaissance missions were tasked over southern Iraq but were substantially thwarted by cloud cover. One was flown over Basrah in support of 1 UK Armoured Division, which had finally entered the city the previous day without encountering significant resistance, while the other imaged five points along the Tigris and Euphrates rivers.

The Al Udeid Wing was, for once, more successful and attacked five targets under GFAC direction. They apparently overcame the worst effects of the weather through a combination of patience, AAR and occasional descents beneath the cloud. After a considerable delay awaiting GPS coordinates, one GR4 bombed Iraqi ground positions in central Baghdad, and two more destroyed a bridge north-west of the city. Another pair successfully targeted headquarters buildings at Hillah.

On 8 April, the Combat Air Wing mounted eight KI/CAS missions, but only one aircraft released weapons against buildings and compounds to the south of Baghdad. One attack was aborted at the last moment after the target area was overrun by US ground troops. The two reconnaissance missions were assigned broadly to the same locations covered on the previous day, although the second mission was also sent to the Al Faw peninsula, south-east of Basrah. The Basrah mission was again hampered by poor weather, but one of the GR4s obtained imagery of a single top-priority POI by descending to 10,000 ft. The second mission covered all 23 of its assigned POIs. Meanwhile, the Al Udeid Wing launched 10 aircraft but did not attack any targets.

On the ground, 9 April was the most dramatic day of Operation Telic – the day that the 3rd US Infantry Division and the 1st Marine Division converged on central Baghdad, the Marines helping Iraqi civilians to destroy Saddam Hussein's statue in Shahid Square. A PJHQ operational summary declared, with some

understatement, that there was 'now strong evidence of regime collapse in the capital'. Resistance east of the Tigris virtually ceased, although there was still some fighting to the west. Air tasking declined still further. Indeed, the entire basis of coalition targeting began to change, moving away from so-called 'target sets' and towards an approach that considered each target on its merits, as defined by the latest intelligence and threat assessments. In practice, this tended to mean Iraqi regime leaders, the irregular forces still supporting them, the few instruments of control still exercised by the regime, and Iraqi regular forces who posed an immediate threat to coalition forces.

The Combat Air Wing mounted six offensive missions that day, and the few tasked aircraft destroyed a tank, an artillery vehicle, and a building occupied by Iraqi troops, who were firing on US forces nearby. In this latter instance, both the complexity of KI/CAS techniques and the inherent flexibility of EPW II were evident once more. The GFAC assured the aircrew that the GPS coordinates supplied for the target were accurate but also warned that friendly forces were 700 metres north and south of the position. In the event, the GPS-guided weapon missed its target by 30 feet. The GR4 then executed a second attack using laser guidance and destroyed the building. Of the two RAPTOR missions, one was completely abortive due to unserviceabilities, and the other was hampered by poor weather over Baghdad. However, conditions were better elsewhere, and 24 out of 36 POIs were ultimately photographed. The Al Udeid Wing attacked tactical targets of opportunity in an open kill-box north-west of Baghdad, executed KI/CAS tasking against tanks to the west of the city, and bombed an intelligence facility near Al Kut in support of 1 MEF.

There is a possibility that some GR4s were not assigned targets on 9 April because tasking authorities were doubtful about the utility of inert EPW IIs. One officer from the Combat Air Wing recorded that 'The idea of using inert bombs has receded, mainly because the troops on the ground prefer a "bigger bang" than that provided by blocks of concrete and were avoiding using the Tornados in favour of US aircraft.' Consequently, the GR4s that took off from Ali Al Salem on the 10th flew in pairs and carried two live EPW IIs with instantaneous fuzes (for attacking vehicles, fielded forces and smaller fixed targets) and two with post-impact fuzing, suitable for larger buildings. The result was a marked increase in tasking. The targets – in Baghdad or north-west of the city – were mainly military vehicles, although one GR4 also destroyed an SA-13. Two reconnaissance missions were flown between Baghdad and Tikrit and covered 54 out of 59 POIs.

The northern cities of Mosul and Kirkuk fell, many of the Iraqi troops still under arms capitulated, and IADS activity ceased. Coalition air reconnaissance continued, but the requirement for offensive air power declined to minimal

proportions, only occasional strikes being requested against tactical targets. In one instance on the 11th, an Al Udeid GR4 pair was passed by a controlling agency to a GFAC working with V Corps engineers. To quote the mission record:

> The ground troops were in a town called As Samawah, trying to clear a bridge of civilians. It became clear that the Iraqis had wired the bridge with explosives and possibly chemicals. The flight was asked for a low fly through to disperse the civilians as the troops had had no luck in this task. After several high passes it was clear a low pass was needed, so to limit risk to the aircraft from small arms and handheld SAMs only [Madras] 63 went below 10,000'. Indeed, two fly throughs were conducted at 100' and 600 Knots. The ground controllers indicated they were great passes and that the crowd had dissipated!

At the time, such tactics were unusual, but such Shows of Force (SOFs) would become very familiar in Iraq in later years.

Two more GR4s (call-sign Throat) were directed by a Predator to target a SAM radar near Tikrit. One aircraft dropped a laser-guided EPW II, but it landed 800 ft short due to a TIALD pod failure. According to 12 Squadron's record of the incident, 'The "pilot" of the Predator, from a bunker on the east coast of America, then informed Throat that the RPAS could designate a second bomb. This they duly did, and the radar was destroyed! This was the first operational co-operative LGB attack between a Tornado and a Predator.' It was perhaps appropriate that the Al Udeid Wing's final weapon release of Operation Telic should have offered a glimpse of one means by which offensive air strikes would be executed in future.

After 11 April, the Combat Air Wing's part in Operation Telic did not immediately end, but the 25 offensive missions launched from Ali Al Salem between the 12th and the 15th resulted in only two further strikes on ground targets and a few more SOFs, when low-flying aircraft using afterburners and flares were employed to disperse crowds.

Tactical air reconnaissance continued at a rate of two missions per day, focusing particularly on the north and west of Baghdad, Kirkuk and Tikrit, yet RAPTOR imagery was now primarily required to support the next phase of Telic – stabilisation, and governmental and economic reconstruction. The basic objectives of the coalition offensive launched by the CFC on 20 March had been achieved: organised Iraqi resistance had ended, and Saddam Hussein's regime had been overthrown. On 16 April, the wing had its first 'down' day since the start of the air campaign, and the 617 Squadron Storm Shadow team was withdrawn to the

UK. So began a more general repatriation process that saw the entire wing replaced by 13 Squadron by the end of the month.

For the Al Udeid Wing, the story was much the same. Between 12 and 15 April, the wing maintained operational flying, but it was largely uneventful. Repatriation started on the 14th, the wing flew its final Telic mission on the 18th, and their GR4s returned to Lossiemouth on the 22nd. The majority of ground personnel followed on the 25th.

15. Harrier Force South Operations, 7-14 April

Between 7 and 14 April, Harrier Force South planned a further 55 missions. Of the 42 offensive missions planned, 37 were flown and 14 released munitions. However, from the 9th, the wing also mounted tactical reconnaissance operations with the JRP, and 13 JRP missions were planned in this period, 11 of which were flown. A full daily breakdown is as follows:

	Offensive Missions Planned	Offensive Missions Flown	Offensive Sorties Flown	Recce Missions Planned	Recce Missions Flown	Recce Sorties Flown
7 Apr	8	7	14			
8	6	6	12			
9	7	4	9	1	0	0
10	4	4	8	2	2	4
11	5	4	8	2	2	4
12	4	4	8	3	3	6
13	5	5	10	2	1	2
14	3	3	6	3	3	6
Total	42	37	75	13	11	22

The tactical reconnaissance task had been the subject of lengthy deliberations involving the ACHQ, the NCHQ, PJHQ, HQ STC and the MOD. Early plans had envisaged that JRP-equipped Jaguars would undertake reconnaissance tasking from Incirlik, but the collapse of the Turkish option left the RAF searching for alternatives. No ramp space for the Jaguars was available to the south of Iraq, and there was in any case obvious scope for the JRP-capable GR7s to fly tactical reconnaissance instead. Yet the GR7s were soon being heavily tasked on offensive operations, and there were barely enough combat-ready pilots to meet the requirements of the Al Jaber and Azraq detachments; the JRP was also better integrated into the Jaguar than the GR7. Moreover, the coalition's difficulty locating and tracking Iraqi ground targets (and also fulfilling other reconnaissance

tasks, such as the collection of BDA) strengthened the argument for sending more collection assets into theatre if basing could be found.

Soon after the ground offensive into southern Iraq began, the US initiated steps to turn the Iraqi air base at Tallil, near Nasiriyah, first into a Forward Arming and Refuelling Point (FARP) for coalition aircraft, and then into a Forward Operating Base (FOB). The CFACC's aim was to reduce AAR requirements and so maximise the effectiveness (and minimise the vulnerability) of the coalition's limited tanker resources. The first role for forward-based aircraft would be KI/CAS but there was also a requirement for tactical reconnaissance. When this became clear, proposals emerged for basing a detachment of Jaguars at Tallil. Their precise origin is unclear but, as early as 23 March, the NCC was reportedly considering the possibility of 'enabling a DOB/APOD within Iraq … thereby transferring equipment [from Incirlik] rather than deploying assets from UK'. The ACHQ was asked to consider the issues involved in consultation with HQ STC.

In theatre and in the UK, the proposals for basing Jaguars at Tallil were seriously considered over the following days, and the UKACC gave his backing to the deployment. However, on the 25th, he noted that a US forward planning assessment for the routes from Kuwait to Tallil did not 'look particularly good'. On the same day, the UK base commander at Al Jaber recorded that firefights were still occurring near Tallil and that Iraqi Roland SAMs posed a serious threat to aircraft using the runway. A convoy of vehicles bound for the airfield had been halted that day 'because of the swamp-like state of the roads'. The Americans initially planned to start FARP operations from Tallil as early as 26 March, but logistical problems and difficulties securing the base caused this timetable to slip, and it was not until the 31st that the first A-10s refuelled there. For security reasons, there was still no prospect of basing aircraft at Tallil for the time being.

When a UK reconnaissance of Tallil at the end of the month concluded that operations from the base could only be mounted under 'bare' rather than merely 'austere' conditions, residual support for a Jaguar reconnaissance role began to fade. Nevertheless, the deployment was still under consideration as late as 3 April. Moreover, the ACHQ also drew up a contingency plan to send four Jaguars to Ali Al Salem to occupy space that could theoretically have been vacated by moving four GR4s to Al Udeid. The CFACC appears to have specifically requested the deployment of these additional tactical reconnaissance assets, not only for the closing stages of major combat operations but also for the subsequent stabilisation task.

However, on the 6th, PJHQ dismissed the Jaguar option completely, citing infrastructure, sustainability and personnel costs and the fact that the tactical reconnaissance task was 'achievable with the GR4 or the GR7 with the JRP fitted,

albeit sub-optimally'. In theatre, it became clear that offensive air tasking would shortly decline and that the role previously envisaged for the Jaguars could therefore be fulfilled adequately by the GR7s. To assist them, a detachment from the 41(F) Squadron Reconnaissance Intelligence Centre (RIC) was sent out from RAF Coltishall to Al Jaber, together with five JRPs and a Ground Image Exploitation System, but their arrival was delayed by a C-17 unserviceability in the UK and by handling, loading and transportation problems in Kuwait.

The protracted deliberations on JRP and the final deployment delays caused considerable frustration among the GR7 crews, who had been hoping that an organic ISR capability would improve their access to target intelligence. Nevertheless, there was still time for them to gain valuable experience in JRP operations, and some 91 sorties with the pod were ultimately flown between 10 April and 3 May. As usual, the GR7s operated in pairs, at first covering areas of interest assigned by the CAOC, 1 MEF, the CFACC and the CFLCC; they also provided direct ISR support to 1 UK Armoured Division. The 41 (F) Squadron RIC detachment exploited all mission tapes, producing textual reports and image highlights as required for each task. Reports and imagery were disseminated to the ACHQ and the appropriate agencies in the UK so that the intelligence product could if necessary be disseminated more widely.

On 7 April, two GR7 missions from Al Jaber executed strikes against Iraqi ground forces in the Al Amarah area. The following day, two aircraft received an Urban CAS request from a FAC and attacked buildings in central Baghdad using EPW IIs. Like the GR4 wings, Harrier Force South was at this time supplied with inert EPW IIs for Urban CAS, but they were rarely employed. Two other GR7 missions performed ad hoc reconnaissance tasks for coalition ground formations around Al Amarah. On the 9th, two GR7 missions obtained tasking to the north of Baghdad, one attacking vehicles in revetments near Samarra East airfield, the other striking artillery near Balad South-East airfield. One further mission was sent to Qalat Salih airfield, north of Basrah, to attack a suspected SA-6 site. In all, five aircraft released ordnance that day. Another pair provided top cover for USAF A-10s and afterwards performed SCAR tasks.

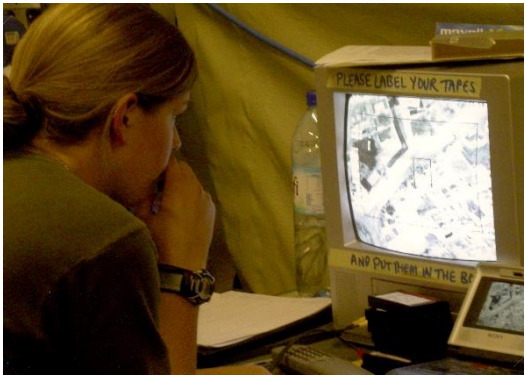
The pattern was similar on the 10th, three aircraft being involved in attacks on military vehicles to the north of Baghdad – north of Habbaniyah and near to Taji airfield – and one employing PW II to destroy a building in Baghdad which was being used by Iraqi snipers. One JRP mission flown in support of British forces in the south imaged all its assigned POIs, but another aborted in the air due to an IFF failure. The sixth mission that day received several impromptu reconnaissance tasks but did not attack any ground targets. That day, Harrier Force South also mounted their first sortie with the electro-optical version of Maverick, known as

TV Maverick. TV Maverick was substantially similar to the standard IR missile but boasted a vastly superior TV picture providing high magnification, so that (in daylight and good visibility conditions) positive identification of targets from range and altitude became much easier.

On 11 April, Harrier Force South launched six missions. Two pairs flew in the reconnaissance role with JRP and the first, around Basrah, imaged 12 out of 13 POIs. The second, along the Euphrates Valley from Najaf to Basrah, was hampered by fuel restrictions (partly because of poor weather, partly because the aircraft were carrying weapons as well as the reconnaissance pod) and by a JRP unserviceability; only two POIs were photographed. Of the other four missions, two released weapons. One aircraft destroyed two tanks in a reveted area to the west of Baghdad, while two others used EPW IIs to bomb a road intersection near Bayji, well to the north, to prevent Iraqi troop movements.

The 12th saw three further JRP missions, one along the main road north from Baghdad to Kirkuk (of six hours duration), and one along the Baghdad-Al Kut road in the east. Two aircraft from different formations bombed vehicles near Taji airfield and an SA-6 site south-east of Hillah. The following day, Harrier Force South released TV Maverick for the first time during their final Operation Telic strike, which destroyed three Iraqi military aircraft at Al Sahra airfield in northern Iraq. By that time, the military value of such targets was, perhaps, questionable, but the CFACC was still apparently determined that they should be attacked – possibly to prevent the movement or escape of senior Iraqi regime members. The wing otherwise flew four more offensive missions that day and one JRP mission along the Baghdad-Al Kut road. On the 14th – the final day of major combat operations – GR7 tasking was largely focused on JRP or ad hoc reconnaissance missions.

After the 'down' day on 15 April, Harrier Force South continued to fulfil a limited amount of KI/CAS and tactical reconnaissance tasking. None of the KI/CAS missions were called on to strike Iraqi targets. From 21 April, the JRP missions were re-assigned to the role of collecting BDA imagery to allow assessment of the results of GR7 attacks throughout the air campaign. The first steps towards withdrawal from theatre occurred on the 24th, when four GR7s left Al Jaber, and the remaining aircraft followed them to Cottesmore, via Akrotiri, on 6 May. The majority of personnel flew home two days later, and the Al Jaber DOB formally closed on the 15th.



JRP: the aircraft, the pod, and post-sortie analysis.

16. Tornado GR4 Conclusions

From 21 March to 15 April 2003, the Combat Air Wing planned and mounted some 214 operational missions from Ali Al Salem equating to 498 planned sorties; 476 sorties actually became airborne. The full breakdown for this period is as follows:

	Missions	Sorties Planned	Sorties Flown
Offensive Support	132.5	324	309
RAPTOR	59	121	115
Counter-TBM	11	21	20
Storm Shadow	7	18	18
ALARM	4.5	14	14
Total	214	498	476

In the same period, the Al Udeid GR4 Wing recorded[38] planning 132 missions amounting to 278 sorties. At least 10 ground aborts are shown in the records; 268 sorties actually flew.

Excluding reconnaissance missions with RAPTOR, Counter-TBM, Storm Shadow and ALARM tasking, the Combat Air Wing planned 132.5 missions and 324 sorties between 20 March and 15 April 2003. Of this number, it is recorded that 15 ground aborted; 309 sorties flew. The 309 sorties resulted in 148 weapon releases (48 per cent). By contrast, the 268 sorties flown by the Al Udeid Wing led to just 87 weapon releases (excluding ALARM releases – all the Al Udeid ALARM aircraft also carried non-SEAD ground-attack munitions such as EPW II and RBL755) – 32.5 per cent. This low strike rate resulted from tasking and target location, identification and clearance problems and equipment unserviceabilities.

The difficulties involved in KI/CAS can most accurately be illustrated by removing from these calculations the 20 planned attacks executed by the Al Udeid Wing during the first three days of Operation Telic and the last four days of major combat operations (as hostilities had in fact largely ceased by 12 April). Excluding these periods, the Al Udeid Wing mounted 220 sorties, which resulted in 67

38. The records sent to AHB are not entirely complete in this respect, and some ground aborts that occurred in April are not recorded. Data compiled by the Air Warfare Centre recorded that 312 sorties were planned and 29 were ground aborted. The same source records that the Combat Air Wing planned 523 sorties of which 68 were ground aborted. These slight variations in the statistical records do not in any way alter the conclusions reached in this narrative – conclusions fully supported by the AWC analysis.

weapon releases, or just 30.5 per cent. From the mission records, it is impossible to separate targets attacked using Type 1, 2 or 3 KI/CAS from secondary targets, but it is clear that at least 14 Al Udeid GR4s struck secondary targets during Operation Telic. A further six releases occurred against large fixed structures (a Ba'ath Party headquarters, an airfield runway and a bridge), albeit in two instances under KI/CAS tasking procedures, when, unusually, accurate GPS target coordinates were available. Therefore, an objective assessment of the Al Udeid Wing's performance when employing KI/CAS procedures against fielded Iraqi forces would have to be based on 200 sorties, of which only 47 (23.5 per cent) released weapons. Moreover, some of these weapons missed their targets and others may have hit Iraqi dummies or decoys.

The apparent gulf between the experience of the Combat Air Wing and the Al Udeid Wing is easily explained. The Al Udeid GR4s experienced lower serviceability rates, resulting partly from the longer distances of their sorties and partly from the relative lack of prepared base facilities available to them. The Combat Air Wing was located far closer to Iraq and was operating from a well-established GR4 base. The availability of aircraft shelters at Ali Al Salem and their absence at Al Udeid was but one consequential illustration of this factor. Second, with more aircraft available, the Combat Air Wing could often generate reserves that could be drawn on in the event of unserviceabilities, whereas one unexpected aircraft or equipment malfunction at Al Udeid would frequently lead to the loss of a planned sortie. Third, flying from close to the Iraqi border, the Combat Air Wing GR4s could hold for longer in Iraqi airspace awaiting such tasking as was available, with less dependence on AAR than the aircraft flying from Al Udeid. Fourth, for reasons unclear, it seems that the Combat Air Wing was allocated a somewhat larger number of fixed targets than the Al Udeid Wing and may also have obtained more secondary targets. Their higher strike rate did not reflect significantly more success in the KI/CAS role against fielded Iraqi forces.

Reconnaissance tasking with the RAPTOR pod accounted for just under a quarter of the sorties flown by the Combat Air Wing. Throughout Telic, RAPTOR gathered highly diverse imagery, which was exploited to good effect for targeting, BDA and surveillance. The pod's stand-off performance and the quality of its imagery drew favourable comment. Nevertheless, RAPTOR was employed in advance of its formal entry into service and could not fulfil all specified requirements. It was also subject to frequent unserviceabilities and required intensive maintenance; it proved particularly prone to heat-related problems. Although poor weather accounted for the Combat Air Wing's failure to image many POIs, unserviceabilities were also partly to blame. In total, 47 per cent of tasked POIs were lost between 21 March and 30 April 2003.

RAPTOR imagery of an Iraqi Astros II multiple rocket launcher on the move on 28 March 2003.

Looting became common as the authority of Saddam Hussein's regime collapsed; on 4 April it was photographed during another reconnaissance mission with RAPTOR.

The aircrew of 31 Squadron were unhappy with these results. They found little need to draw on RAPTOR's stand-off capability after the limitations of Iraq's air defences became clear and regularly used it at short range or even directly over the assigned locations. Some argued that such tasking could have been performed using a more conventional – and far more reliable – tactical pod such as VICON. Many of the POIs lost to unserviceabilities would then have been covered. Yet there were also certain compensating factors, including a genuine requirement for a stand-off reconnaissance pod during the final months of Operation Resinate and in the early stages of Telic, and RAPTOR offered far better imagery resolution than VICON even at short range. Moreover, historically, it has often proved possible to draw on early operational experience with equipment that is not yet fully developed to ensure that an improved end product is ultimately produced, and the experience gained with RAPTOR during Operation Telic certainly proved valuable in this respect.

The same was true where Storm Shadow was concerned. Although Storm Shadow sorties accounted for less than 4 per cent of the Combat Air Wing's total, the novelty of the weapon ensured that its performance was examined in minute detail after the conflict. The most impressive aspect of the missile's performance was its exceptionally high accuracy. Of 27 Storm Shadows fired, 24 hit their desired targets and 22 were believed to have landed within 3 metres of their planned impact points. More negatively, there were occasions when follow-through bombs had failed to detonate or had detonated before reaching the target interiors. These were important findings, given the experimental nature of the missiles employed, and doubtless influenced the subsequent development and tactical deployment of Storm Shadow. The many important lessons identified from Telic more than repaid the strenuous efforts expended on accelerating the missile's delivery to 617 Squadron.

After the introduction of ALARM during the first Gulf War in 1991, it proved difficult to find hard evidence on which to assess the weapon's performance, and fact-based evaluation proved no easier after Operation Telic. In total the Combat Air Wing and the Al Udeid Wing mounted only 10 ALARM missions (including one mixed SEAD and attack mission) comprising 20 ALARM sorties, and weapons were released during 15 sorties according to the records. Between them, the two GR4 wings launched 28 ALARM IIs and 19 ALARM Is. Combat Air Wing ALARM operations were confined to the period 21-25 March; the Al Udeid Wing only employed ALARM on 29 and 30 March.

It is nevertheless clear that, used in combination with far larger numbers of American ARMs (408 AGM-88 HARMs between 19 March and 18 April), ALARM achieved its fundamental objectives. Coalition aircrew mission reports

recorded that a total of 436 SAM emitters were active during the conflict and 1,660 SAMs were observed in flight, yet the overwhelming majority were fired ballistically and thus inaccurately. In achieving such 'soft' kills, ARM missiles have consistently proved very successful. There is, however, no evidence that ALARMs caused any 'hard' kills. The political objections that restricted ALARM's employment in earlier operations were very largely overcome, partly through the ROE and partly through the introduction of ALARM II's miss-inhibit facility.

The Tornado GR4 detachments broke much new ground during Operation Telic through their employment of novel capabilities, such as Storm Shadow, RAPTOR and ALARM II, but Counter-TBM operations represented perhaps the most revolutionary tasking executed in the conflict. For the GR4s, the Counter-TBM task emerged less than three months before Telic began, so that they had considerably less time than the GR7s of 3 Squadron to familiarise themselves with the concept. It was the GR4's bad weather and low-altitude capability that drew the planners' attention to its potential value within the overall Counter-TBM plan, and the aircraft fulfilled their expectations whenever it was required, except on 26 and 27 March, when the weather conditions were exceptionally hazardous. Moreover, its terrain-following radar came into its own for the first time in a live operation since 1991, and the performance of the Counter-TBM crews more than repaid the RAF's dogged determination to maintain low-level flying training, despite the general tendency towards medium-level operational flying evident in the preceding decade.

The 20 Counter-TBM sorties flown by the Combat Air Wing accounted for just over four per cent of the total. They were concentrated into the period 20-25 March to guard against any early attempt by Iraq to respond to the coalition offensive by launching Scuds at Israel and renewed on 3-4 April, as US forces closed on Baghdad. They covered between 150 and 200 POIs during March alone. The concept of operations involved collaboration with a wide range of other coalition air assets, as well as SF on the ground. The flying task was both long and arduous, pushing aircraft to the limits of their operating parameters; it also required exceptional stamina and skill from the GR4 crews and extremely detailed and time-consuming planning on the ground. Although one possible Scud TEL was found, there was no sign of any missiles, and it now seems probable that none were deployed in the western desert. Nevertheless, the coalition air and SF presence may have helped to dissuade the Iraqis from attempting any Scud launches, and we should also bear in mind that the entire Counter-TBM concept was developed primarily for strategic effect, with the aim of deterring Israeli intervention in the conflict. This issue is considered in more detail in the third part of this study.

17. Harrier GR7 Conclusions

From 21 March to 14 April, Harrier Force South flew 179 offensive missions involving 367 sorties, 117 of which released weapons (32 per cent). While this mirrors the achievement of the Al Udeid GR4s in statistical terms, many of the GR7 attacks were executed against secondary targets and, in the absence of such targets, more aircraft would have returned to base with their munitions. This is not to say that secondary targets were unimportant; indeed, the repeated strikes against bypassed Iraqi units in the Al Amarah area helped to remove any threat that they might have posed to British forces around Basrah. But the figures once again illustrate the difficulties involved in KI/CAS tasking in support of the main US advance on Baghdad.

Throughout, the Harrier GR7 proved itself an extremely robust platform, and its excellent serviceability record was punctuated by very few serious problems. It also demonstrated exceptional flexibility. Aircraft flying from Al Jaber executed time-sensitive attacks, precision strikes on tanks, armoured vehicles and other military equipment, and area attacks on fielded forces; they attacked higher Iraqi command and control and fulfilled both KI/CAS and interdiction tasking in the maritime, close, deep and strategic battles. In addition to their combat role, they also flew numerous tactical reconnaissance sorties.

Yet Harrier Force South tasking did not live up to expectations. Pre-conflict planning had envisaged 40 per cent interdiction and 60 per cent CAS, whereas offensive tasking actually consisted almost entirely of KI/CAS (including Urban CAS). Many wing personnel believed that the GR7s could and should have been allocated more conventional interdiction tasking, which would have resulted in considerably more weapon releases per sortie than KI/CAS because of the increased scope for mission planning.

Of 240 targets attacked, 187 (78 per cent) were fielded, including high-value assets such as aircraft, SSMs, and radars. They were mostly mobile, tactical, and hidden, or else protected by berms. Their precise locations were not known before take-off and were often not provided by external agencies such as ASOCs or TAOCs. In such circumstances, the target-location tools available to pilots comprised intelligence from a range of sources and the onboard aircraft systems. They were also assisted by their growing knowledge of Iraqi passive air defence doctrine. KI/CAS, as practised during the invasion of Iraq in 2003, left much to the flexibility and resourcefulness of coalition aircrew.

The TIALD pod was, as we have seen, the critical enabler for Harrier Force South during Operation Telic. Some 95 per cent of GR7 combat missions from Al Jaber were mounted with at least one of the TIALD-capable aircraft, and TIALD

aircraft flew 77 per cent more hours than the non-TIALD aircraft (6.5 hours per day compared with 3.8 hours per day). PW II accounted for 49 per cent of weapons used (a figure that rises to 52 per cent if laser-guided EPW IIs are included). Employed against fielded forces or fixed facilities, the 1,000 lb payload was large enough to ensure that virtually any bomb accurately released destroyed its target; precision bombing also substantially reduced the risk of collateral damage. Yet at times it seemed that this vital capability was hanging by a thread, and in the aftermath of Telic there were calls for more targeting pods and more TIALD-capable aircraft, just as there had been after Operation Desert Fox in 1998 and Allied Force in 1999.

Harrier Force South used the GR7's Joint Reconnaissance Pod to assess the accuracy of their attacks and ultimately produced the following statistics:

Munition	Total	Hit	Near miss	Far miss
PWII	129	106	9	14
EPWII (used as LGB)	8	6	0	2
Maverick	35	19	8	8
EPWII (GPS-guided)	11	11	0	0
Unguided	60	9	39	12
RBL755	20	2	4	14

Yet such figures must be viewed with some caution. A hit rate higher than 80 per cent for PW II would certainly have been very creditable, but the small and fleeting nature of many Iraqi ground targets often made precise assessments impossible. Longer-term analysis suggested that a slightly smaller number of PGMs hit their aim points, while the number hitting *targets* was significantly smaller.

Of the other weapons available to Harrier Force South, the recently acquired Maverick occasioned the most discussion. The TV version ultimately drew more favourable assessments than the IR version because it offered a far superior target image. However, as events turned out, the GR7s would never use Maverick again in live combat. By contrast, the RBL755 cluster bomb was deemed largely unsuccessful, only 6 out of 20 weapons released having put any bomblets on to the target array. RBL755 was in fact an adaptation of the BL755 munition, which

had been designed in the 1970s for low-altitude release and then adapted for use at medium level. Its inaccuracy had been demonstrated during the Kosovo conflict, and its return to even limited operational service in 2003 cannot easily be explained. It was retired soon afterwards. Unguided 1,000 lb and 540 lb freefall bombs proved more accurate than RBL755, with a recorded hit rate of 15 per cent and a 'near miss' rate of 65 per cent. Dropped in airburst mode, they were thought to have been quite effective weapons when employed against fielded forces.

18. Part 2: Conclusion

Operation Telic clearly represented something of a milestone in the development of improved offensive and reconnaissance capabilities in the RAF. Historically, it is notable for the experience it provided in the employment of Storm Shadow, EPW II and III, ALARM II, RAPTOR, and the JRP, and in the development of joint operations involving direct collaboration between fast jets and SF. Yet the exercise of offensive air power during Telic will always be associated first and foremost with the challenges, successes and failures associated with the execution of KI/CAS. Before the operation, the CFACC had hoped for an opportunity to mount a preliminary air campaign ahead of the ground offensive. The original shock and awe concept reflected this aspiration. But the CFC favoured the launch of ground forces into Iraq at the very beginning of the operation; shock and awe never materialised. The A-Day ATO had to be rewritten at the last moment and was substantially cut back in the process. Barely three days of interdiction and other strikes against a limited range of fixed targets were followed by a far earlier move to KI/CAS than had formerly been expected. To a significant extent, V Corps and 1 MEF led the operation and dictated the subsequent actions of the coalition air forces.

After hostilities ended in April 2003, the performance of RAF offensive aircraft in the conflict was analysed in considerable detail by the AWC. Their broadest conclusions were as follows. During the conflict, GR4s and GR7s (including those committed to Counter-TBM in western Iraq – covered in Part 3) flew a total of 1,349 sorties and released 905 weapons. Some 52 per cent of the targets were categorised as 'Army' (vehicles, artillery, troops etc.) – by far the largest category. Of the weapons released, 83.9 per cent were precision-guided. In all, 387 EPW IIs were dropped and 258 PW IIs, although 96 EPW IIs were released in laser-designated mode. The GR4s used the majority of the EPW IIs (317) while the GR7s used the most PW IIs (142). This, to some extent, reflects the higher proportion of fixed targets attacked by the GR4s (including secondary targets) – targets for which GPS coordinates were often available. The GR4s attacked fixed

and mobile targets in roughly equal numbers, whereas the GR7s attacked more than twice as many mobile targets as fixed targets.

Overall, 69 per cent of the weapons employed hit their intended aim point, while 56 per cent hit Iraqi targets. Where PGMs alone were concerned, 80 per cent hit their aim point whereas 68 per cent hit targets; 66 per cent of the weapons released by the GR4s hit targets compared with 49 per cent of those released by the GR7s – a further reflection of the GR4s' higher proportion of fixed targets. Of bombs dropped on fixed targets, 80 per cent were hits compared with only 69 per cent of those released against mobile targets. Assessed on the basis of aim points rather than targets, there was no significant difference between the performance of the GR4s and the GR7s.

It is difficult to compare these figures with those compiled after previous operations, as the basis of some measurements has altered over time. Nevertheless, the data suggest that the proportion of PW IIs hitting their aim points increased by at least 20 per cent between Operation *Granby* in 1991 and Operation Telic. This is hardly surprising because *Granby* was the occasion of PW II's first operational employment. Compared with Operation Allied Force in 1999, the improvement in 'hitting aim point' was closer to 10 per cent, but there was no significant advance where 'hitting target' was concerned. Once again, this reflects the high proportion of small mobile targets attacked during Operation Telic. The same basic trend emerges from comparisons between Telic and Operation Resinate. In Resinate, the PW II 'hit target' rate was significantly higher than in Operation Telic (75 per cent compared with 64 per cent), largely because of the planned nature of Resinate missions and the fact that they were overwhelmingly mounted against fixed targets.

Yet the most telling figures are those that relate the RAF's strike rate to sortie generation during Operation Telic. The Air Warfare Centre data for the Ali Al Salem, Al Udeid and Al Jaber wings indicate that only 31.6 per cent of planned sorties released weapons (or 35.3 per cent of sorties that became airborne). If non-KI/CAS missions are excluded from these figures, they would probably be closer to 25 and 30 per cent. In the delivery of effects, the results were still hugely impressive. Indeed, it is possible that no army in history has received such comprehensive and effective air support as the CFLCC's obtained during Telic. But it is important not to ignore the costs involved and their implications in terms of such elementary military principles as economy of effort and, in the longer term, sustainability.

The basic CAS task is complicated. Indeed, CAS is in many ways the most challenging type of offensive air mission. The difficulties that arose during Operation Telic have punctuated much of the history of air warfare: many would

not have been unfamiliar to Second World War aircrew, despite the huge advances in technology that have taken place since. It is hardly surprising that aircrew invariably prefer planned operations against fixed targets. CAS is infinitely more difficult and often far less rewarding. Moreover, even if aircrew are themselves well prepared for CAS, they may find their efforts frustrated by poor direction from elsewhere; the advent of GPS-guided munitions gave tasking agencies and FACs a significant role in aiming air weapons during CAS sorties.

During Operation Telic, a lack of tasking for aircraft assigned to CAS ultimately resulted in numerous ad hoc attacks on secondary targets. Many of these were fixed facilities and could have been targeted far more economically and effectively by a conventional planned air campaign; at least some had in fact been removed from the A-Day ATO following the launch of the coalition ground offensive. Had such targets as HQ buildings and barracks been attacked during the opening days of Operation Telic, it is also far more likely that they would have been occupied. In the event, by the time they were finally struck, most would probably have been empty.

The propensity for many aircraft to return from KI/CAS missions with unexpended ordnance could be seen as evidence that too many combat aircraft were deployed to the Gulf before the conflict. However, it is important to remember that the size of the Air Component was originally determined by the expectation of a large-scale preparatory air campaign. Furthermore, given the limits of fast jet endurance and AAR capacity, there was a certain logic in offensive aircraft maintaining continuous relays over Iraq to obtain such KI/CAS tasking as became available, even if this meant that many were not called on to strike. The operation certainly demonstrated the critical importance of endurance and AAR: the longer aircraft could hold in the air awaiting tasking, the more likely they were to receive it. In this regard, we should note that such USAF platforms as the F-15 could remain airborne without refuelling for almost twice as long as the Harrier GR7.

It is obvious that the difficulties encountered in the execution of KI/CAS during Operation Telic resulted partly from a lack of training and experience. The RAF had not undertaken any live CAS for many years: the various operations conducted since the end of the Cold War – Granby, Deliberate Force, Desert Fox, Kingower, Resinate – had not required the RAF to provide direct support to ground forces. Moreover, to fulfil the offensive roles assigned to it by British defence policy in this period, the RAF had largely been trained and equipped to hit static targets rather than mobile fielded forces. The principal sensor available to the GR4s and GR7s – the TIALD pod – did not provide enough resolution for small and mobile ground targets to be identified and attacked from medium altitude, and

the only cluster munition capable of medium-altitude release, RBL755, proved very inaccurate. Precision-guided 1,000 lb bombs were often too large for employment in the Urban CAS environment, but inert weapons caused insufficient damage.

After the operation, the UK Armed Forces accepted that there was a need to improve CAS training as part of a broader initiative to enhance ALI, yet purely national training would not automatically have solved the problems encountered in Iraq in 2003. These would only have been addressed by training and exercises involving both UK and foreign – particularly American – CAS tasking agencies. Moreover, even if Telic demonstrated a need for better CAS training, CAS was (and is) but one of the major offensive air roles; the RAF was (and is) required to maintain a balanced range of capabilities.

The impact of CAS must always be judged primarily by its *effect* on the enemy rather than by the physical attrition inflicted. Historically, the effect of CAS (as well as interdiction) has been to hinder or prevent enemy assembly, movement, counter-attack and supply; it has also helped to weaken enemy morale. The direct attrition achieved by CAS has often been less pronounced. However, in 2003, CAS was transformed by precision bombing. As the majority of coalition air strikes were executed with PGMs, they wrought widespread destruction on the Iraqi armed forces. CENTAF later recorded that some 15,592 KI/CAS DMPIs had been struck by coalition air power during the conflict. The Iraqis proved completely unable to assemble large or remotely capable ground formations and did not launch a single significant counter-attack with regular forces against the main coalition axes of advance. US ground forces were only temporarily delayed by small-scale attacks on their lines of communication, many of which were executed by Iraqi irregulars. Under constant pressure from the air, the Iraqi forces guarding the southern approaches to Baghdad largely melted away, leaving the city only lightly defended. Intense demoralisation was amply demonstrated by the disintegration or surrender of many units.

Overall, then, despite the trials and tribulations that accompanied KI/CAS, Operation Telic could be described as an outstanding success for coalition air power. Nevertheless, it is important to remember that the coalition confronted an Iraqi military machine that had been severely degraded, first by the defeat of 1991 and then by years of UN sanctions; Iraq's armed forces were far weaker in 2003 than in 1991, and her air force proved completely unwilling to fight. By contrast, although coalition forces were numerically weaker than in 1991, their weaponry had improved beyond all measure in the intervening years. The cards were heavily stacked in their favour. Thus, while some commentators were afterwards quick to present the operation as a model for the future, their assumption that other potential

adversaries would be no more capable of effective resistance than Iraq was far too optimistic – especially where the air environment was concerned.

PART 3: COUNTER-THEATRE BALLISTIC MISSILE AND SPECIAL FORCES SUPPORT OPERATIONS

1. Introduction

Beyond supporting the coalition offensive in Southern Iraq, the RAF's chief contribution to Operation Telic involved Counter-TBM and SF-support operations in the western Iraqi desert. The strategic importance of the Counter-TBM task was acknowledged earlier in this study. During the first Gulf War in 1991, Iraq had responded to the onset of hostilities by launching Scud missiles at Saudi Arabia and Israel. While Saudi Arabia was targeted as the primary base and launching point for coalition operations, the Scud attacks on Israel were transparently designed to precipitate retaliation. An Israeli attack on Iraq might have united Arab opinion against the West, resulting in the withdrawal of Arab nations from the coalition. The same countries might also have denied other coalition members permission to operate from their soil in these circumstances. In the event, through sustained diplomatic efforts and a mammoth ad hoc diversion of resources, including air power, SF and Patriot missiles, Israel was dissuaded from intervention.

In 2002, as the prospect of further conflict with Iraq became increasingly real, US and UK planners had to address the possibility that Saddam Hussein would pursue the same strategy, possibly using missiles equipped with chemical or biological warheads. Although many Scuds had been destroyed after the first Gulf War, no satisfactory inventory of missiles had ever been produced by the Iraqi government, and it was believed on the basis of UNSCOM's investigations in the 1990s that a few had been retained at hidden locations. Intelligence also pointed to the possibility that Iraq still held enough Scud components, engines and guidance and control sets to assemble around 25 missiles. These components were easy both to conceal and move.

Hence, concerted measures were required to address the Scud threat, which seemed likely to come from the same areas of the western Iraqi desert used for launches against Israel in 1991. In July, US CENTCOM tasked CENTAF to develop a CONOPS involving a range of reconnaissance and offensive support aircraft and SF. CENTAF delegated the task to Air Combat Command, at Langley Air Force Base, Virginia. Initially, there was some discussion of a broader strategy for western Iraq designed to open a third front (in addition to the south and north) or a second front if a northern option proved unfeasible. Soon, however, Air Combat Command's planning came to focus overwhelmingly on Counter-TBM.

Scud: small, mobile, easily concealed, capable of rapid launch; inaccurate but still able to exert genuine strategic effect.

The principal features of the CONOPS were formulated in the autumn and assumed that Counter-TBM operations would largely be conducted from bases in Jordan immediately adjacent to western Iraq. Some of these facilities were already familiar to coalition SF, for they had been used during a series of US-sponsored exercises named Early Victor over the years. Yet this aspect of the Counter-TBM strategy was to prove highly sensitive. Traditionally, Jordan has enjoyed close relations with most western countries; in more recent years, Azraq has openly served as an important base for coalition forces committed to operations against Daesh. But in 2003, many Jordanians and Palestinians resident in Jordan harboured strong pro-Iraq sympathies. Thus, while senior figures in the government in Amman quickly signified their willingness to allow coalition operations to be mounted from Jordanian soil, they were insistent that their support for the US and the UK should not become a matter of public knowledge.

Command and control arrangements were soon finalised. While the CFACC, General Moseley, was designated the supported commander of the Counter-TBM mission, the Combined Forces Special Operations Component Commander

(CFSOCC) became the *supporting* commander to the CFACC; CFSOCC delegated OPCON for Counter-TBM operations to the Commander Joint Special Operations Task Force West (CJSOTF-W).

Overall planning of Counter-TBM operations was assigned to a Counter-TBM Strategy Chief (known as the 'Scud Czar'), who headed a dedicated team in the TST cell in the CAOC. He was to provide guidance to a Mission Commander with day-to-day responsibility for all airborne Counter-TBM operations and assets. The Mission Commander was to be tasked via the ATO and was to work in direct coordination with a Mission Planning Cell based at the Royal Jordanian Air Force (RJAF) base at Azraq. Committed units not based at Azraq were to use the Mission Planning Cell as their single point of contact for mission planning, coordination and deconfliction issues. It was not expected that the Mission Commander would be required to perform continuous command and control functions for airborne aircraft; rather, this task was to be executed by airborne command platforms, such as E-3s and E-8s.

Multiple RAF elements were assigned to the Counter-TBM/SF-support mission between September 2002 and January 2003, including Harrier GR7s, E-3Ds, Nimrod MR2s, Chinooks, Hercules C-130s, Canberra PR9s and RAF Regiment units. It thus represented a very substantial commitment, spanning such roles as CAS (always referred to as CAS rather than KI/CAS over western Iraq), ABCCC, Special Operations, tactical air transport and a wide variety of ISR activity. The following pages examine the contribution of the different RAF platforms to operations in western Iraq during Telic and suggest some possible lessons that might be learnt from placing the RAF's Counter-Scud/SF-support activities in historical context.

2. Harrier GR7 Operations

Throughout Operation Telic, a detachment of RAF Harrier GR7s operated from the RJAF base at Azraq as part of a larger coalition force designed to counter the threat of Iraqi Scud missile launches against neighbouring states. The detachment comprised eight (later nine) aircraft, all CR pilots from 3(F) Squadron, and four additional pilots, two from 1(F) Squadron and two from 4(AC) Squadron. Some 176 engineering, operations and administrative support personnel from 3 Squadron also deployed to Azraq.

After the first Gulf War, several western countries devoted considerable efforts to the integration of SF and fast jets, functioning primarily in the CAS role. SF are by their nature light, highly flexible and manoeuvrable, and they are much easier to deploy than regular ground troops, requiring far more limited basing, transport

and logistical arrangements. But they inevitably lack numbers and, most of all, firepower, as they have to move without artillery or other heavy weapons. Confronted by large numbers of heavily armed enemy troops, they must always find themselves at a disadvantage, despite their training and expertise.

Therefore, it is essential for SF to be pre-warned of the presence of hostile concentrations (so they can be avoided), and they must be able to call in fire support quickly – potentially to deep locations – should they find themselves outgunned. Today, such tasks might be assigned to RPAS. However, in 2003, fast jets were best suited to the SF-support role due to their inherent flexibility, reach, and firepower. They could fly ahead of SF units, identifying hostile forces, and they could be rapidly called in to provide precision CAS. In short, SF and air power were well placed to complement one another, SF providing presence on the ground, often inside hostile territory, while air power gave them both the eyes and the muscle that they otherwise lacked.

During Operation Enduring Freedom in Afghanistan in 2001, SF worked closely with a variety of ground-attack aircraft, and this served to encourage the development of the SF-fast jet concept further still; it quickly became the central focus of Counter-TBM planning within Air Combat Command in the summer of 2002. As the Counter-TBM CONOPS evolved, planners from both sides of the Atlantic became convinced that combat air support from the RAF was required to bolster the USAF's contribution. From a UK perspective, it also seemed that a larger fast air contribution might secure greater influence within the command chain.

From the RAF's offensive support fleet, the task of providing CAS to the SF had been assigned to the three Harrier GR7 squadrons and, within the GR7 force, this role had been embraced with particular enthusiasm by 3 Squadron. Thus, following the decision to allocate RAF combat air power to Counter-TBM, their selection for this vital mission was virtually automatic. The assignment of one third of the front-line Harrier force to the highly specialised Counter-TBM role required some extensive justification and was not at first universally welcomed in the RAF. However, the Americans strongly favoured the concept because of the GR7's capacity to deliver on-call CAS by night; the A-10 was not night-capable and there were not enough F-16s to provide adequate night-time coverage.

In August 2002, the issue was settled, and the OC 3 Squadron, Wing Commander (later Air Marshal) Stuart Atha, received formal tasking notification at the end of the month, shortly before 3 Squadron deployed to St Mawgan for Collective Training. Ironically, they were preparing for a possible detachment to Bagram, in Afghanistan, at that time, and the Station Commander of RAF

Cottesmore had even visited Bagram to conduct a site survey. Then, suddenly, the squadron was tasked to prepare for a very different contingency.

Planning was already under way, initial RAF input having been supplied by staff from the AWC, but preparations subsequently proceeded at a furious pace. Three key events took place at Nellis Air Force Base in October. First, a so-called Joint Working Group Conference of all interested parties was convened to develop tactics, techniques and procedures for Counter-TBM operations. Then there were two live flying exercises, which involved transporting the western Iraqi desert to Nevada, according to one account. The kill-box grid system developed for Iraq was superimposed on to Nevada, and specific named areas of interest were identified, where Scuds and their supporting equipment might be located. Real Scuds, Scud TELs, and Scud decoys were deployed, and the exercises were conducted at night because the Iraqis seemed most likely to launch the missiles under cover of darkness. The majority of force elements at that time committed to the Counter-TBM task were involved – SF, ABCCC platforms, and dedicated attack assets – B-1Bs, F-15s, F-16s, and A-10s, as well as the GR7s.

As we have seen, the primary goal of Counter-TBM operations was the strategic effect of dissuading Israel from intervention if hostilities were initiated against Iraq. They were also designed to exert an effect on the Iraqis, namely, deterrence. Yet if Iraq was to be successfully deterred from launching Scuds, the coalition had to present a credible threat, and it was vital to identify quickly the best means by which this could be achieved. The OC 3 Squadron described the first exercise as being 'just about going, getting airborne, landing, and understanding each other … There was a bit of choreography to make sure the missiles were where we would find them.' Nevertheless, even this limited experiment was enough to show that there would be little difficulty *destroying* the missiles once they had been located. The key challenge would be to find them in the first place.

The solution often proved to be decidedly low-tech. Among the Counter-TBM 'find' assets were B-1Bs equipped with Moving Target Indicator (MTI), as well as JSTARS; but missiles were found on a surprisingly high number of occasions simply by pilots looking out from the cockpits of combat aircraft with NVGs and seeing dust trails. Their contribution to the search and find task was soon christened Non-Traditional ISR (NTISR). It followed that by maintaining as many aircraft airborne as possible, for as long as possible, the coalition would substantially improve its chances of locating the Scuds. Moreover, with an abundance of air power over the western desert (as well as the coalition presence on the ground) the deterrent effect would be considerable. As the OC 3 Squadron put it:

> We wanted to be there for as long as possible. The challenge was to be there for four hours, and cycle people through tankers … What we wanted to create on Day 1 was, the Iraqi radar screens would be on, and they'd think 'Oh my God, look at all that metal that's up there, there's no way that we're going to be saying to those Scud guys, drive out there.' Now that's the effect we wanted to create, and we did. It was wall-to-wall aircraft in the western desert.

The trials at Nellis were particularly beneficial for the units involved, not only in developing the find and kill process but also in achieving a greater understanding between the different force elements. UK participation enabled the RAF to oversee and influence the CONOPS and address a range of issues that had arisen at the air/SF interface in Afghanistan. By November, it was possible to advise the US formally that the GR7s were available and that they could be incorporated into ongoing contingency planning. The same month witnessed further exercises in the UK such as Exercise Wessex Warrior, which involved the provision of CAS to ground forces and some further testing of Counter-TBM tactics and procedures with a visiting detachment of USAF B1-Bs.

Simultaneously, several enhancements were being incorporated into the GR7s, which would boost their contribution to the Counter-TBM force. An IR Maverick capability had been established by 3 Squadron in the previous year, but work now commenced to introduce the TV version of the missile. HQ STC took steps to accelerate the introduction of EPW II across the Harrier fleet and equip 3 Squadron with secure radios, which were essential for joint operations with coalition SF.

Preparations continued in December, focusing particularly on night combat-ready work-ups; 3 Squadron also conducted low-level CAS training and flew numerous EW, AAR and fighter-affiliation sorties. Details were finalised for further exercises in January, and the pace of contingency planning for actual deployment to Iraq also began to accelerate.

Throughout this period, Operational Security (OPSEC) was of paramount importance. The 'need to know' principle had to be rigidly applied. At RAF Cottesmore, the OC 3 Squadron had no choice but to work entirely through the Station Commander, but the secrecy surrounding his mission was still resented by the other Harrier squadrons. National CIS access limitations made the exchange of highly classified information with the Americans particularly difficult between exercises. The emphasis on OPSEC was such that 3 Squadron, based at RAF Cottesmore, remained oblivious for some time to the fact that 8 and 23 Squadron E-3Ds, based nearby at RAF Waddington, had also been assigned to Counter-

TBM operations. The E-3Ds were no less ignorant of the GR7s' role and were working very largely with the Americans, who periodically travelled several thousand miles to Waddington to provide briefs and updates. The three squadrons only became aware of the scope for collaboration shortly before their deployment to the Gulf.

In January 2003, 3 Squadron participated in two final exercises to test the Counter-TBM CONOPS. The first was again organised at Nellis and occurred under the auspices of a normal Red Flag event, although here the normality ended. Some eight pilots deployed along with the Squadron Intelligence Officer and four GR7s to fly simulated war missions over the Nevada desert against real and decoy Scuds.

The second exercise, entitled Desert Thundercat, occurred at Azraq. An exercise involving RAF F3s had long been scheduled for mid-January 2003, but it subsequently proved possible to incorporate an offensive element into Desert Thundercat comprising RAF Jaguars and GR7s. Over a 10-day period, eight 3 Squadron pilots were thus able to fly a total of 45 day and night sorties in their potential operating environment, to meet the Jordanians, to work in collaboration with coalition ground elements, and to release PW IIs and several unguided 1,000 lb bombs. The OC RAF Wittering and future Azraq DOB Commander, Group Captain Andrew Kirkpatrick, was also given an opportunity to reconnoitre the base and meet senior US planners.

By the end of January 2003, then, 3 Squadron and many of the other force elements committed to Counter-TBM were extremely well prepared. There had been abundant opportunities for realistic mission rehearsals and the key challenge – finding the Scuds – had been clearly identified and addressed, if not entirely solved. The overall Counter-TBM strategy was effects-based, the key effect being deterrence; central to the goal of deterrence was persistence. If the Iraqis were not deterred, combat aircraft had to be airborne over the desert, checking up to 6,000 possible Scud hide sites predominantly located along Highways 10, 11 and 12 and along the Haditha-Al Qa'im-Shab Al Hiri railway. They were also to scout ahead of coalition SF and look out for hostile ground forces.

If a threat emerged, they could then immediately be called on to targets. The agreed minimum detection-to-destruction time was just nine minutes, although this was never quite achieved during exercises. A maximum time limit of 30 minutes was based partly on calculations of the time required to launch a Scud, and partly on the rather generalised supposition that the SF could be expected to hold their own in a firefight for some such period. Clear priorities were set for different categories of target, the top priority being a Scud in a raised position or

in the process of being raised; hostile action against coalition ground forces came second.

The full range of ISR and combat air assets committed to Counter-TBM operations was listed as follows in the final version of the CONOPS. No CFACC ISR assets were *solely* assigned to Counter-TBM, but the Scud hunt was nevertheless to be one of their highest priorities.

Aircraft	**Coverage hours per day/days per week (unless otherwise stated)**
ISR Assets for Counter-TBM	
E-3 (AWACS)	24/7
E-8 (JSTARS)	12/7 at night
RC-135 (Rivet Joint) and/or EP-3	24/7
U-2 Extended Tether Programme (ETP)	8-10/7
RAF Canberra PR9	8/7
RAF Tornado GR-4	Periods of poor weather at night
4 x MQ/RQ-1	20 hours
P-3 AIP Coverage	When available
Unattended ground sensors (Steel Eagle)	
Traditional tactical reconnaissance assets	As available
SF ground teams, GR-4 VICON, GR-4 TIRRS	
Non-traditional ISR platforms	24/7
Attack Assets for Counter-TBM	
ODA and coalition ground teams	
30 x F-16C+	24/7 6-ship over Sector
10 x B-1	24/7 single ship over Sector
18 x A-10	14 for Scud Ops, 4 on CSAR alert
8 x RAF Harrier GR7	A-10 and GR7 combined will provide 24/7 4-ship over Sector
12 x F-15E	24/7 2-ship over Sector
24 x F-16CJ	SEAD for 24/7, 4-ship over Sector
4 x RAF Tornado GR-4	Periods of poor weather at night
4 x AC-130U	8-10/7 night coverage
MQ-1	20 hours
1 x platoon of HIMARS	As available

The three basic categories – SF, ISR and NTISR – had to be carefully coordinated to maximise economy of effort. Given the size of western Iraq and the fact that Counter-TBM resources were ultimately limited, it was important to avoid duplicating search areas. A daily Counter-TBM VTC was to be conducted throughout Operation Telic to provide all the 'players' with regular updates on the progress of the campaign, prioritisation, and the commander's intent. Beyond this, a discreet communications net was established known as the TST West HQ Net.

Under the Operation Telic SPINS, all air assets assigned to western Iraq were directed to monitor this net to the maximum extent possible.

Western Iraq was divided into four Areas of Operation (AOs) – north, south, east and west – and each AO was assigned to specific numbered ground task forces. For example, TF 64 was assigned to the eastern AO and TF 14 to the northern AO. Each AO included a number of Joint Special Operations Areas (JSOAs), which corresponded with the kill-box grid system employed by the coalition air forces. Ground units in the JSOAs were responsible for searching them for Scud activity and were also protected by strict fire support control measures – a vital safeguard against fratricide. Outside the JSOAs, fire support control measures could also be applied but they were less rigid, and air assets were responsible for the Scud hunt. The control and coordination tasks performed by air support machinery like ASOCS and DASCs on the main coalition axis of advance were undertaken by CJSOTF-W's Joint Fires Element, which received fire support requests from subordinate ground units and passed them to the relevant authorities in the CAOC.

Apart from the task forces involved in the Scud hunt, certain entirely separate forces, including the US unit known as Delta Force (TF 20), were also planning to deploy into western Iraq in the event of war. Delta Force was to be subject to the direct command of the CFC, and their primary objective was to locate Iraqi WMD, although they could be rapidly re-tasked in accordance with strategic priorities. For those involved in Counter-TBM operations, this unquestionably complicated matters. Their CONOPS noted:

> TF 20 JSOAs will have different dimensions, restrictions, contact procedures and possibly different engagement criteria for SCUDs and SCUD-related equipment than other CJSOTF-W JSOAs. These differences will be outlined in the ATO and ACO.[39] Aircrew will ensure that these differences are briefed. Airborne C2 (normally AWACS) will disseminate changes to TF 20 JSOAs if they are changed inside the ATO cycle.

However, TF 20 JSOAs would at least employ the same kill-box grid system to define JSOA boundaries as the ground units committed to Counter-TBM, and TF 20 also positioned liaison officers at the CAOC and at headquarters CJSOTF-W to coordinate operations.

39. ACO – Airspace Control Order.

At the end of January 2003, the OC 3 Squadron could reflect on the progress of his preparations with considerable satisfaction. 'Although there are some rough edges to the plan,' he wrote, 'I feel that there can be no better example of UK and US land and air forces integrating together in pursuit of such a clearly defined objective: to deter Saddam Hussein from launching Al-Hussein (AKA Scud) missiles towards Israel.'

> The level of co-operation and understanding … is unique. We have truly integrated the mobility and stealth of the SF with the firepower of fast air. We know our customers on the ground, we know our partners in the air (USAF ANG)[40] and we know the targets we are looking for (Scuds). Moreover, we have been part of the development of the doctrine that underpins the plan. I am confident that we can strike Scuds quickly when we find them; I am not so confident that we can find them in the first place.

It was at this stage, however, that 3 Squadron's work-up for Operation Telic became much more difficult. Although providing invaluable training opportunities, the exercises in Jordan and the US, together with their respective trails, reduced the flying opportunities available to the squadron as a whole, and preparations for deployment back to Jordan also impacted on their flying effort. To make matters worse, two of 3 Squadron's most experienced pilots – pilots who had trained for the Counter-TBM role – were posted to the Harrier Operational Conversion Unit for the Qualified Weapons Instructor (QWI) course. This can only be described as an extraordinarily short-sighted ruling, given the over-riding strategic importance attached to the prevention of Scud launches. They were replaced by experienced pilots from the other Harrier squadrons, but these aircrew had not benefited from the extensive exercises and rehearsals that 3 Squadron had conducted in the preceding months. Then, in February, 3 Squadron's deployment plans were thrown into a state of near-total disarray. To explain this, it is first necessary to consider the steps being taken at the same time to establish an RAF DOB at Azraq.

Since the early stages of Counter-TBM planning, senior British commanders including the designated UKACC had expected that the USAF would provide the majority of essential support facilities at Azraq. However, when Group Captain Kirkpatrick and his reconnaissance team arrived at the base during Exercise Desert Thundercat, it became clear that the Americans would not be able to furnish

40. ANG – Air National Guard.

domestic accommodation, technical accommodation, security, and vehicles. The most that could be expected was aviation and ground fuel.

Fortunately, the base's limitations had already resulted in the erection of a new tented camp for exercise participants, and the Royal Engineer and RAF officers responsible for its construction had had the foresight to ensure that it was sufficiently robust to remain functional after Desert Thundercat ended. The tents were pitched on a tarmac and hardcore base, and utilities were built to withstand the rigours of extended exposure to the harsh desert climate. There were 25 portaloos, shower blocks and sinks, and there was also a corrugated iron kitchen. The accommodation tents could house up to 10 personnel each and boasted air conditioning, heating, electric lighting, plywood floors and UK electrical sockets. The camp was not optimally located for force protection, but it offered an immensely valuable alternative when it became clear that USAF accommodation would not be available. Essentially, scope existed to begin operations from Azraq with only a minimum of additional preparatory work.

As USAF deployments for potential operations against Iraq had already started at Azraq at the time of Desert Thundercat, it was essential to leave a small British contingent at the base after the exercise to ensure that UK interests there were represented. Reports received from these personnel subsequently proved crucial in ensuring that the future DOB executives were kept informed about conditions there and were well prepared for the tasks they would perform on their return. The UK presence was strengthened on 28 January by the deployment of the DOB Commander's future Chief of Staff along with the future OC of the DOB Tactical Logistics Squadron. The DOB Commander himself arrived a few days later along with 533 Survey Troop Royal Engineers.

The detachment did not receive any written directives concerning its mission, operational capability, dates or rates of effort. The DOB Commander was simply briefed to exercise (in his words) 'the thick end of mission command'. Indeed, it was only after he had arrived in Jordan that he learnt that the DOB was to support two PR9s from 39 (1 PRU) Squadron, as well as the GR7s. At the time of his deployment, UK air and ground planners were still suggesting that FOC might be required in mid-February, in the expectation that an air campaign against Iraq might begin in late February or early March. Consequently, it was necessary to set a target Initial Operational Capability date for the GR7s of 15 February and a FOC date for both the GR7 and PR9 detachments of 17 February. Deployment plans were duly guided by these deadlines.

Harrier GR7s of 3(F) Squadron at Azraq.

A USAF ANG F-16 about to take off from Azraq for a Counter-TBM mission.

Unfortunately, the projected date for the opening of hostilities then began to slip. When the DOB Commander was informed, he immediately submitted a slower personnel deployment plan to PJHQ and HQ STC, but it was too late. The STC deployment machine had already swung into action, and personnel and equipment began to arrive in Jordan. Between 7 and 17 February, there was a daily in-load of at least one AN-124 and numerous C-130s. By the 15th, the DOB was home to 353 RAF, Army and civilian personnel and large quantities of ground equipment, CIS, munitions and vehicles. Virtually the whole of 3 Squadron had arrived except for those pilots and engineers required to trail the GR7s out to Jordan. The Jordanian position was that the aircraft destined for Azraq should not deploy until the coalition had taken the political decision to initiate hostilities. As no such decision was forthcoming, the proposed deployment date slipped from 15 to 22 February, then to 26 February, and then into March.

The pilots who had reached Jordan had to be withdrawn to Cottesmore to maintain at least some flying currency, but the engineers and other ground personnel remained there and waited. For much of February and early March 2003, 3 Squadron was thus divided, the pilots continuing to enjoy the comforts of home-based living while the ground personnel endured the austerities of life on an air base in the middle of the desert. In the OC 3 Squadron's words, 'It was a very, very difficult period.'

There were some compensating factors. The delay in deploying the GR7s did at least provide ample opportunity to improve the facilities at Azraq so that the logistical task of deploying to the base was easier than it would otherwise have been. The DOB commander identified the following priorities for this period:

1. Develop working relationships with coalition partners.

2. Improve force protection measures.

3. Site operating locations for eight GR7s and two PR9s, including associated support equipment and personnel.

4. Extend contracts for accommodation and catering.

5. Procure new tents and ablution blocks.

6. Provide weapon storage and preparation areas.

7. Establish location for GR7 engine test tie-down pad.

Rhubb shelters replaced tents in some areas, such as the aircraft engineering site. The potential vulnerability of the tented encampment was addressed through the construction of blast protection walls, shelters, barbed wire fencing, anti-vehicle ditches and bunds, and sentry positions, and a Royal Auxiliary Air Force Squadron (504 Squadron) was deployed to provide a continuous guard of RAF areas of the base. Broader force protection problems were also tackled, the responsible RAF staff having been fully integrated into the USAF wing organisation. It became clear that the base was well protected from both TBM and air attack, for US Patriot missiles and RJAF SAM and AAA batteries had been positioned in the area, but there was a shortage of NBC protective equipment throughout February and early March. On the other hand, there was plenty of time for NBC and other Survive to Operate (STO) training. Overall, force protection at Azraq was significantly improved, although the RAF and the USAF retained some concerns regarding threats from the area immediately outside the base perimeter.

The RAF contributed to a coalition operation at Azraq, and the DOB Commander found himself working alongside the commander of the USAF ANG 410th Air Expeditionary Wing; the GR7 and PR9 detachments were completely integrated into the wing's tasking, mission planning and execution cycle. A DOB intelligence cell (in addition to the RAF squadron intelligence staff) was quickly established in the deployed US intelligence centre to provide UK input into coalition reporting and an overview of operations, and all essential CIS was soon in place.

Hence, the delay in deploying the GR7s to Azraq did at least allow base preparations to reach completion before the aircraft arrived, whereas aircraft deployed to find only limited facilities available at some other DOBs. Unanticipated problems in key areas, such as the supply of aviation fuel and air traffic control procedures, were also substantially resolved before they impacted on operational activity. Yet this was cold comfort from 3 Squadron's perspective. By the end of February, both the DOB commander and the OC 3 Squadron (who arrived at Azraq on the 27th) were becoming deeply concerned about the impact of the delay, which had caused a sharp reduction in flying training, leading to skill fade and loss of currency. Relatively few GR7s were available for flying in the UK as many were undergoing preparation for deployment, and most of 3 Squadron's engineers were in Jordan. The other two GR7 squadrons provided as much help as they could, but opportunities for flying training remained very limited and were chiefly confined to periodic qualification renewals such as Qualified Flying Instructor (QFI)/QWI checks and instrument rating tests, rather than tactical flying. The repeated backward adjustment of the deployment schedule also prevented the pursuit of a coherent training programme.

The position was made even more serious by the very nature of 3 Squadron's task in western Iraq. Only eight of the pilots earmarked for deployment had flown from Azraq before, and some had not had an opportunity to participate in Counter-TBM rehearsals. Yet their mission was to be exceptionally demanding, involving multi-agency time-sensitive targeting and emergency responses to calls from friendly ground forces. The GR7s had also to be ready to support the ground infiltration into western Iraq, which was to occur before A-Day. Finally, due to the delay in their deployment, it had been possible to prepare all 3 Squadron's GR7s to carry EPW II bombs. While this additional firepower was very welcome, neither the pilots nor the armourers had any previous experience with EPW II, nor would they accumulate any until the aircraft arrived in theatre.

For all these reasons, there was a particularly pressing need to move the GR7s into theatre. Yet the necessity for OPSEC prevented use of the normal diplomatic clearance channels and it was difficult to exert the necessary leverage through the senior US and Jordanian commanders at Azraq. In the end, clearance to deploy was only secured through the combined efforts of CDS, the CFC, and the Commander of British Forces in Jordan (COMBRITFOR Jordan), Brigadier (later General Sir) Adrian Bradshaw.

On 9 March, 8 GR7s finally trailed out from Cottesmore to Azraq, routing via Akrotiri, where they were serviced by 1 Squadron engineers. In theatre, their initial sorties were flown the next day in support of a ground exercise, which had been planned in the expectation of their arrival. Further exercises followed to cement operating procedures and provide pilots with at least some desert familiarisation. From the 16th, they were able to obtain limited experience of flying over Iraq under the auspices of Operation Resinate. In all, four missions were ultimately flown south of 33ºN on 16 and 17 March during which the GR7s imaged several potential Scud hide sites, but high cross winds prevented all flying on the 18th.

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Very little planned tasking awaited 3 Squadron during Operation Telic: their missions were largely mounted on a reactive basis. Yet the first night of the campaign was very different in that the squadron provided carefully choreographed support to ground units moving into Iraq. The transition to Telic occurred at 1800Z on 19 March. At that precise time, the coalition plan stipulated that SF should demolish the berms on the Iraqi-Jordanian border and advance into Iraq, while two GR7s crossed the 33rd parallel, thus moving north of the southern NFZ. Their chief focus was the four-lane Highway 10 that ran east from the border crossing point. About 15 miles from the border was an Iraqi barracks, from which

a response was expected after the initial ground infiltration. The GR7s' task was to screen coalition ground activity by monitoring the highway. In all, some six aircraft (three pairs) were involved, relaying between the tankers and the AOR.

There were minor hitches on the ground when, for example, vehicles got stuck in sand or suffered mechanical problems; but there were no serious repercussions in the air except that at least one pair of GR7s remained on task for considerably longer than expected, their mission ultimately extending to nearly nine hours. Otherwise, the only unplanned eventuality was the appearance of a USAF AC-130 gunship that did *not* boast secure radio. From the very outset, virtually all Counter-TBM planning had assumed the employment of secure communications. Now the GR7s and the supported ground units were joined by a vitally important (and otherwise extremely capable) close support asset that was not equipped with them. Consequently, despite all the plans to the contrary, operations on the first night were conducted 'in clear'.

Otherwise, this opening phase of Operation Telic ran very smoothly. Limited Iraqi resistance was quickly overcome, and the GR7s were not called on to attack any ground targets. The OC 3 Squadron described the scene thus:

> For 7 hours last night (19/20 Mar) we were fully integrated with the SF scheme of manoeuvre. From blowing up the berms on the border, through 2 firefights, across a 4-lane highway and into the desert beyond … Moreover, acting as a recce screen, we were able to guide 40-odd vehicles around inhabited areas whilst monitoring enemy barracks for activity with TIALD. For 7 hrs the GFACs were in constant radio contact passing information from ground to air and from air to ground such that the situational awareness was awesome … Did I say 7 hours? Try 8 hrs 50 mins! I think I completed the CR(N)[41] syllabus in one sortie.

The next day, 20 March, saw the true beginning of Counter-TBM operations, 3 Squadron's GR7s joining the USAF A-10s, F-15s and F-16s to provide continuous 24-hour coverage of the western desert. Each day was divided into six four-hour periods and the squadron was responsible for two of these, representing a minimum period of eight hours per day. Missions were flown both day and night. On the 20th itself, there were five GR7 missions (all pairs) in western Iraq, three during the day from morning to early afternoon, and two in the evening. At this

41. CR(N) – Combat Ready (Night).

early stage, the task was confined to the more westerly border areas of the desert, the town of Ar Rutbah being the most easterly landmark. Each pair searched a number of suspected Scud hide sites, one TIALD-equipped aircraft conducting the search while the other provided cover. They were assigned two or three on-task periods, which were sustained by AAR in Saudi airspace. No Scuds were found, and the only air strikes required were assigned to assets equipped with GPS-guided weapons – USAF aircraft carrying the Joint Direct Attack Munition (JDAM). The GR7s were carrying PW II rather than EPW II bombs that day. Otherwise, a noteworthy episode that evening was 3 Squadron's first encounter with TF 20, which was observed capturing H-3 airfield, with accompanying impressive 'fireworks and explosions'.

On 21 March, having reacted to calls for support from the ground, the GR7s were held back while USAF aircraft serviced the target; subsequently, they were directed against an Iraqi Flat Face radar but were unable to reach the target area before the USAF destroyed it. Yet the day was more productive in other respects. Although no Scuds were found, the dedicated SF-support function worked well, with further reconnaissance and 'screening' tasks for TF 14 being successfully completed.

It was also on the 21st that 3 Squadron released their first ordnance (and their first EPW II bomb), targeting S-60 AAA to enable F-16s to attack four guard towers at a water treatment plant at Al Qa'im, on the Iraq-Syria border, in support of TF 14. The town had always been a major focus of coalition interest, for several of its factories and industrial sites had been linked to Iraqi WMD storage and possibly development. Many of the Scuds launched in 1991 had been stored at Al Qa'im, and there was strong recent intelligence to suggest that preparations had been made to launch Scuds from the water treatment facility.

However, coalition SF found themselves poorly placed to capture a town defended by a crack brigade of the Special Republican Guard as well as regular Iraqi army units. Another pair of GR7s was tasked against suspect ground troops and vehicles, which were duly found and followed. The contact was subsequently passed to other coalition aircraft.

The Al Qa'im water treatment facility, which was linked to Scud activity by coalition and Israeli intelligence.

Iraqi Scud launch doctrine involved marking a white line on the ground in the firing area; one such line was spotted at the Al Qa'im water works on 30 January 2003. The door of the adjacent building had also been enlarged.

On 22 March, 3 Squadron executed another five missions. These began with NTISR tasking over possible Scud hide-sites at specified locations (identified by the relevant kill-box references), but the GR7s were then often re-tasked to support ground units. A further attack on the Al Qa'im water works scheduled for the evening was aborted when the CAOC withheld authorisation, but two subsequent missions targeted bridges in the Ar Rutbah area. Although primarily to prevent the movement of missiles, their destruction (part of a broader bridge-busting campaign) would also have hindered Iraqi troop deployments towards areas where coalition SF were operating. One attack with EPW II missed the target because the pilot forgot to activate the weapon's thermal battery – a direct result of his inexperience with it, and the lack of prior training opportunities – but the two bridges were then successfully attacked with laser-guided PW2s.

The two morning missions dispatched on the 23rd were tasked to investigate possible enemy military activity in the Asad area – the GR7s' most easterly penetration so far. Some military vehicles were spotted, but the on-task E-3D would not clear them for attack. The GR7s afterwards flew on to H-2 airfield, where they identified enemy aircraft in berms and some suspicious cylindrical containers, but the E-3D again withheld permission to strike, and the targets were passed on to US A-10s. One pair also carried out BDA on the bridges bombed the previous day.

One of the three evening missions had to interrupt its search of possible Scud hide sites when five potentially hostile radar tracks were detected over the western desert. All aircraft airborne over the western desert withdrew south, but it later transpired that the five suspect contacts were US Tomahawk Land Attack Missiles (TLAMs). The second GR7 pair set out on the usual Scud hunt and was then tasked to assist TF 14 in the Al Qa'im area. After a long struggle to establish air-to-ground communications, they were forced to pass on the task to the final GR7 mission of the day, and these aircraft eventually made contact with the ground unit and were cleared to target four separate DMPIs, all of which were hit. EPW II proved its worth as an all-weather munition, GPS guidance enabling an attack that would otherwise have been prevented by extensive cloud over the target area.

On the 24th, poor weather seriously interfered with operations, and there were no morning missions. The first two evening missions were also aborted in the air because of the weather, but two further GR7 pairs were then tasked over Ar Rutbah and H-2 airfield before being directed to attack buildings and ammunition storage areas near H-3. Again, with thick cloud over the target area, EPW IIs were employed to good effect. Ar Rutbah, H-1 and H-2 remained the focus for three of the four missions flown on the 25th, all of which were tasked to attack fixed targets, including a headquarters building at Ar Rutbah and an ammunition storage

area. The other pair of GR7s, having checked several hide sites, had insufficient fuel to fulfil tasking against an ammunition storage depot to the west of Baghdad. The next day witnessed further adverse weather, but another eight GR7s nevertheless took to the air, initially flying in the H-2 area. Later, one pair attacked Iraqi trenches defending the Al Qa'im water works, and the other released four EPW IIs on to a target in Ar Rutbah.

The period from 27-31 March was one of considerable frustration for 3 Squadron. The CFACC re-emphasised that the Counter-TBM mission was his top priority and stressed the need for disciplined ISR action from both the air forces and coalition SF, as opposed to the random interdiction of whatever military targets were available. And so the Scud hunt continued relentlessly, with GR7s often refuelling three times per sortie and remaining airborne for six hours. Battlefield surface-to-surface missiles were spotted and targeted by coalition aircraft as far west as H-3, but no longer-range missiles were found. The few targets attacked by the GR7s during this time were of a secondary nature and were referred to by some pilots as 'dump targets'. The weapon bring-back rate was inevitably high – a growing problem because munitions become life-expired after a given number of hours in the air. During Operation Telic, 3 Squadron destroyed more Mavericks on the ground than they launched in anger. Soon, it was necessary to introduce a policy of returning weapons to storage when they became 75 per cent life expired so that they could at least be used for training or trials when Telic ended.

On the ground, DOB personnel had moved on to 24-hour operations when hostilities began. Expecting the base to be targeted by Iraqi missiles, they always carried full NBC protective clothing and equipment. Yet it soon became clear that the US TBM warning system could be counted on to anticipate such attacks, and they were confined to the Southern Iraq/Kuwait border area in any event. Azraq was never directly threatened and there were not even any bunker runs. Weather conditions were sometimes challenging. On one occasion, a high wind blew up suddenly, picked up a toilet block and deposited it on the DOB mess tent, destroying the tent and slightly injuring three personnel. But host-nation relations provided the DOB Commander with his main source of concern. During the first week of Operation Telic, vocal support for the Iraqi government among some sections of the Jordanian population gave rise to a range of security worries, and it was necessary to keep force protection postures under constant review. However, in time, relations with the Jordanians improved again as it became clear that many Iraqis supported Saddam Hussein's removal.

From the engineering perspective, the rapid accumulation of GR7 flying hours brought with it a penalty in terms of scheduled servicing. It quickly became clear

that there was no prospect of keeping the necessary minimum of six aircraft per day available for operations if scheduled servicing requirements were to be fulfilled, and the DOB Commander therefore requested the deployment of an additional GR7 from Cottesmore. The aircraft duly arrived on 4 April. The squadron's all-important TIALD pods suffered from periodic unserviceabilities, which required some robbing between pods while spare parts were awaited from the UK, but serviceability was just sufficient to ensure that one TIALD-equipped aircraft flew on every mission.

On 27 March, one GR7 mission was tasked against hardened shelters in the area of Shab Al Hiri, which were attacked with two EPW2s, but the other five pairs that took to the air that day did not receive any tasking other than hide-site reconnaissance. Two missions were curtailed by a lack of AAR capacity. The next day, the squadron did not release any weapons. The tasking assigned to one mission was frustrated by communications problems with a ground controller, while two more possible targets (aircraft and a convoy of vehicles) were not cleared for attack by the on-task E-3D. The two other pairs airborne on the 28th returned to the Ar Rutbah and H-1 areas, one observing a US airborne assault on the airfield by TF 20.

The first morning mission on 29 March was tasked to identify Iraqi artillery positions north of Ramadi but came under fire from AAA at Asad airfield while in transit; there were also indications of SAM guidance, although no missiles were seen. Iraqi ground targets in the area were subsequently engaged by A-10s; however, when the GR7s were directed to attack an Iraqi tank, no GPS coordinates were available, and the Maverick display was not clear enough to allow the target to be identified. One of the GR7s later released two EPW IIs against planned secondary targets – support buildings – at H-2, which was on the point of being attacked by TF 14. The second mission was instructed to locate ground targets in the same area as the first but was prevented from doing so by poor weather. Again, the GR7s attacked a building at H-2 on their way back to base. The third mission had no more luck searching for targets – primarily because they were at first sent to the wrong location – but they would also later attack H-2. Otherwise, the three reconnaissance missions flown that evening were uneventful.

On 30 March, the western desert AAR area was moved north into Iraqi airspace. This reduced the time spent by the GR7s (as well as other aircraft) in transit to and from tankers and allowed them to hold for longer in the AOR. The six missions flown by 3 Squadron that day were tasked with the usual Scud hunting, although two pairs also provided direct support to SF east of Ar Rutbah by flying ahead of the ground units and watching for any hostile movement along their intended route. In the event, none was observed. A third pair (call-sign Rabid)

established contact with a Predator operator and was tasked against a Roland SAM in an open location on Asad airfield. One of the GR7s (Rabid 21) made several approaches but found the target area obscured by cloud; Rabid then passed the target to two more GR7s, which were unable to attack for the same reason. However, after tanking, Rabid returned to the area to find that visibility conditions had improved. The Predator operator, who was still observing the target, then offered his laser-designation capability to the GR7, and the result was a successful EPW II strike. This was the first time an RAF fast jet had conducted a cooperative attack with RPAS.

A fifth pair was tasked to search for Iraqi ground forces between Ar Rutbah and Ramadi. None were observed but the GR7s did locate a military compound containing vehicles and possible weapons storage facilities, and this intelligence was duly passed back to the CAOC. One further mission on 30 March involved two GR7s working under the call-sign Llama. After their initial search for Scuds, they were tasked to provide air cover for the emergency recovery of one of the coalition SF task forces, TF 7. The extraction of TF 7 will be considered in more detail in the section of this study covering Tactical Air Transport and Support Helicopter operations.

The progress of the Counter-TBM strategy at this stage can be summarised as follows. First, there had been no overt Israeli intervention in the conflict with Iraq. To that extent the strategy had been completely successful. Second, the SF-support role had functioned very effectively. Yet no Scuds had been found. It may be that Iraq no longer possessed any TBMs with the range to hit Israel from the western desert by 2003, but this was not known at the time. As the launch of just one missile might have spelled disaster for the coalition, the CFC was adamant that the assets assigned to Counter-TBM should continue their operations. However, there was inevitably some disappointment among the units concerned at the lack of 'trade' and a mounting desire to contribute more tangibly to the overthrow of Saddam Hussein. The close US-UK co-operation that had characterised the preceding months was soon rather less evident. At one stage, continuing British suspicions to the effect that the USAF were being assigned the majority of available targets caused the DOB Commander to request a change in the balance of search versus air interdiction/CAS tasks through the UK ACHQ. At the same time, the various Counter-TBM force elements set out to find alternative employment.

Luckily for the GR7 detachment, an entirely new and unexpected requirement for CAS was about to emerge. The OC 3 Squadron later described the situation:

> We talked about how we rehearsed this [Counter-TBM strategy] and we rehearsed with the real people. What was thrown right in the middle of all of this was TF 20: the TF 20 Rangers outfit. They were there to find the smoking gun. And they had their own private air force, A-10s and I think it was F-15s that they had, from down south. A completely separate entity to us, and they came right in the middle of us, and we were absolutely gobsmacked by this. And it's obviously one of these very kind of hush-hush outfits, and so we worked round it. But, as it ended up, we did most of our trade with TF 20.

By the end of March 2003, TF 20 had still not located the smoking gun, but another mission had been found for them. In the 1970s, the Iraqis had started to dam the northern stretches of the Euphrates River to create sources of hydro-electric power, and a massive dam and reservoir had been completed just north of the town of Al Haditha in the following decade. Shortly after Operation Telic began, CENTCOM was warned that the Iraqis might destroy the Haditha Dam, partly to flood the lower Euphrates valley and impede the coalition's advance and partly to deny hydro-electric power to any post-Saddam Hussein regime. Then, on 29 March, a substantial Iraqi force, including tanks, self-propelled guns and artillery was identified on the eastern bank of the Euphrates only a short distance from the dam, and CENTCOM became concerned that it was under immediate threat. As we have seen, TF 20 were at this time in the process of capturing H-1 airfield some 50 miles to the south-west so that it could be used as a FOB, but they were swiftly redeployed.

In support, coalition air power targeted the Iraqi troops near the dam. Several uncontrolled strikes were executed on the 29th, while further aircraft were directed on to tanks and other military vehicles by a TF 20 FAC on the 30th, although 3 Squadron were not involved in these operations but were instead largely assigned to reconnaissance duties. At least one pilot recorded afterwards that he had been 'surprised not to be tasked into kill-box 90AO [which encompassed Haditha Dam] as the two-ship was armed with Maverick, and numerous suitable targets, such as arty and armour, were emerging.' The presence of the FAC in the area on 30 March demonstrates that at least some TF 20 personnel had already been infiltrated by that date, but the main force appears to have arrived in the area the next day.

On the 31st, GR7 operational activity in the morning involved three missions in a fruitless search for Scuds and then tanks that had been reported in the Ramadi area. Cloud cover caused each pair to descend to altitudes between 10,000 and 12,000 ft, despite numerous SAM indications and the presence of AAA batteries

in the vicinity, but no tanks were found. Another mission that evening was sent to Asad and then conducted CSAR duties near the Syrian border, seeking two missing TF 7 personnel without success. But two further pairs, having visited the usual hide sites, were sent to Haditha Dam to support TF 20. They both surveyed the area around the dam without seeing any Iraqi troops. Nevertheless, it is clear that the lightly armed SF who first took up positions on the dam soon found themselves engaged in a fierce fire fight with more numerous Iraqi forces equipped with heavy weapons and mortars. TF 20 certainly sustained casualties, although the numbers involved are uncertain: the documents record casualty evacuations on both 2 and 3 April, on which date three dead and two stretcher cases were involved.

Activity over Haditha Dam was virtually continuous on 1 April, with the first RAF E-3D alone (there were three per day) recording 10 separate attacks against troop concentrations, buildings and guns. Deconfliction between ground and air forces – one of the greatest challenges involved in CAS – proved relatively straightforward because the entire TF 20 force was at this stage positioned on top of the dam. The first GR7 mission on the morning of 1 April was immediately tasked to the dam and passed to a TF 20 ground team. The fighting had temporarily subsided at that time, and the GR7s were therefore directed to look for three patrol boats crossing the reservoir. The boats were duly identified, and the aircraft were then cleared by the FAC to strafe them – a difficult task given that the GR7 had no gun! Next, the leader tried to lase the nearest boat to the shoreline in preparation for a PW II attack, but he could not hold the laser on the boat. His wingman then executed an attack with an unguided 540 lb bomb but missed the target. After tanking, the pair returned to the dam to find that TF 20 were again being shelled. The FAC quickly tasked them against the artillery involved, and two PW IIs were dropped directly on to the Iraqi position.

The second GR7 mission reached the dam soon after the first and was again tasked to attack the patrol boats. In this instance, one aircraft was equipped with Maverick, and the pilot found that a single boat out on the water made a near perfect target for the missile's IR-based display, appearing as a tiny white dot against a black background. It was duly destroyed. The remaining boats, which were on the shoreline, were attacked with a PW II; the bomb narrowly missed but was thought to have caused some damage. The two GR7s were then directed to attack a mortar position south of the dam. A free-fall 540 lb bomb missed the target, but another PW II attack registered a direct hit. A third pair of GR7s then arrived over the dam but found that a formation of US F-16s had got there first and was monopolising such tasking as was available. That evening, two pairs were diverted further east to investigate a reported (presumably short-range) TBM launch, but an extensive search revealed nothing of interest. One further GR7

mission was also tasked with the search but returned to Haditha Dam after tanking and found that TF 20 was still taking fire from Iraqi troops to the south. The lead aircraft made two passes over the Iraqi positions, releasing one PW II on each pass.

On 2 April, the fight for the dam intensified, and coalition aircraft flew throughout the day in support of TF 20. So many aircraft were queuing up for tasking that the airspace over Haditha threatened to become dangerously congested. Six missions were flown by 3 Squadron, all of which released ordnance. On a number of occasions, when a lack of GPS coordinates prevented USAF aircraft from executing attacks with such weapons as JDAM, the GR7s could still bomb by employing EPW II in laser-guided mode.

Nevertheless, weapon-to-target matching emerged as an issue, for the smaller and more mobile targets were often difficult to hit with PGMs. Moreover, while the precision of weapons like PW II, EPW II and Maverick often ensured the destruction of particular Iraqi positions or individual pieces of equipment, other nearby enemy units sometimes emerged unscathed. On occasion, it appeared to some pilots that cluster weapons might have inflicted more widespread damage or provided a solution in other circumstances when PGMs could not be used. Yet the continuing priority attached to Counter-TBM ensured that they were rarely carried. Apart from the PGMs, 3 Squadron typically flew with 540 lb free-fall bombs. Compelling as such arguments might appear, it is worth remembering that the only cluster munition available, RBL755, proved very inaccurate when it was used by other RAF detachments during Operation Telic.

The first GR7 mission that day was tasked against Iraqi military vehicles. An initial strike with a 540 lb bomb was unsuccessful, but a follow-up attack with Maverick achieved a direct hit. The TIALD-equipped aircraft dropped a laser-guided EPW II on to another of the vehicles and, after tanking, executed a further EPW II attack using GPS guidance. The second GR7 pair reached the dam and received instructions to target a group of military vehicles parked on a football field to the south of Haditha. The vehicles were clearly visible from the air but were located close to civilian buildings, and the collateral damage risk was such that clearance to bomb was withheld. After tanking, the GR7s were sent to assist an entirely separate coalition SF unit, which had also been engaged by Iraqi forces some 60 NM north-east of Haditha. The Iraqis were positioned in an easily identifiable building in an open area of desert, and a FAC was on hand to talk the aircraft on to their target. A single PW II hit the building and caused considerable damage without detonating, but a second attack then completely destroyed it, and the GR7s were afterwards warmly thanked by the FAC for their efforts. The third GR7 mission of the morning was again sent to Haditha Dam and assigned to a TF 20 FAC, who requested the destruction of another building being used by Iraqi

troops. Two EPW IIs were released, one of which destroyed the target. Subsequently, the two GR7s were re-tasked to search for the crash site of an F-14 that had been downed that day, but nothing was found.

On the evening of 2 April, 3 Squadron flew three further missions. The first was twice compelled to take evasive action by Iraqi AAA, which was seen exploding nearby as high as 19,000 ft. After tanking, the two GR7s were tasked to work with TF 20 FACs and succeeded in identifying Iraqi artillery, which was engaging troops on Haditha Dam. But the TIALD aircraft then suffered a laser malfunction and was unable to bomb. The other GR7 could not acquire the target with Maverick and so released an unguided 540 lb bomb, which landed short. The next pair (call-sign Pepsi) was again passed to a TF 20 FAC but was forced to tank before tasking became available.

Two more GR7s (call-sign Pentex) took over. The Iraqis had been observed hiding AAA equipment under a bridge. Two PW IIs were released against it, the first hitting one end of the structure, the second going straight underneath it; the detonation was followed by some substantial secondary explosions. The GR7s were then reassigned to a more routine Scud search south of Asad during which they were targeted by several SAM launches. They responded with evasive manoeuvres and deployed chaff and flares, levelling off again when it became clear that the launches were unguided. In the meantime, Pepsi returned to the dam and dropped two PW IIs on Iraqi positions.

The next morning, two missions released weapons, one near the Haditha Dam, where TF 20 was now being reinforced. After a lengthy exchange with a FAC, the first GR7 pair withdrew to refuel and then returned to the area for tasking against a tank in a revetment, which was destroyed by the TIALD-equipped aircraft. A subsequent attempt to attack a building being used by an Iraqi sniper failed due to TIALD laser problems.

The second mission was at first sent to Haditha but was then re-tasked against three artillery pieces (including AAA) near Ar Rutbah and only 13 NM from the area normally used for AAR. An initial strike with one EPW II landed in a compound short of the target, and two attacks with free-fall bombs were also unsuccessful. However, the FAC then designated for a second EPW II strike by lasing the target through a hole in the compound wall created by the first attack, and the artillery was destroyed. Afterwards, the pair conducted a reconnaissance in the Al Qa'im area. A third morning mission was sent to Haditha but received no tasking. That evening, 3 Squadron largely reverted to the search for Scuds, although at least two of the three missions were at first sent to Haditha Dam to provide CAS if it was required.

Smiles for the camera, but the Azraq Counter-TBM task was demanding in terms of sortie-generation and flying hours.

The OC 3(F) Squadron, Wing Commander (later Air Marshal) Stuart Atha

A Paveway bomb to the right beneath the wing of a GR7 at Azraq.

Maverick (with the yellow stripe) beneath the wing of another GR7.

The first two GR7 missions from Azraq on 4 April were assigned specific reconnaissance tasks, including observation of a road convoy heading for Syria and of suspected Iraqi counter-SF teams. They found the convoy but were then told to leave it – presumably because it comprised civilian vehicles; there was no sign of any counter-SF units. The third morning mission returned to Haditha Dam, but US F-16s were already present and working with the FACs. That evening, three further missions received equally unproductive reconnaissance tasking: reported tanks, Scuds, Scud equipment, SAMs and general Iraqi ground movements were investigated, but nothing significant was seen. One pair of GR7s held for a time near Haditha Dam but was not required to intervene.

On 5 April, the Azraq GR7s executed two further attacks in the Haditha Dam area, again working under FAC direction. The first pair was talked on to Iraqi mortar positions in a building, which it destroyed with a single PW2. The second (call-sign Gospel) was tasked against another building from which incoming fire was not merely reported but audible to the pilots via radio transmissions during the FAC's talk on. As the OC 3 Squadron recalled, 'You could hear the mortars coming in and going off around them.' Again, the building was demolished. 'Gospel, that was perfect,' the FAC remarked. 'Just what we were looking for.' The two Gospel GR7s were afterwards sent to the K-3 airfield to search for reported AAA pieces in revetments, but poor visibility frustrated their efforts and the task was eventually passed to other aircraft. The struggle for the dam continued, and GR7s were sent back to the area later that day, but they were ultimately directed to search for Scuds and perform reconnaissance activity along Highway 10 and in the Asad and K-3 airfield areas. Another coalition SF formation had mounted an attack on K-3 that day, and signs of the resulting firefight were clearly visible from the air.

It would be nearly a week before 3 Squadron released weapons again, and only three more missions would actually be called on to attack targets throughout the closing phases of Operation Telic. During this period (6 to 10 April inclusive), they flew a further 25 missions. The Scud hunt moved gradually east, but still no missiles were found. The GR7s were also sent to investigate numerous specific sightings of Iraqi vehicles heading towards Syria, including armoured vehicles and convoys, in an area bordered by Al Qa'im in the north-west and Ramadi to the south-east. However, when it proved possible to find the vehicles concerned (and the task was frequently hampered by cloud cover and fuel considerations), they invariably proved to be non-military.

Perhaps the most valuable work accomplished by 3 Squadron in this period was further reconnaissance screening for coalition ground units. By 6 April, the US Rangers had brought armoured and other vehicles into western Iraq through

H-1 airfield and were moving them across the desert to Haditha Dam in preparation for the occupation of Haditha itself. On the morning of 7 April, 3 Squadron GR7s escorted them throughout their move, and one pair of aircraft (call-sign Icetop) was then tasked to reconnoitre Haditha.

At 1320 (local time) Icetop was holding above the armoured formation, which was positioned at the west end of the dam. According to the FAC, the plan was to drive two M1 Abrams tanks into the town centre as a show of force. The GR7s then flew south, observing the main road from the dam into the town. On reaching Haditha, one GR7 pilot – Icetop 21 – spotted some 30 to 40 white sport-utility vehicles assembling in the town centre; some vehicles were also parked on side streets, and others seemed to be moving in from the outskirts to this central meeting point. Icetop 21 duly relayed this intelligence to the FAC and, after some deliberation, the latter confirmed that the Rangers still intended to send in the two tanks; if they were fired on from the Iraqi vehicles, Icetop would be cleared to engage. Icetop 21 replied that any such air-to-ground attack was likely to pose a high risk of collateral damage.

Icetop 21 next investigated a water treatment plant north of Haditha, presumably on the route being taken by the two tanks. Suddenly, the pilot observed a SAM launch ahead and slightly to the left of his aircraft. He dispensed flares, manoeuvred hard, initiated a BOL IR sequence and then climbed above 20,000 ft, while at the same time warning the FAC of the SAM threat. Within 30 seconds the lead tank had assumed SEAD duty and destroyed the SAM launcher – an SA9. The two tanks then dispensed with a further five SA9 launchers before returning to the dam for ammunition. In the meantime, a formation of F-16s arrived and took over from the GR7s. Later that day, another pair flew a reconnaissance to the north-east of Haditha. Searching an area of 10 miles around a coalition ground position, they eventually spotted three unidentified vehicles at a crossroads and warned the FAC of their presence.

Beyond Haditha, there was clearly some expectation of further tasking for the GR7s around the border town of Al Qa'im, where coalition SF had become bogged down in a virtual siege by early April. Limited air and SF action in the early stages of Operation Telic had achieved little success, and attempts to secure a negotiated surrender with the Iraqis initially fell on deaf ears. However, while there was still a requirement for CAS in the area, the only emerging targets were allocated to the USAF, presumably because it was invariably present in larger numbers and for longer periods than the RAF GR7s. Such tasking in any case disappeared as the coalition implemented a new strategy involving limited ground incursions into sites suspected of housing WMD. This did not create much scope for supporting air operations extending far beyond reconnaissance.

On the 10th, a GR7 mission witnessed a SOF at an industrial complex near Al Qa'im – possibly one of the sites linked with WMD – where Iraqi workers had occupied a factory and were refusing requests from coalition SF to vacate it. The Iraqis appear to have been civilian workers, and it is not clear from the records that they were armed, but their removal from the factory would have involved an extremely difficult and potentially hazardous ground action in which some bloodshed was all but inevitable.

The SOF in this instance involved the generation of sonic booms at low altitude by a pair of F-16s. The GR7s' task was to monitor the F-16s' action and its consequences on the ground and provide further effect if necessary. In the event, the sonic booms achieved the desired result: as the GR7 pilots looked on, Iraqi factory workers began surrendering in the belief that they were under air attack. The FAC announced afterwards that the operation had been a complete success and that no further air power was required. On the following day, coalition aircraft maintained a continuous large-scale air presence over Al Qa'im in support of ongoing surrender negotiations – what one observer described as 'the Al Qa'im International Air Show for the mayor and people of the town'; at least four of the GR7s contributed to this operation. By the 16th, Al Qa'im was in coalition hands.

As it became clear that the western desert was unlikely to produce much further tasking beyond the interminable Scud hunt, 3 Squadron looked further east. The prospect of intensified CAS requirements during a climactic battle for Baghdad seemed to present opportunities. Some SF involvement was anticipated, and the squadron had conducted training in Urban CAS before deploying to the Gulf. However, the Urban CAS task was ultimately assigned to the detachments based in Kuwait and Qatar, and the level of air support required over Baghdad proved to be very limited in relation to the quantity of air assets available because of the rapid collapse of organised Iraqi resistance. There were more opportunities further north. To quote the OC 3 Squadron again:

> We ended up being tasked as far north as Mosul … We [also] went across to Tikrit. We supported TF 20 in Tikrit, and we did some missions in south Baghdad … more on-call kind of missions. And if truth be told these were missions that we'd forced ourselves onto, because there was nothing happening in the western desert, and you'd go across to the relevant agency and say we're here, we've got these weapons, we've got 20 minutes, have you got any trade? And they might occasionally send you across to other places.

Such missions were only ever mounted in addition to – not in place of – the usual hide site reconnaissance, which retained over-riding priority. Indeed, with some coalition SF units tied to the siege of Al Qa'im, others committed to the interception of fleeing Iraqi regime members, and still others being sent east to Baghdad, the residual Counter-TBM task became even more dependent on air power.

Consequently, 3 Squadron could only contribute to operations in northern and central Iraq on a limited scale. On the morning of 11 April, they flew their first mission in the north, their primary objective being Mosul, but the city surrendered shortly before the GR7s arrived. A second pair followed a very different route, beginning with a survey of hide sites around Al Qa'im and then continuing with a further CAS mission near Haditha Dam. There, they were cleared by a GFAC to attack a tank in a revetment, which was duly destroyed with a single laser-guided PW II. After the third mission of the morning had completed another uneventful reconnaissance around Al Qa'im, the first pair to launch in the evening returned to northern Iraq and received tasking at Al Sahra airfield north-west of Tikrit. The target, a large military vehicle, was destroyed with an EPW II, and the detonation set off multiple secondary explosions. The two GR7s were then directed on to an S-60 gun emplacement to the west of the airfield, which was targeted with another EPW II. According to the record, 'The weapon was seen to impact under the TIALD pod cross hairs with a large explosion.'

By the following morning, Iraqi troops around Tikrit were also capitulating, and the single GR7 mission dispatched to the area did not attack any targets. The next two pairs (call-signs Socket and Spanner) were sent south and were eventually tasked in the vicinity of Najaf to work with ground forces, who were facing another confrontation with Iraqi civilians – this time Bedouins plundering an abandoned arms depot. The GR7s again provided air presence, and one (Spanner 33) was called on to make two low-level passes, which persuaded the Bedouins to surrender six vehicles full of stolen weapons. Meanwhile, Socket had flown on to a nearby town, where two more arms dumps were located; a large crowd of Iraqis was threatening coalition forces in the area. One aircraft performed another low-altitude SOF and the crowd promptly dispersed. The three evening missions of 12 April held in the Al Qa'im and Tharthar areas but were uneventful.

Five of the six Azraq GR7 missions flown on 13 April involved only the usual Scud hide-site checks and other routine reconnaissance duties, but one pair dispatched to the Tharthar area was unexpectedly directed by a FAC to destroy a roadside building – a task successfully fulfilled with a laser-guided EPW II. Four further missions were flown the next day, after which all GR7 operations over

western Iraq ceased. The aircraft were flown back to the UK on 17 April and the withdrawal of base personnel also began.

* * *

The Counter-TBM operation executed in western Iraq during Operation Telic was a milestone in the development of fast jet support for the SF – a fact underlined by subsequent fast jet/SF collaboration in Iraq, Afghanistan and Syria. Although RPAS have come to play a more prominent role in providing air support to the SF since 2003, operations from Telic onwards have clearly shown how the defining characteristics of fast air and SF can be complementary, at the very least, and can in optimal circumstances be combined to produce an extremely potent capability. Moreover, for those involved, the Counter-TBM task also hinted at other ways in which air warfare would be conducted in future. The process by which intelligence was drawn from multiple sources and then fed into the dynamic tasking of combat air power around the AOR was streamlined to an unprecedented degree. The sensor-to-shooter time-cycle was cut to the absolute minimum. Offensive air platforms like the GR7s were integrated into this highly fluid and reactive process, which represented a marked departure from the planned air tasking so characteristic of the previous decade. The OC 3 Squadron later reflected:

> The language has changed in that the whole air-to-air reactive mindset has been brought into the air-to-ground business. Whereas hitherto frankly it's been AI, pre-planned, carefully choreographed with 10 per cent CAS, I think it's swung the other way in that 10 per cent of it is pre-planned, carefully choreographed and 90 per cent of it is where you've just got to react in the air. You've got to be responsive; you've got to be flexible; you need to be adaptable; you need to be agile.

The Scud hunt may not have yielded any missiles, but the offensive air assets committed to the Counter-TBM mission proved immensely valuable to coalition SF for reconnaissance screening and the provision of firepower. It is certain that the TF 20 force at Haditha Dam would have suffered heavier casualties without CAS, and they might even have had to withdraw. More generally, by combining SF and fast jets, the coalition opened an additional front in western Iraq during Operation Telic, which certainly had the effect of drawing west some Iraqi forces that might otherwise have been deployed along the main coalition axis of advance from Kuwait. Nevertheless, it is important not to overestimate the potential of the

fast jet/SF combination. Air power may in certain circumstances help to compensate for the basic vulnerabilities of the SF – their relatively small numbers and limited firepower – but it should not always be expected to do so.

From 3 Squadron's perspective, the general Counter-TBM operating procedures developed in the six months before Telic worked very well in most respects, and there were no serious problems. The operation was, of course, a coalition venture in which the RAF and the USAF collaborated with SF from several countries, and there were few important national lines of demarcation within this basic framework. Yet combined training and mutual familiarity was central to the ability of the committed air and ground forces to co-operate in this way. One key lesson was that, despite the obvious difficulties, fast jet/SF training should ideally be conducted on multi-national lines to ensure that different force elements retained a clear understanding of each other's operating doctrine, equipment, tactics, techniques and procedures. This was particularly important where such issues as combat identification and deconfliction were concerned because of the obvious difficulties of distinguishing between friendly and hostile ground forces from altitudes of 20,000 ft or more in a non-linear battlespace. In theory, the system of open and closed kill-boxes should have ensured deconfliction during Operation Telic, but it failed to do so on a very small number of occasions (not involving 3 Squadron). Fortunately, there were no casualties on the ground.

Otherwise, there was a degree of dissatisfaction within 3 Squadron because the co-operative spirit that characterised relations with the USAF in the months before the operation did not fully endure after hostilities began. Once it became clear that Iraqi targets in the western desert were few and far-between, it seemed to some that the Americans attempted to secure the preponderance of available combat tasking.

Yet it is important not to exaggerate the impact of US action in this regard. As we have seen, the allocation of tasking over western Iraq was very largely a dynamic process in which targets were simply assigned to the most readily available aircraft carrying appropriate weapons. As the US had committed 30 F-16s and 14 A-10s as well as detachments of B-1s and F-15s to Counter-TBM operations, they were always more likely than the GR7s to obtain such trade as the area offered. Moreover, while EPW II gave the GR7s a more flexible PGM than the Americans possessed, US aircraft were better equipped for the Scud search in other respects. In addition to systems such as JSTARS and the B-1B's MTI, the USAF ANG F-16C Plus boasted the Litening targeting pod, which provided a much clearer image of small tactical targets than the GR7s obtained from TIALD; and the US platforms were controlled and coordinated via data-links, which the GR7s lacked.

From a broader perspective, the Counter-TBM story provides a classic illustration of the strengths and weaknesses of the organic application of offensive air power. Although, on paper, the air assets assigned to western Iraq were under the command of the CFACC, they were to all intents and purposes locked into the Counter-TBM/SF-support task. As their role was so clearly defined before the onset of hostilities, they were able to train and prepare for it very thoroughly. However, when the anticipated Scud threat did not materialise, and as the requirement for SF support began to decline, it was difficult to assign them elsewhere. In any case, coalition commanders were unwilling to reduce the Counter-TBM air effort while the Iraqis retained their hold on Al Qa'im. Consequently, while much vital work was undertaken by the RAF and USAF elements involved, their strike rate was low even by the standards of Operation Telic.

This is not necessarily a criticism of the whole concept of organic air power; it is simply a reminder that it can involve the commitment of substantial resources to quite limited and specialised tasks. In short, organic air support is not cheap. The GR7s' high weapon bring-back rate demonstrates this clearly enough, but it is also revealing to draw comparisons between GR7 operations flown from Azraq and those mounted by Harrier Force South from Al Jaber. Between 19 March and 14 April 2003, 3 Squadron flew 142 missions for 290 sorties from Azraq. Some 32 sorties released weapons and 73 weapons were dropped in all. Harrier Force South, between 21 March and 14 April, flew 179 offensive missions involving 367 offensive sorties (i.e., excluding reconnaissance missions with the JRP), 117 of which released a total of 265 weapons. In other words, 11 per cent of sorties flown from Azraq released munitions compared with 32 per cent of offensive sorties flown by GR7s from Al Jaber; 3 Squadron had to fly nine sorties per weapon release, whereas Harrier Force South had only to fly three.

These figures partly reflect the fundamental difference between the two detachments' respective roles; 3 Squadron aircraft took off each day to perform NTISR, CAS, and interdiction, but a large part of the NTISR task was focused on one specific object – the Scud missile. By contrast, the Harrier Force South reconnaissance role was entirely separate from their attack role, and offensive missions were tasked to destroy virtually any legitimate Iraqi target that could be found. The Al Jaber GR7s also flew occasional planned missions and benefited from the availability of many more secondary targets than were allocated to 3 Squadron. Consequently, they were more likely to be tasked against targets. Yet their offensive capability was critically dependent on their few TIALD-capable aircraft and pods, and the over-riding priority attached to the Counter-TBM mission compelled them to manage throughout the campaign with half the number

of TIALD aircraft available to 3 Squadron (four compared with eight), and with the same number of pods (five – initially four at Al Jaber). Their struggle to maintain these mission-critical resources has already been described.

It is therefore appropriate to conclude by recalling the observations of the UK air lessons report on Operation Telic. The report described the Counter-TBM strategy as a 'highly successful, well-trained operation, which demonstrated unprecedented levels of integration between air elements and SF. In the event, the SCUD threat never materialised but this highly capable pool of assets was used extensively for TST/dynamic targets and other re-role requirements … The number of untasked assets available to the CFACC allowed dynamic tasking to be accommodated within the ATO cycle.' At the same time 'The operation also demonstrated that the RAF will require to invest in data-links, more capable targeting pods and specialist CIS tools (ADOCS)[42] … to progress these concepts.' Moreover, 'The plan for the Counter-TBM operations in the west … was a significant drain on resources.'

3. E-3D (Sentry) Operations

The commitment of a detachment of three E-3Ds to any prospective operation against Iraq was considered almost from the start of contingency planning in 2002. It was first proposed in a submission from CJO to DCDS(C) on 13 September, and HQ STC envisaged that the aircraft would be based at Incirlik, Turkey. However, their precise role in the operation was not defined in detail at this stage. It was not until December that RAF Waddington received notification to place all crews and personnel from the E-3D Squadrons on standby for a major deployment in support of the operation subsequently named Telic. As a detachment of E-3Ds based in Oman was still contributing to Operation Oracle over Afghanistan, this new requirement imposed a considerable burden on the station. The detachment was withdrawn during the second half of December, but those involved began preparations for a return to the Gulf immediately.

On 17 January 2003, the Station Commander of RAF Waddington attended the conference at HQ STC at which the Air Officer Commanding-in-Chief appraised senior station executives and group staffs of the latest planning for the operation. He confirmed that a detachment of E-3Ds would participate, although basing and other host-nation issues had still to be finalised. As we have seen, the US operation

42. ADOCS – the Automated Deep Operations Co-ordination System. This was a software tool that enabled rapid cross-component coordination of effects; it was employed in the TST cell in the CAOC during Operation Telic.

plan – OPLAN 1003V – envisaged three separate E-3 orbits, each of which would perform airborne warning and command functions for the joint campaign. The USAF did not have enough E-3s to meet this demand and their other global commitments. Three RAF E-3Ds were therefore required to maintain one 24-hour orbit covering western Iraq, which represented one third of the overall task. They would primarily focus on supporting the strategically vital Counter-TBM mission. This tasking left the aircrew assigned to the deployment with very little time to familiarise themselves with the Counter-TBM CONOPS, whereas some of the RAF and USAF elements involved had already been preparing for it for several months.

The initial E-3D deployment plan was issued on 23 January and envisaged a detachment drawn from both 8 and 23 Squadron (six crews from 8 Squadron, three from 23 Squadron), which might deploy for up to six months. All of those concerned were soon involved in strenuous work-up activity in the air and via simulator and other ground training, practising the procedures that would be used in any future conflict with Iraq. Two crews also participated in an exercise entitled Desert Pivot at Kirtland Air Force Base, New Mexico. This was a combined simulator exercise incorporating a variety of assets in addition to E-3Ds, including Compass Call, Rivet Joint, combat aircraft and tankers.

Controlling the number of assets assigned to the western desert within time-sensitive or even time-*critical* parameters promised to impose a considerable workload on the E-3D crews. The E-3D was procured in the 1980s chiefly for air defence and could originally accommodate only two Weapons Controllers. In the Kosovo conflict, three had barely been adequate. However, subsequent configuration changes meant that by 2003 it was possible to employ the E-3D with an enlarged four-man Weapons Control team and a Fighter Allocator. Although by no means standard, this was the arrangement chosen for Operation Telic.

To meet the additional demand for Weapons Controllers and fill gaps in other crew positions in the planned E-3D detachment, 23 Sentry Conversion course flew training missions at every available opportunity. Another enhancement introduced into the E-3D fleet since Kosovo was the Joint Tactical Distribution System (JTIDS), also known as Link 16. Prior to Telic, under UOR procedures, an improved tracker was ordered with the capability to track contacts to the very high degree of accuracy that Link 16 platforms required.

Basing arrangements were finalised by the end of January: the E-3Ds were assigned to PSAB in Saudi Arabia, which accommodated the existing Operation Resinate F3 detachment. For Telic, as we have seen, it would also provide basing for additional F3s, a Nimrod R1, Nimrod MR2s and VC10 tankers. Deployment was to take place in the second half of February. However, other aspects of the E-

3D plan were subject to revision. The basic task of the detachment involved a single orbit for 24 hours per day for an unspecified period, providing airborne warning and ABCCC for operations over the western desert while US E-3Cs performed equivalent functions on the central and eastern orbits. To achieve the western desert task, three E-3Ds would be employed for successive eight-hour periods on station. Originally, this commitment was expected to necessitate the deployment of five aircraft and nine operational crews (at the time representing all the operational E-3D aircrew at RAF Waddington) supported by two full shifts of first-line engineering personnel.

Yet it soon became clear that the availability of accommodation and ramp space at PSAB would determine the force size and structure, and the constraints were such that the E-3D detachment had to be reduced to four aircraft and six crews. The Detachment Commander warned that the 24-hour orbit might prove difficult to sustain in such circumstances, as both crew fatigue and aircraft availability would be limiting factors, but the risks had ultimately to be accepted.

The E-3Ds' departure for PSAB was delayed by difficulties obtaining Egyptian and Saudi diplomatic clearance for over-flight and landing, but an advance party deployed on 24 February and immediately began setting up the necessary operations, mission briefing and flight support facilities. Two aircraft – with two crews – followed on the 28th. The remaining two E-3Ds and two further crews flew to Saudi Arabia on 2 March, leaving the last personnel to deploy three days later.

The first two weeks on the base were to prove challenging. Airlift constraints delayed the deployment of essential equipment, and some of the equipment that did reach theatre (mainly CIS) was temporarily impounded by the Saudi authorities on procedural grounds. Early flying had to be undertaken without the benefit of the E-3D mission support system, which only became fully functional after 10 March. There was also a serious shortage of motor transport, a severe handicap given that PSAB was roughly the size of the Isle of Wight and that the coalition complex, where some of the detachment sleeping quarters were located, was a 30-minute drive from the main base operations area (known as 'Ops Town'). The standard of accommodation at PSAB was better than expected, but domestic and office accommodation were overcrowded, some mission-critical personnel having to sleep four to a room. Temporary facilities such as portacabins and tents provided a partial solution, but these were not initially backed by much in the way of supporting infrastructure. Strenuous efforts were soon under way to remedy the various problems. There was much collaboration with other RAF detachments at PSAB to improve the standard of the facilities there, and the Americans provided invaluable assistance.

One of the PSAB E-3Ds during Telic.

Pre-flight E-3D preparation at PSAB.

Ground preparation involved a wide range of briefs covering both the Counter-TBM CONOPS and associated planning, and Operation Resinate, including constant updates on the ATO and ACO. There were also regular 'chair fly' exercises in which the E-3D crews talked through a range of scenarios from the Counter-TBM CONOPS, which was issued as (in the American parlance) a 'playbook' to all participating personnel. The E-3Ds flew their first missions on 4 March in support of Resinate. On 8 March, the detachment participated for the first time in a series of exercises entitled Blazing Saddles, practising the procedures that would be employed in Counter-TBM operations over western Iraq if war broke out. Orbiting in western Saudi Arabia, the E-3Ds were assigned responsibility for Iraqi airspace west of 43°E and south of 35°N. Their task was to provide tactical command and control of all air assets assigned to Counter-TBM, including ISR and NTISR platforms, CAS assets for ground forces (chiefly coalition SF), Defensive Counter-Air (DCA) and Offensive Counter-Air (OCA) assets. They were also to coordinate operations by air and ground forces and manage AAR of all air assets active over western Iraq.

The first exercise was not wholly successful from the E-3Ds' perspective. This was partly because of satellite and other communications problems and partly because a shortage of DCA cover prevented them from orbiting in the correct area (priority in the allocation of DCA cover having been assigned to Operation Resinate). DCA coverage improved once Resinate operations were placed on a 24-hour basis, and the detachment engineers quickly addressed the various communications issues. A communications trial sortie flown on 9 March demonstrated that the majority of difficulties had been overcome.

Although restricted aviation fuel supplies at PSAB imposed severe limits on the amount of flying that could be achieved in the second week of March, the E-3Ds contributed 10 more sorties to Blazing Saddles before the start of operation Telic and apparently conducted valuable Counter-Scud training. There was also some further participation in Resinate, particularly from the 15th to the 18th, when a considerable number of aircraft entered western Iraqi airspace for either ISR or Counter-TBM mission rehearsal. Boom AAR training featured during some of these sorties but tanker capacity was severely stretched, and aircraft were not always available.

By 17 March, all deployed crews had flown at least one theatre familiarisation sortie and one Counter-TBM practice mission – enough in the Detachment Commander's view for them to be declared ready for forthcoming events. For the E-3Ds, Operation Telic really began on the morning of 18 March, when their 24-hour flying programme was initiated. In this way, they could establish a constant presence on the western orbit before introducing the Telic SPINS, ATO and ACO

(at 0300 on the 19th). The three eight-hour on-station periods were scheduled from 0800Z to 1600Z, 1600Z to 2400Z and from 0000Z to 0800Z. Including the transit time from PSAB, each E-3D sortie duration would be in the order of 12 hours. The E-3D detachment executives formulated this schedule to provide optimum coverage of western Iraq at times of day when the Iraqis had launched Scuds during the first Gulf War. During key threat periods, they were to be on station – not handing over or refuelling.

The ultimate switch to Operation Telic documentation proved extremely difficult, for numerous drafts were issued in the days preceding 19 March; the final SPINS only appeared on the 18th, while the ATO and ACO were not available until 2130Z that evening – for activation only five and a half hours later. As the RAF could not access the US SIPRNET CIS, planning and briefing data generated by the Americans had to be placed on disk and carried by hand from the CAOC to the E-3D operations section. As the Detachment Commander put it, 'The disconnect between an operation planned … on US-only electronic CIS but executed by a UK C2 platform reliant on paper for its information, has been a recurring theme for the detachment.' After the Operation Telic ROE and TD came into force at 1800Z on 19 March, it transpired that there were small but significant differences in their application between US, UK and Australian forces, which had all to be assimilated by the E-3D crews.

Although the E-3Ds were in part employed for their early-warning capability, their primary role in coalition operations over western Iraq involved ABCCC and was vitally important. As we have seen, command and control of Counter-TBM operations was vested in the CFACC and extended through the CFSOCC to the CJSOTF-W. Planning was conducted from a dedicated cell within the TST cell in the CAOC, while day-to-day responsibility for all airborne Counter-TBM operations and assets belonged to the Mission Commander at Azraq. Yet *continuous* tactical command and control functions for airborne aircraft were exercised by the E-3Ds, which also maintained direct contact with the Command and Control Duty Officer in the TST cell. They were responsible for coordinating the activities of approximately 110 combat aircraft specifically allocated to the Counter-TBM task, a wide range of ISR platforms and the fixed and rotary-wing air transport employed by coalition SF. The task was complicated further by the organic air support of ground elements such as TF 20, which was active in the western desert but not committed to Counter-TBM operations.

The system of AOs and JSOAs developed for western Iraq has already been described. Air support requests had normally to be submitted by ground units through CJSOTF-W's Joint Fires Element, and most were then passed to the Special Operations Liaison Element in the CAOC. However, the E-3Ds were

assigned a key role in this process. Aircraft tasked in response to requests could only enter a JSOA under the control of the E-3Ds, which were tasked to allocate air support to the appropriate ground team. Tactical-level command and control was divided between operations inside and outside JSOAs, which were governed by different procedures, but, according to the CONOPS, 'The airborne C2 platform serves as the standardised communicator for the CFACC's intent in either case.'

With up to 30 coalition SF teams due for insertion into western Iraq, there was always a high probability of contact with the enemy and multiple near-simultaneous calls for air support, which had the potential to overwhelm the on-task E-3D. The SF units were therefore directed to route all but the most urgent calls for CAS through their headquarters, 'most urgent' being defined as troops under imminent threat (as opposed to troops in contact but not under such threat). Units confronted by an imminent threat were to contact the on-task E-3D directly using the code-word 'sprint'. In priority, such calls were second only to those assigned the code-word 'earthquake' – the positive identification of a TBM in imminent launch profile.

Over the course of Operation Telic, the E-3Ds conducted a multiplicity of tasks. At the beginning of the operation (19-21 March) and in many other periods, they were responsible for controlling the airborne infiltration of coalition SF; on 7 April, the first large aircraft to reach Baghdad International Airport (BIAP) – an SF C-130 – flew from H-1 airfield under the airborne command and control of an E-3D. But deconflicting the airspace of western Iraq was a particularly critical duty. Given the numerous air assets operating over the western desert at any one time, the risk of mid-air collision was significantly greater than any threat posed by Iraqi air defences.

Deconfliction activity probably accounted for the largest proportion of E-3D tasking during Operation Telic. It was often of a routine nature, but there were periodically some more unusual and challenging scenarios. The incident on 23 March, when transiting US TLAMs caused all Counter-TBM air assets to be temporarily withdrawn, was managed by the on-task E-3D and was but one of several such episodes involving TLAMs and Conventional Air-Launched Cruise Missiles (CALCMs) during the first week of hostilities. The missiles sometimes strayed outside the agreed corridor, so the E-3Ds crews had to monitor their path carefully. From the flight deck, it was possible to watch some of them hit their targets and see the glow of Baghdad, over 200 NM away. Aircrew could also observe the missiles in flight on the radar. More common was the basic task of ensuring that ground units were not threatened by coalition air strikes, although E-3Ds had also to monitor potential ground-to-air threats. Several times, they

coordinated unplanned firing by the US Highly Mobile Aerial Rocket System (HIMARS), the missiles from which could easily have threatened aircraft operating over western Iraq.

The E-3Ds were responsible for assigning offensive aircraft to a wide variety of targets. These included military vehicles, Iraqi aircraft, short-range Surface-to-Surface Missiles (SSMs), SAMs, radar sites, communications facilities, Ba'ath Party headquarters, bridges and bunkers. Some of these were planned targets while others were targets of opportunity. On 7 April, the aircraft selected to bomb a Baghdad restaurant in a time-critical mission to kill Saddam Hussein was airborne over western Iraq when the tasking came through, and consequently received its orders from an RAF E-3D. Many more assets were assigned by the E-3Ds to investigate possible targets, including suspected TBMs, which were not attacked. In most cases, these would first have been spotted by ISR or NTISR assets and either passed directly to the E-3Ds or passed via the Counter-TBM Mission Commander at Azraq. Sometimes, the on-station E-3D would 'pocket' targets that satisfied the extant ROE but were not necessarily a priority for attack. These could later be assigned to aircraft that would otherwise have been left untasked.

The E-3Ds repeatedly handled short-term CAS requests from SF teams, sometimes for offensive support, sometimes for striking identified fixed targets and sometimes because the SF found themselves under fire and called 'sprint'. In such circumstances, CAS assets were usually passed by the E-3Ds to SF forward air controllers. The E-3Ds controlled all the air operations during the heavy fighting around Haditha Dam at the end of March and in the first week of April. Between 9 and 11 April they coordinated the maintenance of continuous large-scale air presence over Al Qa'im in support of ongoing surrender negotiations.

The E-3Ds were also extensively involved in the acquisition and relay of broader intelligence on Iraqi activities. They passed back information on Iraqi operations received from both aircraft and the SF, reports of coalition troops in contact and intelligence on Iraqi GBAD, as well as managing the withdrawal or redirection of coalition air assets in response to specific threats. There were false alarms, as we have seen, but an E-3D identified three Iraqi military vehicles by radar on 26 March and passed them on to a B-1B equipped with MTI. On 1 April, an E-3D detected and reported on the launch of an Iraqi short-range SSM. E-3Ds were also responsible for coordinating activity to prevent the escape of senior Iraqi regime figures: they kept a close watch for aircraft or helicopters that might have been used to reach neighbouring countries and coordinated coalition reconnaissance activity along possible escape routes leading from Iraq to Syria. Their surveillance work even extended into Syrian airspace, primarily to observe Syrian responses to coalition actions on the Iraqi side of the border. Syrian radar

was extremely active throughout Telic, and there were strong suspicions that the Syrians were supplying Iraq with an air picture of coalition operations over the western desert.

It was rare for the E-3Ds to be directly threatened by Iraqi action. A few unguided SAMs were launched close to or even over the Saudi border, but only two were in any proximity to the aircraft. Both were reported as having the appearance of white firework trails with green tops. One (launched on 21 March) burned out well below the E-3D, but the other, which was spotted on the night of the 29th/30th, reached the aircraft's normal operating altitude during Telic of 34,000 ft. Consequently, the Detachment Commander reminded crews to vary their flying patterns and orbiting lobes and change call-signs so that their aircraft were more difficult to track.

Beyond controlling offensive air activity and ISR over western Iraq, the E-3Ds were also required to direct CSAR for downed aircrew and SF who ran into trouble. They coordinated the emergency extraction of TF 7 on 30 March and the search for the two TF 7 personnel who remained at large afterwards. They also handled casualty evacuation for American SF from Haditha Dam on 2 and 3 April and assisted the centre E-3C in a CSAR operation on the 1st.

Another regular task was the organisation of short-term changes to AAR plans: the critical link between the combat and ISR aircraft and the fuel they needed to remain airborne was the E-3D. On 25 March, such changes were caused by a combination of factors, including the limited number of tankers available and poor weather, which prevented some aircraft from landing at their normal bases. On 6 April, an E-3D handled an emergency AAR link-up, when the weather prevented a planned rendezvous, and aircraft that could not complete their scheduled AAR for various reasons were diverted to the nearest available coalition air bases on several occasions. On 9 April, the arrival of an A-10 formation in western Iraqi airspace with no pre-arranged tanking necessitated the improvisation of AAR at particularly short notice.

The following Form 540 entry from the third E-3D mission on 2 April gives some flavour of the scope and tempo of the detachment's work during Operation Telic. Of the various call-signs, Bondo was the E-3D, Bloodhound was the Counter-TBM Mission Commander at Azraq, Striker was the TF 20 GFAC, and Curfew, Groovy, Nodder, Cobweb, Facing, Ewok, Stew and Look were all aircraft under the E-3D's control.

After the crew proceeded on station at 0200Z, the activity soon built. At 0228Z, Curfew 15 was tasked to investigate a squall[43] and identified the contact as a fuel tanker. The tasking at Haditha Dam remained heavy as it had been for the last couple of sorties, and at 0230Z Groovy 11 was tasked to work with Striker 72, a GFAC with Task Force 20. A further squall was reported at 0350Z and was investigated by Nodder 11, who confirmed that it was not an SSM. Curfew was again tasked with a visual identification task at 0500Z … Initially the contact was identified as military vehicles and troops, however on closer investigation they were found to be farm vehicles and sheep! Cobweb 25 continued the activity when, at 0507Z, he reported that hide site 07004 was full of munitions. This target was pocketed and passed to the Special Forces. Shortly after, at 0520Z, Nodder 11 identified several trucks, tracked artillery and a Roland [SAM]. During this process he picked up indications of being tracked by SA-8. These targets were again pocketed. Activity at Haditha Dam continued and at 0539 Striker 73/32/35 required continuous coverage. Facing 15, Curfew 15, Nodder 11 and Ewok 17 were allocated in turn and struck several targets including tanks, troops, artillery and boats in the vicinity. At 0725Z Bloodhound passed tasking to investigate 3 DMPIs believed to be vehicles in culverts, [and] these were confirmed clear by Stew 33. Cobweb 25 was pushed up to support the activity around the dam and gained a successful strike on some artillery … though he did express concern over congestion over the target area. This was unsurprising considering the number of aircraft in the vicinity. At 0825Z Bloodhound passed further tasking to target an SA-3 site, [and] the target was designated by a Predator. Towards Haditha Dam the fighting became more intense and at 0840Z Look 13 relayed that the teams were taking direct fire and required casevac. Striker's satcom was also down. At 0846Z all assets available at the dam were put into a co-ordinated flow plan to support the troops who were by then taking mortar and artillery fire. The activity at Haditha Dam continued until Bodo called off station at 1000Z.

43. 'Squall' was the term used to warn of a possible Scud TEL.

In most respects, the entire Counter-TBM concept of operations ran smoothly from the E-3D detachment's perspective. Although the first operational missions witnessed a recurrence of the satellite communications failures encountered during some of the Blazing Saddles exercises, these were quickly traced to a so-called 'black hole' in satellite coverage that could be avoided simply by orbiting in an alternative lobe. Similarly, when operations in the western desert shifted predominantly to the north in early April, causing some deterioration in E-3D UHF communications with the SF, a solution was swiftly found by moving the E-3D orbit north into a Restricted Operating Zone (ROZ) in Iraqi airspace (with the UKACC's agreement). The area employed was deconflicted from other air traffic and was not subject to any significant threat from Iraqi GBAD. At first, the new orbit could only be used on a case-by-case basis, but the UKACC later agreed to allow crews to employ it whenever it was deemed operationally necessary.

The delayed appearance of essential paperwork – the latest ATOs, ACOs and amendments to SPINS or the Counter-TBM CONOPS – remained a problem. For much of Operation Telic, these documents were only finalised on the evening before the day of their introduction (at 0300Z), making mission planning very difficult for the third E-3D, which was responsible for the 0000Z to 0800Z on-station period. Yet there was no obvious solution, given that E-3D operations extended over 24 hours, and the records do not identify any notable adverse consequences apart from the extra workload imposed on the crews.

The majority of contributors to the Counter-TBM mission adhered rigidly to the published CONOPS, and there were few significant digressions. On two recorded occasions, the Mission Commander at Azraq issued 'destroy' instructions prematurely. According to the CONOPS, such instructions could only be issued after deconfliction with ground forces had been completed. However, on 23 March, the order was issued to destroy a bridge before ground units had fully withdrawn. Luckily, there were no friendly casualties. When a similar order was issued on 28 March, the on-station E-3D treated it with greater caution and intervened to ensure the necessary deconfliction.

Occasionally, coalition aircraft failed to squawk the appropriate IFF modes. These included a C-130 on 3 April and an aircraft involved in casualty evacuation on the 8th; both were quickly identified as friendly. A more serious contravention of the SPINS took place on the 10th, when the second E-3D mission recorded that 'many' SF aircraft transited their AOR without squawking. Periodically, too, aircraft failed to check in with on-station E-3Ds before entering western Iraqi airspace, despite being specifically required to do so by the Counter-TBM CONOPS. These included B-52s and F-15s on 9 April, which, according to the records, were 'not talking to anyone but simply executing a pre-planned DMPI

list'. While these attacks had apparently been deconflicted with ground operations, no equivalent process had taken place in the air. On the 10th, an E-3D picked up an unidentified aircraft transiting from Ar'ar air base to H-1; it passed close to two other coalition aircraft but failed to contact the E-3D and did not respond to any calls. Two days later, 'a number of fast air players came well inside the western AOR without checking in,' including two aircraft described as 'Tornados', a Harrier GR7, and two more unidentified contacts.

The other intermittent problem involving coalition aircraft was IFF jamming, which was repeatedly experienced during the second week of April. This is said to have degraded the E-3D sensor considerably, making an accurate RAP difficult to construct and compromising flight safety. With the help of the centre E-3C and a Nimrod R1, the culprit was identified as a US EA6B Prowler; the jamming apparently ceased on 10 April.

Perhaps the greatest challenge confronting the E-3D detachment during Operation Telic, given the limited number of aircrew and aircraft deployed, was that of sustaining the continuous 24-hour operations required to execute the Counter-TBM mission. As early as the first week of hostilities, it became necessary to consider the deployment of three additional crews at the beginning of April. By that time, all the crews in theatre would have flown at least 80 hours in 15 days; between 5 and 7 April, they would reach 130 hours in 30 days. This exceeded maximum operational flying hours as stipulated on safety grounds by HQ 2 Group.

However, after much discussion, the UKACC decided that the additional personnel would not become essential until the 9th. As he anticipated a reduction in tasking in the interim and was under orders to ensure that the various UK force elements remained as 'lean' as possible, the E-3D crews were instructed to prepare themselves for the long haul. The Detachment Commander recorded on 1 April that they were doing well and were firmly established in their various sleeping patterns. They were nevertheless closely monitored for signs of fatigue before each mission. He was confident that they could maintain 24-hour operations for at least another week but considered that two weeks 'might be stretching things'. On 4 April, the UKACC visited the detachment and agreed contingency measures for the deployment of additional weapons controllers in the event of continued 24/7 operations, but a decline in the flying rate appeared far more likely.

No easier than the task of maintaining continuous 24-hour flying with six E-3D crews was the challenge of doing so with only four aircraft. Three aircraft per day were required for the Counter-TBM missions, and a spare had to be available for each launch. The planned flying rate was far higher than the normal peacetime level and more intensive than any rate formerly maintained by an E-3D

detachment on operations. To sustain it, the detachment engineers established two twelve-hour shifts, which they each worked for six days per week. After one aircraft (ZH107) suffered a series of unserviceabilities, it became the primary source of parts for the other three, pending the arrival of spares from the UK.

As time passed, the task of providing three serviceable aircraft per day became increasingly taxing. By the second week of April, the engineers were working in temperatures of up to 50°C; delays in the delivery of spare parts were giving cause for concern, and items of equipment were regularly being swapped from one aircraft to another to compensate. One of the deployed E-3Ds (ZH103) was rapidly approaching a point at which scheduled servicing would become essential, and further difficulties were being experienced with ZH107. Flying had to be concentrated on ZH104 and 105 as far as possible. On many occasions, the incoming E-3D had to be turned around in as little as four hours to ensure that a spare aircraft was available for the next mission.

It appears unlikely that the E-3D detachment could have sustained 24/7 operations for much longer without the deployment of additional personnel and aircraft. In the event, however, the collapse of Iraqi resistance rendered this unnecessary. On 11 April, the second E-3D found that airborne command and control was only really required around the Tikrit area, which lay beyond their AOR, and the on-board Tactical Director commented that there was not nearly enough work for the three coalition E-3s. By the 14th, there was no longer any significant activity in the airspace over western Iraq beyond limited air traffic management, and the CAOC planners therefore agreed to a draw-down of ABCCC coverage. The E-3D detachment mounted two more missions on the 15th, the 16th was a 'down' day, and they flew only a single eight-hour mission per day over southern Iraq thereafter, the other 16 hours being covered by US E-3Cs. During the second half of the month, the detachment was reduced to two aircraft and three crews. They were finally withdrawn from PSAB on 1 June, by which time three ground Control and Reporting Centres had been established in Iraq. During the period 19 March to 15 April (inclusive), the E-3D detachment mounted 74 operational missions for nearly 900 hours.

An objective assessment of E-3D operations during Telic could only reach very positive conclusions. In 1999, Operation Allied Force had given rise to several recommendations for modernising the RAF's E-3D fleet, but no similar proposals appear to have followed from operations over Iraq in 2003; the lessons of Kosovo had been applied. The key issues that emerge from this study are as follows:

Host-Nation Support. When the Turkish basing plan collapsed, the UK was luckily able to exploit pre-existing Operation Resinate basing arrangements at such locations as PSAB as alternatives. Yet with large numbers of UK and US aircraft all requiring ramp space, PSAB's resources were severely stretched. The planned E-3D detachment had therefore to be reduced in scale, which in turn placed limits on its sustainability. Fortunately, these limits were not reached before the war ended.

Force Generation. The generation of a force capable of fulfilling the Counter-TBM mission was an exceptional achievement given the E-3Ds' prior commitment to Operation Oracle and the limited time available for crews to prepare for the unusual and specialised tasking they would execute over western Iraq. The problems experienced with communications early in the deployment almost certainly resulted from the haste with which the aircraft were prepared, but they were soon rectified.

Flexibility. The E-3Ds made a highly significant contribution to an extensive range of air operations. These included coalition SF infiltration and extraction, CAS, NTISR, information relay, AAR, CSAR, Airborne Early Warning (AEW) and the organisation of large-scale air presence.

Interoperability. The E-3Ds demonstrated throughout the operation their capacity to conduct airborne command and control in airspace dominated by the USAF. Crucial to their success was JTIDS; indeed, the E-3D's role in Telic would probably have been impossible without JTIDS given that the system was employed by much of the USAF. The detachment's key interoperability problem was its lack of access to the American SIPRNET CIS, which severely hampered mission planning activity from one day to the next.

Joint Capability. The E-3Ds played a vital role in coordinating the activities of air and ground forces in western Iraq, demonstrating in the process that effective airborne command and control is a fundamental prerequisite for air operations in support of the SF.

4. Nimrod MR2 Operations

During operations mounted in the years immediately before Telic, RAF Nimrod MR2s normally associated with maritime air reconnaissance had developed a new over-land capability involving communications re-broadcast ('comms rebro') for ground units. The precise circumstances in which this new task evolved are not clearly recorded in the available documents, but several factors were apparently involved. These included the coalition campaign against Al Qaeda and the Taliban in Afghanistan (Operation Oracle), which generated an urgent requirement from ground units for continuous comms rebro facilities (notably to call for air support) in the mountainous Afghan environment. The Nimrod had long conducted comms rebro over water and had occasionally performed similar duties over land. With its protracted endurance, it proved eminently suited to requirements in Afghanistan. It is also likely that the Nimrod force was on the lookout for new roles in this period due to the decline of traditional maritime threats to the UK since the end of the Cold War.

On numerous occasions during Operation Oracle, Nimrod MR2s provided comms rebro between ground units and ABCCC aircraft, which were in turn responsible for tasking offensive platforms such as F-14s, F-16s, F-18s, B-52s and AC-130s. Their contribution favourably impressed the supported units and played a pivotal role in several important missions. It is therefore not surprising that the prospect of operations in Iraq should have encouraged proposals to develop the Nimrod's over-land capability further.

PJHQ's submission to DCDS(C) on 13 September 2002 covering the RAF's prospective involvement in such an operation (see Part 1) listed a detachment of four Nimrods, which would be based in Jordan. It was clearly envisaged that these aircraft would be committed to the Counter-TBM operation in western Iraq, but the precise nature of their tasking at this stage required clarification. Potentially, the Nimrods could perform the same comms rebro functions that had proved so useful in Afghanistan. However, since Operation Oracle, there had been extensive deliberations at HQ 3 Group regarding the extension of the aircraft's over-land role. The result was a list of potential capability enhancements that encompassed precision-guided bombing and, more realistically, better communications and a stand-off EO camera.

After further investigations and discussions involving the MOD, PJHQ and the SF, the EO camera emerged as front-runner. A small project team quickly produced a specification document covering the proposed capability, and the project itself was assigned the name 'Dougal'. A visit to the Farnborough Air Show then brought to their attention a suitable camera – the L-3 Wescam MX-15.

The MX-15 was a sophisticated day/night optical system with a high-magnification four-step zoom lens and an integrated laser illuminator/range-finder. Apart from its impressive performance, it was housed in a pod very similar in size and shape to the Nimrod's existing Sandpiper IR camera pod and thus appeared to present no obvious installation difficulties. MX-15 was also attractive because it offered considerable potential for future development. The project team subsequently established a close working relationship with Wescam, which produced opportunities for testing the MX-15 and for witnessing its operation by more than one UK police force.

In the meantime, a window for UORs relating to possible future operations against Iraq had opened in September. The project team duly prepared a case for procuring MX-15s for the Nimrod, which was submitted at the beginning of November and covered the provision of four aircraft fitted for and with the camera. The UOR stated that the system was needed 'to enable Nimrod MR2 with a stand-off/long-range, high-fidelity, day/night poor weather EO imagery capability in support of Counter-Scud, other SF, MIOP[44] and Joint force protection ops … Without this equipment capability, Nimrod MR2s would not have the capability to support SF and other tasks at the required stand-off ranges against current targets.'

The UOR did not receive immediate approval. Predictably enough, the responsible MOD staffs had been flooded with similar requirements, which took time to process. At the end of November, the Air Commodore Maritime at HQ 3 Group recorded his frustration about the delay. 'Unfortunately, the staffing … has not been as coherent as it could have been, and I sense that we have already lost too much time on this important issue.' Finally, early in December, the project was authorised. However, there was afterwards a further delay before the necessary funds became available, and the entire MX-15 purchase was thrown into jeopardy during this period when it emerged that the Spanish Air Force was attempting to buy four cameras for their maritime air patrol fleet for a forthcoming NATO exercise. As the MX-15 was still relatively new at this stage, the Wescam production line was slow: only one camera was being delivered every nine weeks. If Wescam had sold the next four units to the Spanish, there would have been no prospect of obtaining any for the Nimrods by the February-March period, when operations against Iraq seemed likely to commence.

With the Spanish both ready and willing to buy, Wescam ran out of patience and sought an immediate guarantee that the MOD was still intending to purchase MX-15s for the Nimrod MR2. News of this unwelcome development reached HQ

44. MIOP – Maritime Interdiction Operations.

3 Group's SO1 Nimrod shortly before he was due to board an aircraft at Heathrow on the afternoon of 11 December. To secure the cameras, he was left with no alternative but to use his personal American Express card to pay a £15,000 deposit to Wescam via mobile phone; the MOD released funds for the full UOR a few days later. Spain's commitment to the NATO exercise had afterwards to be taken over by the UK.

On 19 December, the HQ 3 Group project team met with BAE Systems (BAES) at Woodford to initiate installation of the MX-15. The contractor was at first unprepared for the urgency attached to Project Dougal, and the project team was not authorised to discuss the possibility of operations against Iraq in the New Year. BAES had to be told that the cameras were needed for Afghanistan. The veil of secrecy could only be lifted in January following the government's public announcement of the first deployments to the Gulf. The installation nevertheless proceeded very rapidly – the result of much detailed preliminary work by the project team and of close collaboration between BAES and the Nimrod Aircraft Engineering Development and Investigation Team at RAF Kinloss. Consequently, only 29 days after the 19 December meeting, the first Nimrod equipped with MX-15 took to the air. A second aircraft was completed in February.

To this extent, the Project Dougal story was one of outstanding achievement in the face of scepticism at HQ STC and among some of the RAF's more established over-land ISR elements. However, the intense focus on the camera installation to some extent diverted attention away from the equally critical issue of its potential exploitation in the Gulf. The Nimrod staff at HQ 3 Group had no visibility of the American Counter-TBM CONOPS. Until January 2003, exceptionally tight OPSEC restrictions prevented liaison between the Nimrod and Harrier staffs at the HQ that might otherwise have brought the Nimrod element into mainstream Counter-TBM planning. They ultimately sent one junior officer to observe the third of the live-fly exercises in Nevada, but this appears to have produced only a limited amount of feedback.

If anything, the situation at RAF Kinloss was worse. An Operation Order covering the prospective deployment to the Gulf eventually appeared on 19 December 2002. After the decision was taken to base the GR7 detachment in Jordan, Nimrod basing plans were revised and the MR2s ultimately joined the RAF E-3Ds, F3s, VC10 tankers and the Nimrod R1 at PSAB. Apart from the four aircraft (the first two equipped with MX-15 and all equipped for comms rebro), the detachment initially comprised 149 personnel. There were six crews, two from 120 Squadron, two from 201 Squadron and two from 206 Squadron. Wing Commander Andy Flint, the OC 206 Squadron, became Detachment Commander. Augmentation personnel were provided by 42(R) Squadron, engineering support

came from the Nimrod Line Squadron at RAF Kinloss, and Kinloss also supplied flight operations and survival equipment staff.

Yet none of the Nimrod crews destined for the Gulf were read into the Counter-TBM CONOPS until the very last moment, nor did they participate in any of the live-fly exercises. Prior to their deployment, they had very little knowledge of their likely tasking in the Gulf, and the role of their new MX-15 capability remained unclear. When the first Nimrod equipped with MX-15 reached Kinloss, the aircrew assumed it was intended for maritime reconnaissance. Post-Flight Analysis (PFA) equipment procured under a separate project for the in-flight and post-flight scrutiny of MX-15 imagery was apparently sent to Kinloss but not made available to the Nimrod detachment before their departure; nor was it sent out later.

The Nimrod deployment was originally scheduled for February 2003; however, what the Kinloss Station Commander described as 'the ebb and flow of political and military currents' caused some delay. This did at least extend the time available for training aircrew to use the MX-15. A Master Deployment Order was eventually issued by the station on 26 February, and the first aircraft departed for Saudi Arabia (flying via Akrotiri) on 3 March; all personnel were in theatre by the 8th. They were quartered partly in the tent city at PSAB and partly at the coalition complex in Al Kharj, where the original single en suite rooms had been equipped with two bunks so that each could accommodate four personnel, albeit in cramped conditions. The detachment set up a small operations room in the main PSAB operations area. The facilities were adequate, but work was hampered by the same shortage of ground transportation that affected the other RAF force elements at the base.

The Nimrod detachment arrived in theatre with only a vague idea of their likely role and soon found that no one else knew what they were supposed to be doing either. No Nimrod Subject-Matter Expert (SME) had been appointed in the CAOC, the view in theatre apparently being that a representative would be found from within the detachment itself. Even SF elements who had earlier supported the MX-15's procurement were completely unprepared to exploit this new and valuable capability at first. No means existed to play back or edit imagery obtained via the MX-15, nor did the detachment possess any qualified imagery analysts.

The Detachment Commander arranged a meeting with the UK UKACC, who quickly agreed to the appointment of a Nimrod SME, and a squadron leader from HQ 3 Group arrived to take up this post soon afterwards. The detachment also established relations with the ISRD in the CAOC and the SF liaison cell at PSAB, where the ISR liaison officer turned out to be a member of the Nimrod community. But considerably more pressure was needed to establish a modus operandi. The

detachment had to secure access to the relevant ATO and SPINS meetings and obtain specific requests for imagery from coalition SF units. Nevertheless, by 9 March, they had secured tasking via the Resinate ATO up to the Saudi-Iraqi frontier, where they used the MX-15 to obtain high-quality imagery of Iraqi border posts. Back at PSAB, they scrounged film replay and editing equipment from the RAF Media Operations team, and one or two gifted and enthusiastic amateurs then produced edited CDs to demonstrate the camera's potential. The Detachment Commander ultimately placed the end product before one of the CFACC's most senior deputies, who was deeply impressed.

By such unconventional means was the Nimrod detachment integrated into the western Iraq Counter-TBM operation within about a week of arriving in Saudi Arabia, although even the final version of the Counter-TBM CONOPS issued on 19 March did not list the MR2s as contributing assets. It soon became clear that little comms rebro would be required given the relatively flat and open terrain of the western Iraqi desert; instead, their primary task would involve the provision of EO imagery and (in near real time) intelligence based on that imagery. Requests for imagery on specific locations were normally channelled via the Collection Cell in the ISRD, but the Nimrods could also be tasked in direct support of ground units. Initially, Nimrod operations were to target the more westerly stretches of Saudi Arabia's border with Iraq, extending as far as Jordan, with frontier posts and other crossings being the main focus. Coalition SF required this intelligence to plan their infiltration. TF 14 assigned signallers to the detachment, who flew onboard the Nimrods during most of their sorties.

Tasking of this nature occupied the detachment throughout the week before the outbreak of war. In total, they flew 15 missions in this period using the two EO-capable aircraft, XV241 and XV235. They typically involved an extensive transit to an operating area just south of the border, followed by line searches (covering roads and other line features) and the imaging of more specific pre-allocated targets cued by the Nimrod's central tactical system, using grid references. They also imaged targets of opportunity. For their own safety, the Nimrods conducted their task from an altitude of 29,000 ft – a striking comment on the MX-15's capability. On one occasion, a Nimrod was obliged to make a precautionary turn south in response to a hostile radar track north of the border, but the detachment was otherwise untroubled by Iraq's air defences. All these missions provided valuable opportunities for crews to train with the new EO system, develop appropriate tactics for its employment and establish its operating potential and limitations. It quickly became clear that that the MX-15 was an extremely powerful sensor, but its utility in cloudy conditions was severely restricted.

A Nimrod MR2 at PSAB during Telic.

The MX-15 camera on a Nimrod MR2 during Telic.

Some of the MX-15 imagery identified hitherto unseen targets, which were passed to the CAOC and attacked after the onset of hostilities, but most went straight to ground units. The detachment worked particularly closely with TF 14 in this period, and one of their liaison officers at PSAB passed back a message after their successful infiltration, thanking Nimrod personnel for their support. 'The information Nimdet has provided over the last week has been invaluable. Every report was fused on the 'battle table' and played a key role in planning for the air infill.'

On the night of the infiltration (19 March) both XV235 and XV241 were tasked in support of coalition SF units. XV235 was primarily assigned to provide comms rebro, but this was not required in the event. XV241 was to support the insertion of elements of TF 14 by six RAF Chinooks from 7 Squadron. Operating just south of the border, the Nimrod was to use the MX-15 to identify any potential threats, which could be reported to the main ground command and control nodes or directly to the helicopters. The crew were initially directed to search a 17 NM area extending north into Iraq and report on any observed enemy activity. Their attention soon came to focus on a series of buildings and on military vehicles moving south towards the border. This activity was duly reported and, from 2150, the Iraqi forces were repeatedly targeted by AC-130s, A-10s and Black Hawks. In the ensuing period, the Nimrod crew observed coalition SF assembling along the Iraqi border and monitored the three shuttle runs executed by Chinooks carrying TF 14. They also relayed messages from the helicopters to Ar'Ar. By 0330, the insertion was complete, and all six Chinooks had returned to base safely.

During the next few days, the Nimrods continued to operate just south of the border, using the MX-15 to check for potential threats (or 'sanitise') along the ingress and egress routes being used by RAF C-130s and Chinooks conducting further infiltration or re-supply missions in Iraq. Their role in this regard was of considerable importance. Moreover, between ingress and egress periods, they could collect imagery of other areas for more general coalition exploitation. But the detachment incurred a major setback on 22 March when the MX-15 on XV235 became unserviceable. As there was no comms rebro requirement, they found themselves restricted to mounting one long mission per day with the remaining EO Nimrod, which meant virtually one mission per week for each of the six crews available, conditions permitting. However, it was obvious that conditions would not always be suitable; indeed, there was no operational flying on 25 and 26 March because of poor weather. The Detachment Commander therefore concluded that the number of crews in theatre should be reduced. By the end of the month, two crews had returned to RAF Kinloss together with the two non-EO capable Nimrods. In the meantime, arrangements were finalised to bring the third EO

aircraft into theatre as soon as it was ready. The detachment was also augmented by two photographic interpreters from JARIC, who were tasked to analyse the MX-15 imagery.

As the various coalition SF task forces advanced further into western Iraq, it became necessary for the Nimrods to advance with them. This involved moving from a low-threat to a medium-threat environment and was part of a broader change of tactics instigated by the CAOC whereby a number of larger and more vulnerable aircraft were cleared to operate in Iraqi airspace. The risks had to be accepted.

The first Nimrod mission across the border occurred on 27 March and was largely flown over the desert south of Ar Rutbah. The aircraft was assigned two basic tasks. The first was to sanitise an area extending 40 NM into Iraq, which again encompassed the ingress and egress routes used by Ar'Ar-based C-130s and Chinooks, this time for TF 7. According to the detachment record, 'A strip 8 NM wide was sanitised and this information was passed to a CH-47 Chinook (call-sign Limey 30) and also to TF-14 ground forces via tactical satellite communications.' The second was to search the main supply route running east to west through Ar Rutbah for Scuds and their associated support vehicles, and a number of possible Scud launch and hide sites. Although no Scuds were found, several other targets of interest were noted. In all, the Nimrod completed three on-task periods, refuelling twice from RAF tankers and remaining airborne for 14 hours 35 minutes – the longest Nimrod mission of the campaign to date. After that, all missions were flown in Iraqi airspace.

The following day's mission again used the MX-15 to sanitise routes for coalition SF aircraft (Chinooks and a C-130 engaged in the second TF 7 lift). The Nimrod later conducted a line search of a major road running north-east from the Saudi border to Radif Al Khafi aerodrome in Iraq and then focused on specific pre-designated areas of interest – primarily potential Scud hide sites – around Nukhayb airfield. It was during the execution of this latter reconnaissance task that an MR2 crew had their first significant scare, when the aircraft was illuminated by a Fansong SA-2 missile guidance radar. The pilot responded with a standard break-lock manoeuvre and then flew to a different search area. A later assessment concluded that the radar was located in Baghdad, well outside the SA-2's lethal range, and was probably being used for early warning purposes. On the 29th, a second mission again became possible using XV235, which had been returned to service using the fourth MX-15 from the original purchase. During this mission, the crew witnessed a ballistic rocket air-burst about 3 NM in front of the aircraft, and 2,000 ft above it.

Over the next few days, the Nimrods were repeatedly tasked in direct support of TF 14, firstly in operations to capture H-2 airfield, then further east to H-1 and later north up to Al Qa'im. As the SF were limited in number and some of the areas concerned were very large, there was always scope for Iraqi forces to infiltrate back into locations from which they had previously been evicted. The Nimrods normally combined these missions with additional tasking, such as the further sanitisation of Chinook and C-130 ingress/egress routes and the continuing search of potential Scud hide sites, particularly around airfields like H-3, Mudaysis and Nukhayb. On the 31st, they flew two missions that were predominantly in support of TF 14 around H-2. The first was directed to obtain BDA from previous strikes on the airfield, and the crew recorded capturing some 'good imagery of targets in that area', although their efforts were hampered by partial cloud cover.

The second Nimrod received a hand-over from the first, and the crew then contacted TF 14 via secure radio. They were asked to sanitise an area within H-2, where it was intended to land three C-130s carrying personnel and vehicles. The task was duly completed, and the insertion took place according to plan. After tanking and checking some of the pre-briefed hide sites, the Nimrod was re-assigned to image a site of continuing Iraqi resistance on H-2 and then survey the route of a group of TF 14 vehicles moving towards the airfield. During this period, there was a considerable amount of surface-to-air fire, although the Nimrod does not appear to have been directly threatened.

On 1 April, two Nimrod missions were again predominantly tasked on a reactive basis by TF 14 in the H-2 area. They used the MX-15 to reconnoitre buildings and a potential tactical landing zone at the airfield and to sanitise the main road between H-2 and Ar Rutbah. Other targets included suspected artillery and WMD-associated buildings, a radar vehicle and two bridges. Tasking then continued broadly along these lines in direct response to requests from ground units. It included strip searches of main roads north and east of H-1 and H-2 (including the search of a planned TF 14 route of advance towards Al Qa'im) and of a route between an SF supply Drop Zone (DZ) and a laying up point. On 4 April, a Nimrod was requested to image a road south of the Euphrates and to observe a target that coalition SF were planning to attack; there had been reports of Iraqi militia in the area. Pinpoint targets included another potential DZ for re-supply operations and an area near H-1, which was found to contain numerous potentially hostile vehicles.

Periodic route searches for transport aircraft and helicopters continued, as did the hunt for Scud missiles, particular attention being paid to airfields still under Iraqi control. There were several further encounters with Iraqi GBAD, which were immediately reported back to the on-task E-3D so that it could warn other aircraft

of potential threats. One Nimrod crew witnessed surface-to-air fire on 2 April, and there were regular signs of hostile radar activity over the following days. On the 4th and 5th, respectively, Nimrods were illuminated by Fansong and Roland fire control radars and responded with standard evasive manoeuvres. In these circumstances, it would have been extremely unwise for aircraft to linger for very long in particular areas, so the Nimrods tended to divide their missions, performing SF-support tasking for a given period, then moving elsewhere to search pre-briefed targets, and then renewing their operations with ground units. By this time, an area code-named 'Kipper' had been set aside for the sole use of Nimrods operating at 29,000 ft, stretching from the Jordanian border in the west to 4230ºE and from the Saudi border in the south to the Euphrates in the north.

Between 5 and 7 April, the Nimrods were primarily assigned to work in support of TF 14 in the Al Qa'im area, but cloud cover made their task very difficult. The most successful mission flown in this period (on the 7th) performed searches of a cement works, a phosphate factory, bunkers, bridges across the Euphrates, and roads leading to the border crossing with Syria. However, it was also on that day that detachment engineers made an unwelcome discovery during an after-flight service of XV241: the MX-15 turret was loose. Further investigation showed that two of the three brackets holding the turret to the starboard wing of the aircraft had sheared. Had the pilot not achieved a very smooth landing at PSAB that day, the third bracket would probably have failed as well, causing the turret to fall off. The engineers then checked XV235 and found the same defect. Back in the UK, HQ 3 Group hastily arranged a meeting with BAES, where it emerged that similar problems had occurred with the Nimrod's older Sandpiper IR camera. The necessary remedial work required both XV241 and XV235 to be returned to Kinloss but a third Nimrod, XV231, had by this time been fitted with the MX-15 and had deployed to PSAB.

Operations with XV231 began on 9 April at a rate of one mission per day; the problematic turret brackets were meticulously inspected after each mission. On the 9th, the Nimrod made the usual transit to western Saudi Arabia and then uplifted the maximum amount of fuel possible from a VC10 before entering Iraqi airspace and flying north to the Al Qa'im area. There, the crew were tasked to image the water treatment works, a phosphate plant and traffic movement along the main road into Syria – Highway 12. No significant traffic was observed but the crew passed back important intelligence on the phosphate plant, which was used by TF 14 to plan an attack that evening. Other tasked investigations covered buildings around the Al Qa'im border crossing into Syria and a convoy of vehicles north-east of the town, which turned out to be friendly. The crew also imaged 16 out of

30 pre-briefed targets; most if not all of these were probably suspected Scud hide-sites.

On the 10th, TF 14 asked for a further search of the water treatment works, where they were intending to rendezvous with personnel already operating inside the town. As a result of these meetings, they designated an area for a possible humanitarian aid drop, and the Nimrod was then tasked to determine whether there were any potential threats in the vicinity. There was a further Nimrod mission extending from the Al Qa'im area to the northern bank of the Euphrates the next day, but signs of wear on the MX-15 turret brackets compelled the Detachment Commander to restrict flying again on the 12th. Missions would now be launched only when EO coverage was most needed by coalition SF. Crews were placed on a standby form of rotation, and the SF agreed that any request for a Nimrod mission on a given date would be submitted by 2000 hours on the previous evening. However, it soon became clear that the major combat phase of Operation Telic was coming to an end, and no further requests were received. The detachment eventually mounted its final mission on 14 April to check pre-briefed targets in the Al Qa'im area, but deteriorating weather conditions persuaded the crew to return to base early. Although there was some expectation of comms rebro tasking over the following days, none was ultimately forthcoming, and the detachment was eventually withdrawn to RAF Kinloss on 23 and 24 April.

Despite this rather low-key ending, the Nimrod MR2 detachment nevertheless achieved a great deal over western Iraq, operating with the minimum of preparation in the highest threat environment to which the aircraft had ever been exposed. Obviously, their role was very experimental. Participating aircrew had to devise entirely new tactics, techniques and procedures appropriate to the MX-15, and there was also much that the coalition SF units had to learn about the new sensor. But the opportunity to test this new capability in a live operational environment was immensely valuable: the performance of the MX-15 could be closely monitored, allowing identified lessons to be exploited in future operations. In particular, missions flown during Operation Telic demonstrated clearly the scope and limitations of the system at different stand-off ranges and in different weather and visibility conditions.

It was also soon apparent that the sensor could be exploited to even greater advantage by downloading the MX-15 imagery to ground units in real time, obviating the necessity for intelligence to be passed verbally over voice radio nets. Although not available during Operation Telic, the means to do this would soon afterwards be to hand. It was not possible to prevent the MX-15 turret brackets from shearing, but a strict monitoring regime helped to restrict the problem to manageable proportions and in no way undermined the very positive assessments

that were subsequently made of the camera in the aftermath of the operation. Whereas the UK armed forces possessed no MX-15s at all before the initial Nimrod purchase in December 2003, they had acquired no fewer than 47 by November 2006.

Thus, a necessarily limited UOR acquisition helped bring about a fundamental change in the Nimrod MR2's role. When added to the comms rebro capability established over Afghanistan, the reconnaissance missions that the Nimrods flew during Telic further demonstrated their potential in over-land operations: clearly, the aircraft could no longer be classed as a purely maritime air reconnaissance asset.

The Nimrods made a particularly important contribution to the support of coalition SF in western Iraq. SF operations by their very nature involve high risks, and any measures that can be taken to moderate the innumerable hazards they face may substantially increase the likelihood of mission success. The Nimrod EO reconnaissance capability provided a vital means to precisely this end by sanitising the routes of SF insertions and subsequent re-supply and movement sorties flown by support helicopters and tactical transport aircraft, and by providing support to ground movement and offensive operations. Additionally, this new capability could be employed for more general reconnaissance of potential Iraqi targets, including suspected Scud hide sites. The significance of the Nimrod's role in western Iraq was not lost on the Detachment Commander, who subsequently recorded without exaggeration:

> We have written another chapter in the long and illustrious history of this aircraft – a chapter that will stand out above the rest for the ability [of personnel] to quickly get to grips with the newly acquired equipment in a hostile and threatening environment. The Nimrod MR2 has once more proven her adaptability, capability and achievement in a war-fighting role and has not been proved wanting.

Nimrod MR2s continued to employ the MX-15 capability in support of British ground forces in Iraq and Afghanistan until 2009.

5. Tactical Air Transport and Support Helicopter Operations

The RAF's contribution to tactical air transport in western Iraq was provided by 47 Squadron, then equipped with Hercules C-130 C1s and C3s. Throughout the operation, they worked closely with 7 Squadron, equipped with Chinook HC2s – part of the Joint Special Forces Aviation Wing (JSFAW) based at RAF Odiham. There is little record of either unit's preparations for Operation Telic before January 2003 beyond limited references (in the case of 7 Squadron) to 'intense ground training and significant aircraft engineering work'. However, both 47 Squadron and 7 Squadron were involved in one of the Early Victor exercises in October 2002 (see above), which proved valuable for training and theatre familiarisation.

As for preparations to participate in Counter-TBM operations, the first recorded measures involved 47 Squadron's deployment between 2 and 13 January for the third Counter-TBM live-fly exercise at Nellis Air Force Base in Nevada. Four crews and two C-130s were involved, and the exercise was afterwards described as the 'final dress rehearsal for potential operations against Iraq'. Other participating personnel from RAF Lyneham were drawn from the Engineering Wing, the Station Armoury, and the Survival Equipment Section.

The flying programme comprised two waves per day, one in daylight and one after dark, but the various force elements tasked with tactical airlift flew solely at night to enhance their NVG capabilities. The exercise has been described elsewhere in this narrative. For 47 Squadron, it proved valuable for two reasons: first, it introduced personnel to the western Iraq Counter-TBM/SF-support CONOPS and to the Telic ROE; second, it provided scope for practising NVG disciplines. These included operations from (normally natural surface) Tactical Landing Zones (TLZs), close formation flying, and low-level cross-country navigation. Unfortunately, though, one of the two aircraft suffered regular communications unserviceabilities that limited training opportunities for two of the crews.

Meanwhile, 7 Squadron deployed two Chinooks to Jordan to take part in Exercise Desert Thundercat. They were joined by a single 47 Squadron C-130 and one crew on the 17th, although this detachment eventually operated from Akrotiri. From the perspective of the ground units committed to Counter-TBM, Desert Thundercat provided a further opportunity to train in a desert environment and practise the techniques that would be employed in the event of hostilities with Iraq. Naturally, they required tactical air transport and support helicopters. However, for 7 Squadron, the exercise also provided a valuable opportunity for training with their newly introduced Night Enhancement Package (NEP), a programme of

modifications designed to improve the safety, situational awareness and night capability of the Chinooks and their aircrew. The enhancements included improved NVGs with a display NVG system (similar to a head-up display), a forward-looking infra-red multi-role turret, and an improved navigation suite that incorporated integrated inertial navigation and GPS capabilities. For the 47 Squadron contingent, Desert Thundercat offered ample scope for practising both insertion and extraction of the ground units from TLZs under cover of darkness, and they also mounted a number of parachute re-supply missions for ground patrols in the desert. The C-130 returned to RAF Lyneham on 23 January, while the two Chinooks were withdrawn to Akrotiri.

Back in the UK, both squadrons conducted further training prior to deployment, 47 Squadron practising a number of key disciplines, including fighter evasion, operational low flying, and TLZ operations from Pendine Sands in Wales. Two 7 Squadron Chinooks and three crews were sent to a location near Carlisle to perform a range of Full Mission Qualification and Basic Mission Qualification checks. Crews completed NVG qualifications, mounted a fast-roping assault on a lakeside objective, and trained in the use of personal locator systems and PRC-112 survival radios. There was also a simulated pick-up and insertion, and an Advance Landing, Arming and Refuelling Point (ALARP) exercise, in which a C-130 refuelled the two Chinooks.

During the month, 47 Squadron and 7 Squadron personnel destined for deployment were organised into constituted crews, and their ultimate deployment plans allocated specific crews, personnel and equipment to the aircraft involved. The two detachments were each to be divided between two task forces. TF 7 was at first to operate from RAF Akrotiri and was responsible to the coalition Commander Joint Special Forces Task Force North (CJSOTF-N), which was primarily assigned to northern Iraq. One 47 Squadron C-130 and two crews were allocated to TF 7, along with two 7 Squadron Chinooks and two crews. At the time of deployment, it was anticipated that TF 7 would be infiltrated into the Mosul area, their aircraft flying between Akrotiri and Mosul via Turkish airspace. Yet this plan was dependent on Turkey's willingness to permit over-flight and limited FOB facilities. The second task force, TF 14, was subordinated to the CJSOTF-W and committed to Counter-TBM operations mounted from Jordan, as we have seen. Five 47 Squadron crews and three C-130s were to deploy there with five 7 Squadron crews.

Additional aircrew from 27 Squadron were required to support both 7 Squadron detachments. One 27 Squadron crew and a third Chinook were assigned to Akrotiri, while two other crews prepared for deployment to King Faisal air base, Jordan, where they were to assist in the operation of a total of six Chinooks. The

primary task of the 27 Squadron crews was to deploy ALARP facilities to refuel 7 Squadron Chinooks at locations where the C-130s were unable to land. Similarly, the 47 Squadron detachments were to be supported by two further C-130s and a number of crews from 70 Squadron, whose task was to meet the in-theatre air transport requirements of TF 7 and TF 14. The two aircraft had been prepared for NVG operations and the crews held both NVG and tactical flying qualifications, but they were not permitted to fly inside Iraqi airspace.

The two detachments deployed in the expectation that it might be necessary to establish FOC by 15 February. The TF 7 detachments flew out to Akrotiri between 3 and 5 February, the Chinooks routing via Bordeaux (where they were forced to land by bad weather), Nice, Naples and Rhodes. The TF 14 elements began deploying on the 6th. The first C-130 reached King Faisal that day while the second arrived three days later, by which time the 15 February FOC date was already slipping back. The third aircraft flew to Akrotiri on the 12th and on to Jordan on the 16th. The four TF 14 Chinooks had reached Akrotiri by the 8th but were then prevented from transiting to King Faisal by poor weather along the route. They ultimately completed their journey on the 11th.

At Akrotiri, for reasons of operational security, TF 7 were at first segregated from the main base facilities and accommodated in a tented area located around a large hangar on the airfield's eastern dispersal site. Later, this strict isolation policy was relaxed somewhat. At King Faisal, 47 Squadron described their accommodation as 'austere but bearable', and their bed-down apparently proved relatively straightforward.

Both detachments trained intensively throughout the second half of February, working closely with their respective ground units and continuing to hone key skills. Only quite restricted training areas were available in Cyprus, but there were at least suitable TLZ and DZ locations, and limited range facilities. Flying training included ALARP, force protection and other TLZ drills involving the Chinooks and the C-130. The Chinook detachment also recorded that they undertook AR 5 familiarisation sorties, personnel location training, and exercises with TF 7 requiring the movement, insertion and extraction of both troops and vehicles (quad bikes and militarised Landrovers, or WMIKs – an abbreviation for Weapons Mounted Installation Kit). There were also opportunities for air-to-ground gunnery practice and fast-roping exercises. Other training included the employment of self-defence measures, such as chaff and flare systems, and break-lock manoeuvres. There was simulated helicopter-versus-helicopter flying against a Lynx of 657 Squadron, Army Air Corps, and at least one Chinook crew had the opportunity to test a newly procured air-portable fuel cell. On the ground, the detachment

undertook NBC drills and received flight safety and aircraft self-defence briefs, and small-arms training and preparation.

By contrast with Cyprus, Jordan offered large expanses of desert that were ideal for training and exercises. The main training area could be accessed by coalition aircraft via two low-level routes. The so-called Desert Route, flown clockwise, took aircraft over the relatively flat terrain to the north, which was very similar to the western Iraqi desert. The Mountain Route, flown in an anti-clockwise direction, led to higher ground around Petra. Working with TF 14, the C-130s and the Chinooks practised insertions to and extractions from natural surface TLZs, and the C-130s were again employed as ALARP platforms for the Chinooks, setting up refuelling sites on TLZs to provide the helicopters with a greater operational radius. They were also used to deploy air portable Field Surgical Teams (FST) into the training areas. The teams were so equipped that (on the ground) they could turn the freight bay of a Mk 3 C-130 into a battlefield operating theatre, capable of treating casualties in forward locations as soon as they had been withdrawn from the front line.

The Chinook detachment conducted preparations very similar to those undertaken by the TF 7 crews in Cyprus, but a high priority was also assigned to desert familiarisation sorties and specifically to training for landing in featureless desert terrain in low-light conditions. This was a critical part of so-called Low Ambient Light Operations (LALO). Appropriate techniques were quickly developed, involving near total reliance on instruments, but the aircraft had still to be carefully stabilised during their approach, and the closest possible co-operation between aircrew was essential. Formation flying was also central to 7 Squadron's work-up for LALO. On 19 February, the squadron mounted a four-helicopter mission in low ambient light conditions for the first time. Once the critical importance of LALO training in desert operations became clear, the TF 7 Chinooks deployed from Akrotiri to Jordan temporarily. They arrived on 23 February and spent the following week flying LALO, before returning to Akrotiri on 2 March.

In the last week of February, the TF 14 detachment suffered two mishaps that perfectly illustrate the critical importance of training and exercises to the successful prosecution of SF support and other airborne operations. On the first occasion (20 February), during a mobility drills mission, two Chinooks were damaged when TF 14 attempted to load their Pink Panther Landrovers (known as 'Pinkies') on to the helicopters at night. On the second occasion, at the end of the month, a full Counter-TBM mission rehearsal was making use of several TLZs and airfields to simulate locations in hostile territory, while H-4 airfield in north-east Jordan was employed as a FOB, where troops and equipment would be

assembled before an initial coalition SF infiltration. The rehearsal began on 27 February, when two 47 Squadron C-130s were used to deploy an FST on to a desert landing strip in daylight. After dark, C-130s and Chinooks transported an SF contingent from H-4 to one of the TLZs; the mission ran smoothly despite periodic air-to-ground communications problems.

The C-130s then returned to H-4 for their second load before again transiting to the TLZ. The first aircraft landed and unloaded without incident but was on the point of take-off again when the crew spotted one of the SF vehicles crossing the strip immediately ahead. The pilot reacted rapidly enough to ensure that, as the C-130 took to the air, the vehicle received only a glancing blow from the starboard main-wheel undercarriage door. The aircraft was then flown back to base, where it executed an emergency landing. Debris on the TLZ runway prevented the other two aircraft from landing, so they too returned to base. Finally, as dawn began to break, the crews were advised that the TLZ had been re-opened, and they were able to complete their mission. The aircraft involved in the accident remained out of use for nearly a week afterwards while repairs were carried out by a USAF battle damage repair team. One occupant of the SF vehicle suffered a severe back injury and was evacuated from the TLZ by Chinook.

The Counter-TBM mission rehearsals continued in the following days, mixing insertion, re-supply, ALARP, and extraction (including CSAR and other emergency extraction) exercises. C-130 re-supply sorties provided essential training for TF 14 ground patrols in setting up the appropriate DZ markings on the exact grid references given to the 47 Squadron crews. The missions were executed largely to plan, but there were further difficulties establishing air-to-ground communications. Crews therefore followed tried and trusted standard operating procedures, which decreed that the drop should be made if the DZ was correctly marked, even if no air-to-ground communication was possible. All the drops were successful, and the supplies delivered to the ground units then allowed their patrols to progress further north to a range complex to conduct live firing in collaboration with Lynx helicopters of 657 Squadron. Chinook insertion and extraction exercises included the carriage of a so-called Counter-Mass Effect (CME) troop and a Special Monitoring Team (SMT), which had specific responsibilities for examining suspected WMD-related sites.

The final pre-Telic rehearsal occurred on 2 March and was again chiefly concerned with locating ground units. The task was to extract two patrols using Chinooks working under the direction of a single C-130. The C-130 correctly established the whereabouts of both ground teams and passed their positions to the Chinooks, which duly executed the extractions.

RAF Chinooks shortly before Operation Telic.

A 47 Squadron C-130 during Operation Telic in 2003.

During the following week, the TF 7 plans were extensively revised. By this time, the Turkish government appeared unlikely to provide forward basing or overflight permission for coalition forces. The only feasible alternative lay in flying TF 7 into Iraq from Jordan or Saudi Arabia using broadly the same base facilities as TF 14. Their task would now be to deploy north of the Euphrates. After this decision was taken, the 7 Squadron and 47 Squadron aircrew at Akrotiri spent several days developing their planning cycle for the insertion into Iraq. The infiltration plan was briefed to TF 7 on 6 March, and the aircraft assigned to TF 7's support deployed to King Faisal on the 9th.

The acute political sensitivities surrounding potential operations in Iraq resulted in the virtual cessation of training flights at this time, but there were still opportunities for taking other preparatory steps, many of which would have been essential under any circumstances. First, the move of TF 7 from Akrotiri to Jordan allowed air resources and expertise to be pooled: the Chinook and C-130 detachments were now effectively joined together, and the TF 7 aircrew were read into the Counter-TBM CONOPS on the 12th. Second, during the lull in training, there was a concentrated effort to reposition TF 7 and 14 vehicles and equipment to FOBs. Between 13 and 21 March, the 47 Squadron and 70 Squadron crews completed numerous shuttle runs forward, delivering a large number of attack vehicles and substantial quantities of stores and ammunition. They also flew many longer sorties, moving personnel, vehicles and supplies between Cyprus, Jordan, Saudi Arabia, Kuwait and Qatar. This activity provided at least some opportunities for the 70 Squadron crews to practise tactical flying.

The limited amount of flying training conducted by the Chinooks chiefly took the form of firepower demonstrations to TF 14, which were flown with other Counter-TBM air assets such as GR7s, AC-130s and Lynx helicopters. There was also a further loading exercise, and the 27 Squadron crews mounted additional desert familiarisation sorties. Otherwise, there was much preparatory work to be completed on the ground, including briefs on intelligence, communications and planning, on SF doctrine and tactics, and on the techniques employed for the emergency extraction of personnel from TLZs. Members of the RAF Regiment also devised a ground-training syllabus that encompassed weapons handling, NBC countermeasures, and the essentials of combat survival. Aircrew were given the opportunity to fire their personal weapons and were instructed in escape, evasion, survival, and conduct-after-capture techniques, and in the probable rescue measures that would be implemented if they were brought down in enemy territory. The more senior detachment personnel also visited Ar'Ar in this period to inspect the airfield that would be their principal FOB.

During the second week of March, coalition commanders decided that C-130 missions would not at first be flown into Iraq in support of the SF insertion because intelligence suggested there was a significant threat from SAMs, Man-Portable Air Defence Systems (MANPADs) and AAA in the western desert. They *would* be used to move the SF to their FOBs – H-4 and Ar'Ar – but the airlift into Iraq would be mounted only by Chinooks.

Potentially, this left TF 14 short of lift capacity for their initial insertion. It was therefore necessary to increase the number of Chinooks involved in the operation: 7 Squadron would execute their mission using formations of six helicopters. According to their record, 'A 6-ship insert into enemy territory by CH-47 had not been attempted before.' On the 11th, they flew a training mission to test the concept. Unfortunately, one Chinook became unserviceable, but the exercise was still productive, the larger formation proving straightforward in terms of manoeuvre and landing. There was no reason to expect that the addition of one more aircraft would cause any problems. The following days were spent completing the final planning, briefing and orders processes and other last-minute preparations. Finally, on 17 March, six Chinooks from 7 Squadron and a further two from 27 Squadron transited south-east from King Faisal to Ar'Ar with part of their TF 14 cargo, while 47 Squadron C-130s delivered the remainder.

Daylight hours on 19 March were taken up with final briefings and equipment checks pending authorisation for TF 14's insertion. This was received at 1930 and gave permission for the lift to begin at 1950, which meant entering Iraqi airspace at 2000. The six 7 Squadron Chinooks each then flew two sorties into Iraq, and five flew one further sortie to complete the operation. Their route ran almost due north from Ar'Ar, and the landing zone was approximately 130 miles north of the airfield and 85 miles inside the Iraqi border. The zone was located in very sparsely populated desert terrain; the only inhabited area of any significant size was Ar Rutbah, which lay 50 miles to the north-west. The mission ran entirely according to plan and there were no hitches of any kind; the third and final Chinook

formation landed back at Ar'Ar at 0235 on the 20th. The only active Iraqi air defence elements were visual observation posts on the frontier. These were still operating when the Chinooks flew their first mission but were afterwards put out of action by other coalition air and SF assets.

One vital task for TF 14 following the infiltration involved the location of a TLZ for C-130 landings. This would significantly ease the task of deploying additional personnel and equipment. With the help of previously acquired imagery, they quickly identified a suitable site (which was code-named 'Victoria'), and details were duly passed up the command chain and on to the responsible mission planners. The 47 Squadron detachment then began planning its first lift into Victoria, which was scheduled for 22 March.

The lift was to be mounted directly from King Faisal to Victoria and involved three C-130s transporting TF 14 personnel, vehicles and equipment. They took off at five-minute intervals having been assigned a very tight evening schedule, which had to be observed to ensure deconfliction from other coalition air assets. The transit to Victoria did not pose any problems, and the first C-130 landed and unloaded in a matter of minutes before vacating the airstrip so that the second could make its approach. However, this aircraft was delayed on the ground by difficulties encountered in the removal of loose freight, causing the third aircraft to hold off some distance away. While holding, it narrowly escaped a head-on collision with a USAF MC-130H. Again, after it landed, there were delays unloading so that take-off from Victoria was some 15 minutes behind schedule, although still within the deconfliction plan.

It had been intended that the three aircraft would afterwards fly to Ar'Ar to assist with the withdrawal of a US support unit, but engine trouble compelled one of them to abandon this part of the mission and fly directly back to King Faisal. The other C-130s proceeded to Ar'Ar as planned, collected their respective loads, and then delivered them to H-5 (another Jordanian base) before also returning to King Faisal. Throughout the mission, the only sign of Iraqi activity was a limited amount of light AAA, which posed no threat to the aircraft, and possible rocket-propelled grenade fire on one of the main supply routes across the western desert.

Chinook and C-130 missions in support of TF 7 began later, as they were not involved in Counter-TBM operations. Their plan required two Chinooks to insert a reconnaissance team into a location north of the Euphrates and close to the Syrian border on 22 March. The team was tasked to locate a suitable TLZ site, and further elements of TF 7 were then to be inserted by Chinook and C-130 the following night. The reconnaissance team was flown in from Ar'Ar in a mission described by 7 Squadron as follows:

> The TF 7 insert … was a classic long-range SF insertion carried out in the finest traditions of the Service. The 2 ac departed Ar'Ar at 2100 … Environmental conditions were ideal; no moon had reduced light levels to negligible (i.e., less than 0.2 mlux). However this was offset by clear skies and good visibility which enabled the FLIR[45] to give an excellent picture throughout the mission. These conditions were a real test of the NEP equipment and practised flying techniques, neither of which were found wanting.

The Chinooks flew north and crossed the Euphrates about 30 NM east of Al Qa'im. Soon, the desert was replaced by rolling grassland: 'Bedouin encampments became larger and more numerous.' The primary drop point some 10 NM south-east of a disused Iraqi airstrip at Subaikha (about 50 miles north of the Euphrates) proved unsuitable as a Bedouin camp had been erected nearby, so the TF 7 personnel were put down on to a secondary position located 2 NM further east. It is not clear that the presence of Bedouins in significant numbers was factored into coalition plans, and it seems unlikely that, if Bedouins were visible to the Chinooks, the Chinooks were not visible (or at least audible) to the Bedouins.

The Chinooks' return journey was uneventful, and they landed at Ar'Ar at 0150. The TF 7 reconnaissance team rapidly located a suitable TLZ, and preparations were then finalised for a C-130 lift to bring in the bulk of the squadron that evening. The aircrew involved were literally boarding their aircraft when they received word via tactical satellite radio that the proposed TLZ had been compromised: the TF 7 personnel in the area had been attacked by Iraqi troops and were attempting to break contact. Consequently, the C-130 mission was cancelled, and two Chinooks set out from Ar'Ar to extricate the reconnaissance team. Airborne at 0015 on the 24th, they located the TF 7 contingent at 0220 and recovered all personnel and equipment successfully while a pair of USAF F-16s provided top cover. They arrived back at Ar'Ar at 0430.

Drawing on intelligence gathered by the reconnaissance team, TF 7 then replanned their insertion into Iraq. The new plan envisaged flying C-130s from King Faisal into TLZ Victoria; at the same time, Chinooks operating from Ar'Ar would mount an initial lift to a new landing zone not far from the area previously surveyed by the reconnaissance party. They would then return to Victoria, where the C-130s were to act as ALARP platforms. While refuelling, the Chinooks would take on board the TF 7 personnel and equipment brought in by the C-130s, which

45. FLIR – Forward Looking Infra-Red camera.

they would then move north. Supporting TF 7, elements of 45 Commando were to manage operations at Victoria and protect the TLZ during the infiltration, which was to take place over two consecutive nights.

The operation began on the night of the 27th. One of the C-130s developed an engine fault during its initial transit to Victoria and had to return to King Faisal, where its load was quickly transferred to a replacement aircraft, but the 47 Squadron mission otherwise ran smoothly. Three C-130s flew sorties from King Faisal to Victoria, from Victoria to Ar'Ar, and from Ar'Ar back to Victoria. Throughout, one aircraft was normally on the ground at Victoria on ALARP duty while the other two were airborne. The final C-130 to transit back from Victoria to King Faisal left behind a fuel bladder for future use by the Chinooks.

For 7 Squadron, the insertion was more challenging and took longer than expected. The TF 7 lift requirement was such that they had to fly four separate waves of four aircraft. All four lifts and their subsequent return to Ar'Ar had to be executed under cover of darkness. Consequently, their turn-around time at Victoria between missions had to be kept to the barest possible minimum. They were evidently disappointed to discover that the refuelling capacity provided by the C-130s at Victoria was not to exceed two hoses at any one time, and the arrival of TF 7's vehicles there seems also to have been slower than the Chinook crews originally anticipated. This was partly because of the C-130 unserviceability and partly because one aircraft had to be held at Victoria for ALARP duties. Yet it was also due to C-130 load limitations and the fact that 47 Squadron had to fulfil an additional lift task for TF 14. This combination of factors ultimately left the Chinooks waiting on at least two occasions pending the completion of further C-130 sorties to Victoria.

The first Chinook mission to insert TF 7 was uneventful, but there were signs of Iraqi air defence activity during the second. The formation was locked up by an Iraqi radar en route to the TF 7 landing zone and was also scanned by two height-finding radars typically associated with anti-aircraft artillery batteries. The crews observed AAA fire on several occasions, but it was too inaccurate to pose a serious threat. Their experience was very similar during the third mission. Nevertheless, the infiltration was successfully completed, and the four Chinooks landed back at Ar'Ar at 0335.

On the following night (28 March), the four Chinooks left Ar'Ar empty, picked up the remaining TF 7 personnel and equipment at Victoria, and moved them forward to join the force already deployed north of the Euphrates. There was a brief scare at Victoria when Iraqi vehicles were spotted nearby to the north and south, and the Chinooks were held on the ground until the immediate threat had

passed; afterwards, they routed east out of the TLZ to avoid any Iraqis still in the area.

This final TF 7 insertion was otherwise uneventful except that, during their return transit, the Chinooks were warned by the on-task E-3D of an active Roland SAM system nearby. They responded by descending to 50 ft above ground level, an altitude which they maintained for 10 miles, relying on their Thermal Imagers (TIs) to avoid higher terrain. A single C-130 also flew to Victoria that night, bringing in supplies and acting as an ALARP platform to deliver eight tons of fuel to the four Chinooks. On the 29th, two C-130s returned to evacuate the Royal Marines to Ar'Ar. With the TF 7 infiltration completed, their task was over. The mission was uneventful, although it was noticeable that the surface of the TLZ was beginning to deteriorate.

Meanwhile, since their initial infiltration, TF 14 had required minimal support from the Chinooks or 47 Squadron. During this period, they were largely engaged in sanitising particular areas of the western desert so they could be declared free of Scud missiles. However, after a few days, some further infiltration and re-supply sorties became necessary. On the evening of the 28th, two Chinooks brought in command and control elements and a detachment of vehicle mechanics. Another sortie that day dropped food, vehicle spares and ammunition. Some initial hold-ups during load preparation caused the parachute drop to be postponed slightly in flight to ensure deconfliction with helicopter traffic around the DZ. This was a complex process involving communication between the on-board signaller and higher command authorities to deconflict the amended route. Once the change had been approved, authorisation had then to be passed back via the same chain to the aircraft. When the time came for the drop, the C-130 made two passes, releasing four one-ton loads on the first pass and six on the second. All the supplies were successfully recovered on the ground. The crew observed some light AAA fire 15-20 miles north of the DZ but no other signs of Iraqi opposition.

On 30 March there was a major setback. Following their insertion, TF 7 operated for two days untroubled by the Iraqis. However, on the evening of the 30th, they were surprised at their laying-up position by a large and well-equipped enemy formation. They immediately scattered and managed to break contact with the Iraqi force.

Emergency extraction procedures were instantly initiated, involving the Chinook and C-130 detachments. Fortunately, TF 20 had recently captured H-1 airfield, which was significantly closer to TF 7's location than TLZ Victoria and made a perfect FOB. Two airborne 7 Squadron Chinooks were re-tasked and diverted to H-1 in preparation for the extraction, and at least two more joined them directly from Ar'Ar. Two C-130s were sent in from King Faisal to provide

ALARP facilities for the Chinooks and deploy an FST. Thankfully, the team was not required and was soon stood down, but the C-130s dispensed an extra two tons of fuel to each of the participating Chinooks while the extraction was in progress.

After refuelling, the first Chinooks set out to find TF 7. Initially, there was no sign of any personnel at the agreed rendezvous, so the helicopters initiated a circular search pattern, which soon produced the desired response in the form of a strobe light. The first aircraft then landed and only then did the crew learn that TF 7 had been split into at least four groups, which were dispersed over a wide area. In the meantime, however, the F-16s assigned to provide CAS for the extraction had ascertained the position of a second TF 7 group, and the coordinates were duly passed to the Chinooks. Then, as the helicopters approached, the F-16s illuminated the position with a powerful IR source. A third TF 7 group was found in the same way, and the Chinooks then returned to H-1.

Two more Chinooks then took off to search for other TF 7 elements, which had become separated from the main groups and were reported as moving towards an agreed pick-up location. Crossing the Euphrates, the two helicopters were locked up by Iraqi radars, but they broke lock successfully and descended to 50 ft above ground level – a considerable challenge given the prevailing poor light levels and undulating terrain. The mission was then suspended, and the Chinooks were withdrawn south across the Euphrates; subsequently, it was re-launched, and they were sent back north. During both transits they were again locked-up by Iraqi radars and, again, they managed to break lock. The new pick-up location relayed to the Chinooks by the on-task E-3D took them deep into an area of considerable enemy activity. To quote the 7 Squadron record,

> Several vehicle headlights were now seen in the area and they seemed to be searching for friendly activity, as they kept moving back and forth. The crews searched every hot spot on the TI. However, some of these were enemy vehicles as they actively sought to illuminate the ac as we approached. This area was distinctly unfriendly, and as we had seen no sign of our troops in the location, we routed south.

They were about to check another area near the Syrian border when they received updated coordinates for the pick-up and almost immediately spotted lights on the ground at approximately the right location. However, the crew of the lead aircraft mistook the flashing strobes for incoming enemy fire and began returning fire until they were warned off by the second Chinook. Luckily, no TF 7 personnel were hit as the Chinook's M-134 machine gun rounds mainly

impacted between their two WMIKs. Each helicopter picked up one WMIK and several TF 7 personnel; having been continually chased for four hours and fired on by vehicles with .50 calibre weapons, they were very relieved to be rescued. In all, the Chinooks brought out 52 of the 54 members of TF 7 safely on the night of 30 March – a truly outstanding achievement – but most of their vehicles were lost, and they also left behind the bulk of their equipment and supplies.

On the following evening, there was a further search for the two missing personnel. One C-130 provided ALARP facilities for the Chinooks, while another employed personal locator equipment in an attempt to establish communications with the two men via their survival radios. Had they been found, Chinooks would have deployed to extract them. The C-130 assigned to the CSAR mission was placed in a racetrack holding pattern near the Syrian border, from where it sought to interrogate the survival radios, but after two fruitless hours it was recalled to King Faisal. Meanwhile, two Chinooks were kept at readiness at H-1 until 2300, when they were released and sent back to Ar'Ar. The unlocated TF 7 pair eventually found their way to safety via Syrian territory.

So ended TF 7's role in Operation Telic. It is clearly not appropriate for this study to consider the circumstances that led to their failure and the planning lessons that might be identified from it, and the role of Iraqi radar, which intermittently tracked their insertion, must remain undetermined. More important is the fact that, when TF 7's mission was compromised, only 7 Squadron stood between them and almost certain capture – or worse. The Chinooks tasked with the extraction were required to accept extreme risks, flying deep into enemy territory at very low altitude, dodging Iraqi air defences, and landing in an area where a substantial hostile force had been deployed. Moreover, their CSAR sorties were eminently predictable, and a more competent adversary might well have prepared far more effective interception measures.

The TF 7 extraction marked the peak of 7 Squadron tasking in Telic. On 31 March, the TF 14 Chinooks set out on a re-supply mission but found the pre-arranged TLZ (near H-2) deserted. After an extensive search, they began to run short of fuel and were forced to withdraw. Over the next four days, there was no operational flying. In contrast, 47 Squadron continued flying re-supply and infiltration missions. Indeed, even on the night of the main TF 7 evacuation – 30 March – 47 Squadron mounted a single parachute re-supply mission for TF 64. A late relocation of the DZ led to some re-planning before take-off, but ingress to the area was otherwise straightforward. However, near the DZ, it proved impossible to establish communication with the ground unit. TF 64 had to use a strobe light to show their position to the C-130 crew. After they had been spotted from the air, the drop was successfully executed, and all the stores were recovered

on the ground. The C-130 then flew back via H-4, picking up some non-essential equipment for return to King Faisal.

On the evening of the 31st, three C-130s were used to insert elements of 45 Commando and 2 Squadron RAF Regiment to a new TLZ code-named 'Breezy', which had been activated due to the deterioration of Victoria. Their initial transit went according to plan, and they afterwards flew to H-4 to collect a second 45 Commando contingent. Of the three C-130s, the first duly returned to Breezy, unloaded and then routed back to H-4. However, some eight miles south-west of the TLZ, the second aircraft began receiving Roland SAM warnings on its RHWR. The pilot performed the prescribed evasive manoeuvres and dispensed chaff before continuing to the TLZ. The on-task E-3D was warned of the threat and instructed the third C-130 to change its approach to Breezy. It duly landed at the TLZ uneventfully, offloaded its cargo, and flew back to H-4.

These three aircraft then completed a third mission, having been joined by the C-130 that had earlier flown the ALARP mission to H-1 (see above). Again, the first sortie to the TLZ was straightforward, but the second ran into trouble. This time, approximately 25 NM south-west of Breezy, there was a further series of RHWR and audio warnings indicating another Roland threat. The C-130 manoeuvred repeatedly and released more chaff, but to no avail. The loadmaster then witnessed a flash just above the port wing-tip and also saw a projectile climbing away slightly ahead and to the port side before burning out. The crew updated the E-3D on the incident to alert the rest of the formation, and the aircraft then landed at the TLZ.

The following two C-130s continued their approach to the TLZ, receiving constant updates from the E-3D on the reported positions of the Roland sites. The first landed as planned but the second had to re-route to deconflict with other coalition aircraft and avoid one of the suspected SAM locations. Finally, after this last C-130 turned back towards Breezy, it was ordered to abort, and all further 47 Squadron operations were cancelled that night because of the SAM threats in the TLZ area. Two sorties flown the following evening brought the remaining elements of 45 Commando to Breezy.

On 2 April, a single 47 Squadron C-130 mounted two parachute re-supply missions, one to a US unit known as FOB 51 some 60 miles north of the Saudi-Iraqi border, the other to TF 14. About five minutes before reaching the FOB 51 DZ, the crew tried to establish radio contact with the ground unit but failed. They were no more successful in observing the normal location aids – infrared torches and strobes – when they reached the DZ. In total, the C-130 made three passes over the area without establishing either radio or visual contact with FOB 51.

Eventually, lacking any confirmation that American personnel were present at the DZ, they decided to fly on and execute the supply drop to TF 14.

The FOB 51 load had been positioned at the rear of the aircraft, near the ramp, and had to be moved out of the way before the TF 14 supplies could be dropped. Between them, the loadmaster and air dispatch team drew up a plan for dismantling the FOB 51 load in flight. The higher command and control authorities granted a short time extension to the mission, and the air dispatchers then worked feverishly to reposition the loads, completing the task with under seven minutes to go before the drop. The crew made contact with TF 14 soon afterwards but then experienced further difficulties locating the DZ, which was positioned on the hidden face of a wadi. After their first pass, they sought confirmation of the DZ coordinates from TF 14 and only then discovered that they differed from the pre-briefed coordinates; the distance between the two locations was about half a mile. Flying the second pass from the opposite direction, placing the DZ on the more visible open slope of the wadi, they spotted it almost immediately. After a successful drop, the pilot set a course for the Saudi border.

Near the border, the crew received an urgent directive to fly to the FOB at H-4, where they were to reconstruct the load intended for FOB 51 before making a further attempt to deliver it. The pilot discussed the situation with the on-task E-3D and, pending deconfliction with other coalition air assets over western Iraq, the C-130 was placed in a holding pattern just inside Saudi airspace. The loadmaster then produced another plan for reconstructing the load in flight, working under considerable time pressure because of the need to ensure that the aircraft retained enough fuel to make the drop. Ultimately, he took just 15 minutes.

The C-130 then flew back to the FOB 51 DZ area. Again, the crew were unable to establish radio contact with the ground unit, nor was there any visual sign of the DZ location. Fuel was now running low, and it seemed possible for a brief period that the mission might have to be aborted. Only further consultation with higher command authorities eventually linked FOB 51 with a building and a vehicle that were both visible from the air, and the load was dropped on this basis using the briefed coordinates of the DZ. On returning to King Faisal, the crew learnt that FOB 51 had recovered the supplies and were extremely grateful to all concerned. Nevertheless, the mission had revealed serious flaws in coalition DZ procedures, which were highlighted during the post-mission debriefing. Instructions previously issued on primary and secondary methods for illuminating DZs had apparently been ignored; instead of the recommended torches and strobe lights, the ground unit had used inferior infrared sources with a poor track record. The direct consequences included two in-flight reloads and five passes over the FOB 51 DZ.

The next 47 Squadron sorties were flown on 4 April and contributed to the dismantling of the FOB at H-4 and the establishment of a new base at H-1, deep inside Iraq. H-1 (primarily operated by TF 20) was to be used as a stepping-stone between King Faisal and BIAP as soon as it was in coalition hands. The squadron executed seven routine sorties between King Faisal, H-4 and H-1 from 4 to 6 April. The C-130s' cargo included not only UK personnel from King Faisal but also support elements to enable 7 Squadron Chinooks to operate from H-1, and A Flight, 2 Squadron RAF Regiment for force protection. Two Chinooks deployed from H-4 to H-1 on 5 April and two more arrived from King Faisal on the 6th, by which time US ground forces had already secured much of BIAP.

The original plan envisaged that the Chinooks would insert a TF 14 reconnaissance team into BIAP that evening. However, after the first attempted US landings received a hot reception, the TF 14 mission was postponed for 24 hours to allow coalition forces to consolidate their hold on the airport and the surrounding area. Once BIAP had been secured, it was established that, although the main runway was unserviceable, a nearby taxiway was large enough for the take-off and landing requirements of fixed-wing air transport. The TF 14 insertion could therefore be mounted by the C-130s.

Yet aspirations to land four 47 Squadron C-130s at BIAP on the evening of 7 April proved unduly optimistic, and three of the planned sorties were postponed for 24 hours shortly before take-off. The risks involved in sending a formation of large tactical transport aircraft into Baghdad so soon after the airport had been captured were too great. Therefore, 47 Squadron mounted a single flight to BIAP that night, staging from King Faisal to H-1 with supplies before picking up nine personnel and two Land Rovers destined for the Iraqi capital. The remaining three C-130s conveyed elements of TF 14 to BIAP as planned on the night of the 8th. The only significant problem was a general power failure in Baghdad, which plunged the entire city into darkness. The 47 Squadron pilots therefore made their approach using a planned safe altitude to ensure ample clearance of any nearby obstacles; the taxiway used for the landing had been clearly marked out by American tactical air traffic controllers. Having successfully unloaded, the three C-130s made an uneventful transit back to King Faisal.

Following the cancellation of the Chinook mission to BIAP, 7 Squadron's part in western Iraq operations effectively came to an end. Some members of the squadron departed from Jordan on 8 April, leaving enough cover in theatre for routine tasking for such units as the CME troop and TF 64. On 10 April, two Chinooks positioned at H-1 were placed on standby to pick up suspected Iraqi regime members who had been stopped en route to Syria, but they turned out to be Syrian diplomats, and the mission was duly cancelled. However, on the

following day, TF 64 had more luck and blocked the escape of some 59 Iraqi personnel, who presumably had political or military connections and had in their possession $630,000. Among them was a regime member from high up on the US 'most wanted' list. The two Chinooks were tasked to bring them to H-1, where they were handed over to the Americans. This was the last mission of any significance flown by 7 Squadron in support of the combat phase of the operation. Elements of the squadron remained in theatre for the remainder of April before returning to the UK in the first week of May.

For 47 Squadron, there was one further substantial TF 14 infiltration from H-1 to BIAP on 11 April, involving four C-130s and including elements of 2 Squadron RAF Regiment; but missions were otherwise soon confined to routine relocation, resupply or roulement tasks between King Faisal, H-1 and BIAP. Up to 17 April, flying inside Iraqi airspace was still restricted to the hours of darkness, but the threat assessment was then revised downwards and the C-130s duly received authority to operate in daylight. As the volume of tasking declined, the 47 Squadron detachment began to draw down. One crew had been withdrawn as early as 2 April; the other aircrew from the original detachment returned to the UK between 9 and 26 April, leaving a single C-130 and two crews to fulfil any residual tactical air transport requirements.

The record of 47 Squadron and 7 Squadron in Operation Telic demonstrated that RAF doctrine and training for the employment of tactical air transport and support helicopters with the SF were robust and that they catered very effectively for virtually all relevant operational contingencies. The small number of interoperability issues that arose underlined the need for training to be regularly conducted with potential coalition partners. Occasional communications difficulties reflected the broader weakness of the UK armed forces' communications infrastructure at that time, but their impact was minimal. In general, the intensive work-up activity that characterised the months leading up to Telic could hardly have paid more handsome dividends; in this period, the C-130 and Chinook elements assigned to the operation repeatedly honed the skills, roles and capabilities they would use after the outbreak of hostilities in March 2003. Among these capabilities, ALARP operations loomed particularly large. Planned in a systematic and yet imaginative way, they repeatedly provided the 7 Squadron Chinooks with extended reach into Iraqi territory. For 7 Squadron, LALO and larger formation training also proved extremely useful. While at least three aircraft were damaged through mishaps that occurred in training or exercises, it is infinitely better to learn lessons in this way than to encounter unforeseen difficulties in the heat of battle.

Nevertheless, the frequent alteration of operational or tactical plans is an inescapable fact of military life; it is impossible to prepare for all eventualities. The aircrew allocated to TF 7 had to accommodate the wholesale revision of their operation plan when it became clear that Turkey would not grant overflight permission or forward basing facilities, and TF 14's original insertion plans were also substantially revised. Beyond this, there were constant adjustments at the tactical level, often executed while missions were in progress, which emphasised the critical importance of flexibility.

Operation Telic did periodically stretch RAF SF lift capacity to the limit. On a few occasions during the first two weeks of hostilities, it was not possible to employ C-130s, either because TLZs were unavailable or because of concerns about the strength of Iraqi air defences. However, even when they were in action, infiltration requirements had to be met by flying multiple return sorties deep into Iraq during the restricted hours of darkness. All these factors imposed limitations on the scaling of ground units that could be inserted within given periods of time. This was only to be expected: similar variables have always served to limit the ambitions of airborne and air-mobile forces. Nevertheless, Telic provides a reminder of the difficult challenges that often confront airborne planners. In such circumstances, the old planning maxim – keep it simple – may well be hard to observe, yet complex plans incorporating multiple inter-linked and interdependent actions (so-called 'moving parts') are inevitably more prone to disruption, delay and even failure.

Operation Telic also illustrated the risks periodically accepted by 47 Squadron and 7 Squadron to fulfil their basic roles. On occasion, they were deployed into very high threat environments, and 47 Squadron nearly lost a C-130 as a direct result. Episodes such as this underline how important it is for their aircraft to be fitted with modern and capable self-defence systems. Given the inevitable constraints on procurement budgets, there may sometimes be pressure to economise on the acquisition of protective equipment, but the headline savings that such economies might bring should be balanced against less immediately tangible factors – the human cost of casualties, the reputational cost for the RAF, the capability cost for the SF, and the financial cost of replacing highly trained crews and specialised aircraft lost on operations. Moreover, SF can periodically exert a genuinely strategic effect and thus provide a return that amply justifies relatively high outlays on their air support.

Finally, from an historical perspective, we might observe from this study of a relatively recent operation that many of the basic principles of what the RAF once called Special Duties have proved remarkably enduring. It is true that larger tactical transport aircraft, helicopters, better command, control and

communications, and improved night navigation have all helped to reshape air transport provision to the Special Forces over time. Nevertheless, there is much in the foregoing account that would have been familiar to the RAF Special Duties practitioners of the Second World War, and the ALARP concept was first developed by the Allied Tactical Air Forces in the later wartime years. To that extent, this is one field of RAF activity that offers abundant historical lessons of continuing operational relevance.

6. Canberra PR9 Operations

UK planning envisaged as early as September 2002 that 39 (1 PRU) Squadron Canberra PR9s would be based at Azraq in the event of hostilities with Iraq to contribute to Counter-TBM operations. The subsequent experience of 39 Squadron in Telic was in many ways similar to that of 3(F) Squadron, although 39 Squadron received rather less preparation for the Counter-TBM mission than the GR7 crews. This was because the PR9s, as dedicated reconnaissance platforms, were not expected to face any particularly novel challenges in the forthcoming operation, whereas the GR7s were completely new to the NTISR task. Plans to exploit the PR9 over western Iraq also drew heavily on experience gained over Afghanistan during 2001.

From the available records, it is not clear that any 39 Squadron work-up activity was directly related to the Telic mission before December 2002, when the designated CAOC PR9 SME deployed to the Gulf to participate in Exercise Internal Look. This proved to be a very worthwhile experience, for it provided an opportunity to meet many of the personnel he was destined to work with in the following year. In the same month, the squadron received warning of a potential deployment to Nellis Air Force Base to participate in the third of the three Counter-TBM live-fly exercises. However, it eventually became clear that this was primarily a night-time exercise whereas the PR9s' imaging capability was restricted to the hours of daylight. The deployment was therefore cancelled, although the PR9 SME made the journey to Nellis as an observer. On 13 December, the squadron was warned to prepare for reduced (five days) notice to move to the Gulf, with effect from the 20th; clearly, the more senior personnel would by this time have been read into the Counter-TBM CONOPS.

A Canberra PR9 take-off during Operation Telic.

Such 39 Squadron work-up activity as did take place focused on preparation for COMAOs. This emphasis presumably reflected the fact that some aircrew would have been more accustomed to operating independently, whereas air operations over Iraq were likely to involve multi-platform packages. Beyond this, the squadron also conducted airborne training against an extensive array of simulated air and ground threats. On the ground, there were the usual pre-deployment briefs from the relevant authorities on potential threats in the area of operations, combat survival and rescue, and conduct after capture.

At the same time, the squadron engineers worked tirelessly to bring two Common Data-Link (CDL) capable PR9s to readiness. The data-link represented a critical capability as it allowed still imagery from the PR9s' Rapid Deployment Electro-Optical System (RADEOS) to be transmitted over considerable distances (up to 240 miles) in near real time to the squadron imagery analysts of the Tactical

Imagery Flight (TIF). In Telic, the TIF was to operate from a deployable ground station at Azraq. There, they would not be able to upload interpretation reports or imagery directly to the CAOC, for this would have required access to SIPRNET, but data could be quickly burned on to CDs and passed on to the Americans for uploading. By this means, it could reach the ISR Collections cell in the CAOC just 10 minutes after acquisition, if not sooner.[46] The coordinates and description of any potential targets could then be supplied to the Counter-TBM Strategy Chief, providing him with a collection asset far more flexible than satellites (which are difficult to re-route at short notice). If necessary, he could then order a near-immediate attack on the target via the on-task E-3D.

On 30 January, 39 Squadron's notice to move was reduced further to 48 hours. Over the next few days, steps were taken to deploy in accordance with the original instructions given to the Azraq DOB commander to the effect that operations might begin as early as mid-February, and the 39 Squadron advance party was flown out to Jordan on the 10th on this basis. The main party followed on the 12th, and the bulk of their ground support equipment reached Azraq on 15 and 16 February. This included the self-contained cabins that made up the photographic processing area, two different imagery exploitation units, and the data-link control cabin. But the aircraft deployment originally scheduled for the 15th then slipped to the 22nd because the necessary diplomatic clearances were not forthcoming – the same problem that confronted 3 Squadron. By the 21st, all the PR9 mission support and engineering facilities were in place and ministerial approval for PR9 operations had been received, but the aircraft deployment remained on hold.

On 23 February, the CFC visited Azraq and discussed the delayed GR7 and PR9 deployments with the DOB Commander. Their deliberations produced a scheme to deploy the PR9s to Akrotiri from where they would mount reconnaissance missions along the Jordan-Iraq border. The 39 Squadron TIF would remain at Azraq and receive imagery from the aircraft via data-link. However, it would be necessary to move some engineering and operations personnel back to Akrotiri and obtain diplomatic clearance to over-fly Israel and Jordan. This was not expected to present significant problems. Two days later, the movement of selected personnel to Akrotiri began, and the first PR9 deployed there from the UK; the second flew out on the following day. Initially, only one of the available aircraft was data-link capable. After the other had completed its

46. In Operation Telic, the transfer of data from UK to US CIS was the most time-consuming part of this process for the TIF was located some distance away from the USAF headquarters facility at Azraq. To accelerate the transfer, CDs were carried over to the USAF by bicycle.

planned daily mission, its data tape and any wet film was therefore to be flown on to Azraq for processing.

Plans were now finalised for a series of missions in the border area to image potential Iraqi targets in the western desert and identify entry routes that might be used by coalition SF. For reasons that reflected a range of host-nation sensitivities, these missions had to be excluded from the ATO; they were thus flown without coalition CSAR and AEW provisions. To reduce any potential threat to the aircraft, they were prohibited from crossing into Iraqi airspace – a ruling that extended to the southern NFZ and restricted their imaging to an area no deeper than about 80 miles inside Iraq. However, given the normal PR9 operating altitude of 50,000 ft and the prevailing wind in the border area (a strong westerly), any aircrew forced to eject faced a high risk of being blown a considerable distance into Iraq. Consequently, it was periodically necessary for the PR9s to operate well inside Jordanian airspace, limiting their effective coverage of the Iraqi interior still further.

The absence of AEW increased the danger of interception by the Iraqi Air Force, but the risks had to be accepted. The PR9 crews were accustomed to operating independently and without the safeguards that so many other aircrew took for granted. Their representative at the CAOC, who had access to the full RAP, was briefed to monitor closely all available information on Iraqi Air Force activity and pass warnings of any significant events by secure telephone to the data-link cabin at Azraq. Such alerts could then be relayed to the aircraft via the data-link signal, which also provided for secure voice communications.

On 27 February, diplomatic clearance for PR9 over-flight of Israel and Jordan was confirmed. Flight Lieutenant P. Morris (pilot) and Wing Commander K. Smith (navigator, OC 39 Squadron) therefore flew the first reconnaissance mission over the Jordan-Iraq border that day. Effectively, this was the first operational mission flown by the RAF in support of Telic, as all other RAF missions were still being conducted under the auspices of Resinate. It was not a particularly memorable mission, for weather in the target area was poor; only intermittent data-link connectivity was achieved, and no wet film was used. Nevertheless, the detachment was now operational.

On the following day, when there were two further missions, problems again arose with the data-link. A technician had to fly back to Azraq from Akrotiri to produce a solution, but he was at least able to bring with him the data tapes and wet film produced by the PR9s while they were on patrol. This same procedure was used on 1 March, although the TIF also received some imagery directly via data-link. By this time, the aircraft were capturing high-quality imagery of the border area and POIs in the Iraqi interior. On 2 March, there was an opportunity

for 39 Squadron to test their improvised early warning procedures. The single airborne PR9 was 60 miles from the Jordan-Iraq border when the SME at the CAOC was warned that two MiG 25s had launched from Asad airfield on a westerly course. He duly diverted the PR9 to a holding position over Azraq pending clarification of Iraqi intentions, but it transpired that the MiGs were only flying a training mission and they landed soon afterwards. The PR9 then proceeded to the border area to complete the assigned tasking.

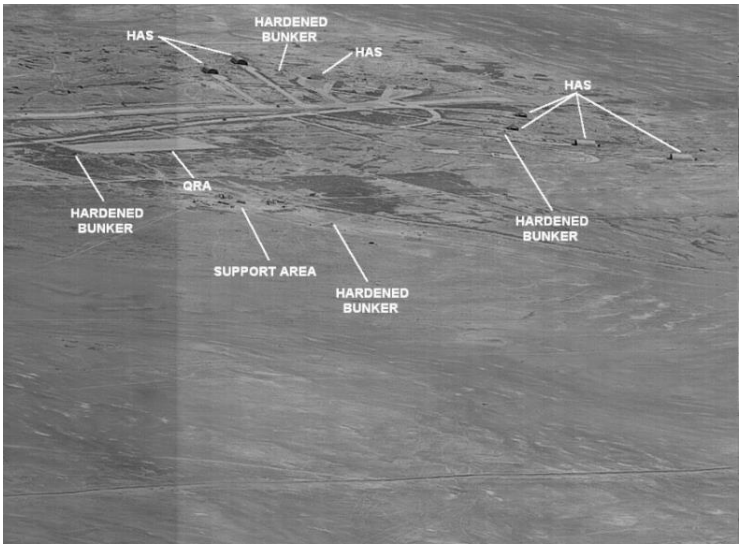
By this time, the second data-link capable aircraft was ready to deploy from Marham, and the Jordanian authorities were on the point of granting diplomatic clearance for operations from Azraq. On the 4th, one aircraft mounted a further mission from Akrotiri along the border and then landed at Azraq while the second data-link capable PR9 deployed to Akrotiri. It flew on to Azraq the next day. The ground personnel withdrawn to Akrotiri on the 25th returned to Jordan in the meantime.

Over the following week, PR9 operations along the border continued at a rate of one or two missions per day, depending on weather conditions and other factors such as aircraft serviceability. The border area itself was photographed in detail to help coalition SF plan their entry into western Iraq when hostilities began, and Iraqi military facilities in the western desert were also carefully monitored. The mission flown on 1 March was notable for producing imagery of a Pluto low-level radar, which was positioned at Ruwayshid airfield only a few miles from the Jordanian border.

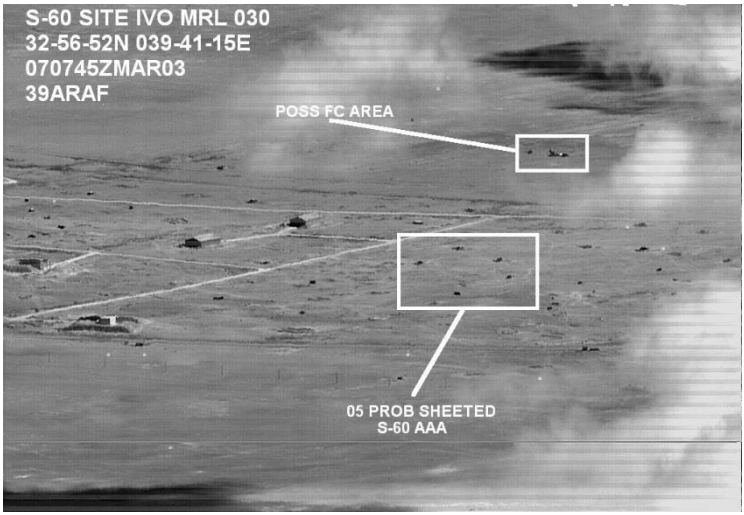
In some ways, such discoveries were frustrating because they only served to highlight how much more might have been achieved by flying inside Iraqi airspace, albeit within the NFZ. Nevertheless, the Pluto imagery was a major coup for the RAF as the ISRD had been searching for the radar for several days. A subsequent mission obtained what was described as the first good imagery of H-3 airfield, showing 20 or more S-60 anti-aircraft guns and a Flat Face radar. Photographs of another airfield complex some 50 miles inside Iraq revealed the presence of a second Pluto system.

PR9 imagery of the Pluto radar at Ruwayshid airfield.

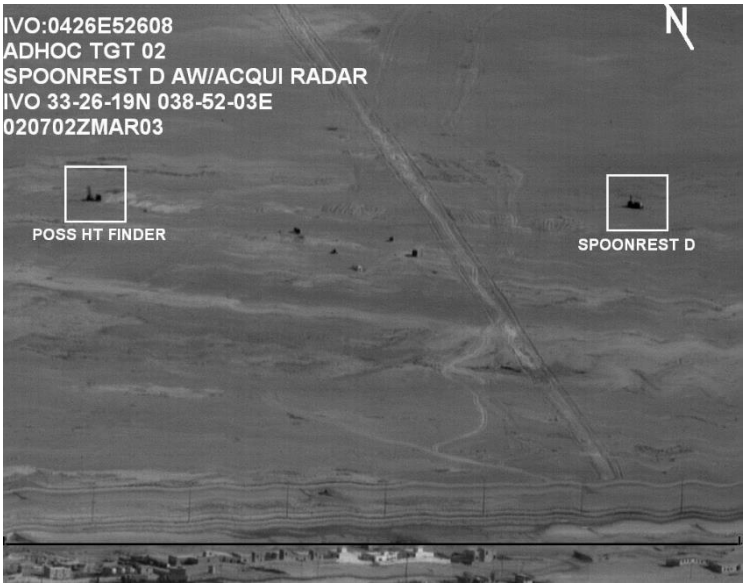
PR9 imagery of the Jordan/Iraq border crossing point.



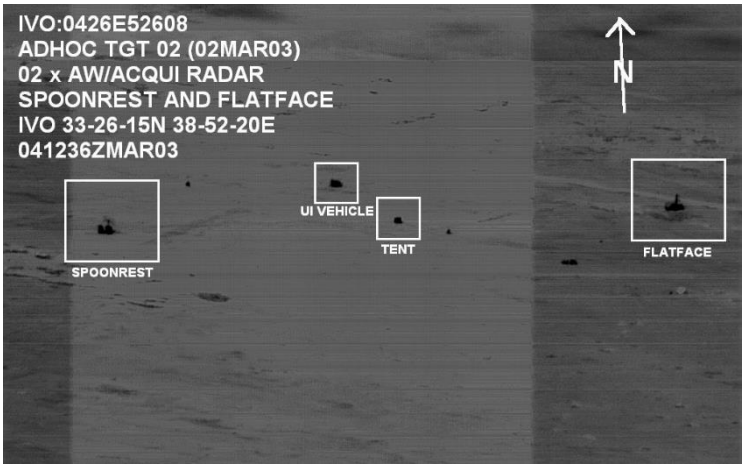
PR9 imagery of H-3 airfield, supporting coalition plans to use H-3 as a FOB.



PR9 imagery of Iraqi S-60 AAA.



An Iraqi Spoon Rest radar photographed by a PR9 on 2 March 2003.



Another Spoon Rest and a Flat Face photographed on 4 March.

PR9 imagery of H-3 on 1 April, showing signs of earlier fighting there but also suggesting the movement of Iraqi forces back into the area.

This intelligence called into question the accuracy of the extant coalition intelligence picture of western Iraq and probably contributed to the decision not to use C-130s in the initial SF insertion on the 19th. It also resulted directly in three attacks by the USAF on the Iraqi radars. The first of these was launched as a Response Option following the identification in the southern NFZ of a Flat Face and two Roland SAMs. The target radar was destroyed in a strike that took place while the second PR9 was on task, and the aircraft was afterwards re-assigned to obtain imagery for post-attack BDA. After an Iraqi MiG 25 flew into the NFZ on the 13th, two F-15Es attacked the Pluto at Ruwayshid but missed their target, and a follow-up attack also proved unsuccessful. Therefore, the next day, two B-1Bs returned to Ruwayshid and ensured the destruction of the radar by using four 2,000 lb bombs.

For 39 Squadron, 16 March marked something of a watershed, for it was on that day that a single PR9 mission first appeared on the Operation Resinate ATO. The mission was extended into Iraqi airspace (inside the NFZ) and gathered some valuable imagery from much further inside Iraq, as well as proving that the data-

link could be reliably employed over far greater distances from Azraq than had previously been covered. The 17th provided a further opportunity to operate over Iraq, but poor weather prevented both PR9 missions the next day. Nevertheless, coalition SF advanced across the border on 19 March with exceptionally accurate intelligence on their initial area of operations based in part on imagery gathered by 39 Squadron in the preceding weeks.

Counter-TBM operations began in earnest on 21 March, when 39 Squadron mounted three missions for the first time, each of three hours in duration, to provide full daylight PR9 coverage over western Iraq. Flying was largely restricted to the more westerly sectors of the western desert region, but the PR9s' stand-off capability allowed imagery to be captured from a far larger area, including Ar Rutbah, roads north of the town, and substantial stretches of the main east-west supply route. Within this region were located most of the suspected Scud hide sites outside Al Qa'im and the roads and railways in its immediate vicinity. Maintaining three missions per day was not always possible. There were periodic aircraft unserviceabilities to contend with, and adverse weather severely disrupted the PR9 flying programme on 24, 25 and 26 March. However, over the following eight days, the three-mission target was achieved on every day except two; on one of these occasions, it was possible to image all tasked POIs during the two missions that were mounted.

Throughout this period, 39 Squadron collected high-quality imagery in abundance. The squadron commander recorded on 27 March that so much had been gathered that the imagery analysts would be 'working long into the night to process all the information' – to prepare it for prompt transmission to the CAOC. That said, virtually all the interpretation reports merely confirmed that suspect hide-sites were empty. A small number of other assignments emerged, such as the collection of BDA, and 39 Squadron was sometimes asked to report on the general Iraqi order of battle in particular areas to assist coalition SF. After the emergency extraction of TF 7 on 30 March, PR9s also helped to search for their two lost personnel around Subaikha airfield and several nearby Syrian border posts. But the squadron was otherwise very largely tied to the hide-site task.

Naturally, it was very important for the Counter-TBM staff at the CAOC to know that potential hide-sites were not being used, given the extent to which resources were stretched by western desert operations. Such intelligence helped prevent duplication of effort and ensured that other assets were efficiently deployed. But the absence of TBM activity in the areas under observation inevitably became a source of increasing frustration to the 39 Squadron crews, who were less well placed to appreciate the true value of their achievements. Compared with the GR7 pilots, they had little room for manoeuvre. Beyond

checking the hide-sites, GR7s could be employed to provide CAS, to scout ahead of ground units, and to maintain air presence. By contrast, the PR9s had no viable alternatives to their basic reconnaissance role. After 3 April, their tasking rate was reduced to two missions per day. This came as a relief in so far as it reduced the pressure on the squadron's ageing aircraft, but it also led some personnel to conclude that the Counter-TBM task no longer enjoyed the overriding priority assigned to it in the early stages of the conflict.

This view may have been reinforced by other events in the western desert. Apart from the fact that the CAS assets were increasingly being employed in more general coalition SF-support duties, the SF themselves were being re-assigned. Yet the PR9s went on checking the main supply route and potential hide sites in the more westerly areas day after day.

By 11 April, 39 Squadron was actively pressing for a change in tasking from the CAOC. After another unproductive mission over Ar Rutbah, they pointed out that the most recent intelligence suggested that all Iraqi regime personnel had left the town and that it was under coalition control. Coalition SF were also said to control most other areas of the western desert and the major lines of communication. Command and control of the Iraqi SSM force had apparently broken down, no missiles had been observed anywhere in western Iraq, and there was allegedly no evidence to suggest that any had been positioned as far west as Ar Rutbah since the early 1990s.

> The boss, and most of the Squadron aircrew for that matter, are getting more and more frustrated by this tasking which is, in our opinion, a waste of a valuable resource when we could be over in the east of the country imaging events in Tikrit, Baghdad, Ar Ramadi, and Mosul.

The CAOC ISR Collections staff responded with strong counter-arguments. They pointed out that the Ar Rutbah task was in no way confined to the town but extended to a much larger area containing over 400 POIs, where coalition SF were very thinly spread. Iraqi SSM activity was said to be continuing even though no Scuds had been found. Equally, the partial re-tasking of SF away from Counter-TBM operations had only been possible because air assets were available to monitor the hide sites.

> CFC and CFACC continue to perceive that there is a possibility, albeit a slim one, that there could be a rogue launcher out there, hell bent on firing one off at Israel as soon as we drop our guard.

> As this would obviously have huge strategic effect and is something that we want to avoid, until CFC and CFACC are convinced otherwise, the monitoring continues. The situation is reviewed regularly, because you are not the only asset that could be used on other tasks elsewhere.

The CAOC's stance apparently left little room for compromise but the matter clearly did not rest here, for the PR9s were moved up to the Al Qa'im area the very next day. This may have been related to the general air show of force being mounted above the town at that time to secure the Iraqi garrison's negotiated surrender. It was in this location that they mounted their last six missions of Operation Telic – missions still overwhelmingly orientated towards suspect Scud hide sites. On the 15th, they flew a single mission for the Jordanians along the Jordan-Syria border; on the 17th, both aircraft left Azraq bound for RAF Marham.

Viewing the entire period of 39 Squadron's participation in Operation Telic – from 27 February through to 15 April – it is hard to avoid the conclusion that they exerted their most pronounced influence on the course of operations in western Iraq before the formal outbreak of hostilities. Despite their delayed deployment to Jordan and the further constraints imposed by their exclusion from the Operation Resinate ATO, they gathered some valuable imagery in this period; their work clearly contributed to a substantial revision in coalition thinking on the Iraqi air defence threat in the western desert. As a result, several air attacks were launched against radar and anti-aircraft facilities, and SF lift plans were revised. Beyond this, 39 Squadron's detailed surveys of the border area provided much useful intelligence for the ground units that entered Iraq from Jordan on 19 March.

However, from 19 March onwards, the character of the operation changed completely as 39 Squadron became part of a broader effort to maintain continuous reconnaissance coverage over the areas from which Scud launches were considered most likely. As coalition intelligence had been unable to rule out the possibility that the Iraqis still possessed a limited number of Scuds, this task was eminently necessary. Moreover, in executing their mission, the squadron drew frequent praise from the Counter-TBM staff at the CAOC both for the high quality of their product and the remarkable speed with which it was supplied in response to short-notice requests. But as time passed, and no Scuds were found, the hide-site reconnaissance became dull, repetitive and unrewarding at squadron level, from where it increasingly appeared that the PR9s' considerable capabilities were being under-utilised. This was not the view of the CFC and the CFACC. Consequently, the hide-site operations continued. While this brought 39 Squadron's participation in the major combat phase of Telic to a rather frustrating

end, their services would soon be called on again to support counter-insurgency operations in Iraq, and they would also see action over Afghanistan before the PR9's final withdrawal from service in 2006.

7. Part 3: Conclusion

Operations in western Iraq during Telic seem almost to amount to a war within a war – a conflict separate from the coalition main effort in the south. Such a depiction would not be entirely accurate. The SF/air power combination employed in the west did complement coalition activity elsewhere, effectively opening a third front in addition to the advance from Kuwait, and airborne operations in northern Iraq. Hence, the western axis did contribute to a process whereby coalition operations destroyed the cohesion of the Iraqi regime and its security infrastructure by exposing it to multiple simultaneous threats. Ultimately, too, the western desert provided mounting bases from which the SF could be airlifted to Baghdad after the capture of BIAP.

Nevertheless, in most other respects the western Iraq task was highly specialised and focused overwhelmingly on the Counter-TBM mission. It is not known whether Iraq ever intended to deploy Scuds in the event of hostilities with a US-led coalition in 2002-2003, so it is impossible to establish whether the Counter-TBM effort genuinely exerted any deterrent effect; no Scuds or Scud TELs were ever found. Yet coalition intelligence did suggest strongly that Iraq retained at least some residual Scud capability, and missiles could easily have been dismantled and moved from a border location like Al Qa'im into Syria (assuming Syrian agreement), if Saddam had decided at a relatively late stage against using them. The truth may never be fully established. It is certain, however, that Israel was deeply concerned over the prospect of renewed Scud attacks, and this was really the decisive factor.

Counter-TBM operations realised their ultimate goal in so far as Israel refrained from overt military intervention in 2003, yet this genuinely strategic effect was only achieved through a very substantial air effort extending right across western Iraq throughout Telic. The RAF commitment alone involved the permanent allocation of some 32 fixed-wing and rotary-wing aircraft as well as tankers and RAF Regiment personnel; Tornado GR4s based at Ali Al Salem also participated intermittently. USAF operations were mounted on a much greater scale. The strategic importance attached to the Counter-TBM mission was such that the assets involved could rarely be re-deployed elsewhere, even when early experience suggested that the Iraqis had no immediate intention of using Scuds. In the later stages of Telic, with the prospect of a Scud launch appearing still more

remote, the gradual move of some coalition SF units towards other tasking had the effect of locking coalition air power even more tightly into Counter-TBM activity.

The high cost of western Iraq operations might have raised more questions had coalition forces in the south or north obviously lacked air support, but they were amply provided for. The CFACC always accepted that aircraft committed to the west were essentially earmarked for the Counter-TBM task. The main difficulties, emerging at the tactical level, were eminently predictable and reflected the often dull, repetitive and unrewarding nature of western desert operations. Aircrew became frustrated about the lack of trade, and about what they saw as unproductive missions and the under-utilisation of assets and capabilities. There was some competition between units for the limited amount of work that went beyond merely checking suspected hide-sites, and some of those involved began to look outside western Iraq for alternative tasking.

None of this should divert attention from the ultimate success of the Counter-TBM strategy. Furthermore, the coalition's entire approach to the Scud problem represented a substantial advance in relation to the Scud hunt of 1991, with its unplanned diversion of numerous air assets and resulting interference with other operations. And whereas all the Counter-Scud techniques and tactics employed in 1991 had to be introduced in an ad hoc fashion without any prior notice, in 2003 they had been carefully developed, rehearsed and tested in advance over a period of at least six months. They were known to be effective well before the onset of live hostilities.

Beyond this, there were numerous other positive lessons that could be drawn from the Counter-TBM story. The utility of many different equipment enhancements was amply demonstrated, including EPW II and Maverick on the Harrier GR7, the augmented weapons controller stations and JTIDS on the E-3D, NEP on the Chinook, the MX-15 camera on the Nimrod MR2, and RADEOS on the PR9. Operations in the western desert also showed how the distinctive characteristics of air power and the SF could complement each other to produce a range of very valuable effects extending far beyond the basic Scud hunt; and they offered novel solutions to many longstanding ALI problems as well as the potential for achieving levels of integration previously unknown to western armed forces.

GENERAL CONCLUSION

It remains very difficult not to view Operation Telic in the context of the political controversy that surrounded it and the long and costly counterinsurgency campaign that came afterwards. The US-led coalition overestimated the level of post-9/11 public support for an operation against Iraq and massively underestimated the challenges of post-war stabilisation and reconstruction, and the scale of the power vacuum that would be generated by Saddam Hussein's overthrow. They removed one major source of regional instability only to see it replaced by others. Iran gained strength from Iraq's weakness and extended its influence south to Yemen and west into Iraq and beyond; the end of the insurgency in Iraq made way for the rise of Daesh's caliphate, stretching into a civil war-torn Syria; yet another US-led coalition was formed to foil their ambitions; the threat to the Syrian regime drew in Russia; Kurdish nationalism complicated matters still further and produced an inevitable reaction from Turkey. Instead of bringing peace and stability in 2003, western intervention achieved the opposite effect with serious and protracted repercussions.

The aim here is not to deny this basic truth. However, the justification for the coalition's intervention and the subsequent consequences of the invasion of Iraq have been addressed by innumerable commentators, journalists and historians over the years, and by the public inquiry chaired by Sir John Chilcot, and lie beyond AHB's remit; this is not a history of strategy or politics. Instead, this study set out to view the events of March-April 2003 purely from a military perspective – in the context of how the RAF applied air power in support of coalition goals.

The deployment process is of course central to any overseas military operation. In Telic, the original UK deployment plans were thrown into disarray by Turkey's denial of basing and overflight provisions, but the loss of Turkish access, basing and overflight did not exert a significant impact on the RAF's participation in the air campaign. Indeed, basing arrangements were altered with remarkable speed. The cost was a degree of delay and disorganisation among some of the detachments dispatched to the Gulf that was obviously far from ideal, but it was manageable, and the whole UK Air Contingent achieved FOC status before hostilities began. Nevertheless, while the RAF continued to fly from Gulf bases like Al Udeid in support of Telic until British forces were withdrawn in 2009, recent UK air operations in this theatre have predominantly been mounted from Akrotiri.

The transition from one operation to another in the same theatre was not unprecedented but it was a novel experience for the responsible coalition

commanders, and it generated multiple command and control issues. These spanned the key areas of ROE, Targeting Directives and ATO planning, as well as broader matters, such as the alignment of UK and US postures and practice during the transitional period. Perspectives on this process inevitably differed, and arguments that reached from the UK ACHQ up to PJHQ and onwards to the MOD mirrored similar debates between home and overseas command tiers that are as old as military history itself.

After Telic, in the Libyan theatre in 2011, the RAF had to manage the transition from the non-combatant evacuation operation Deference to the US-led air campaign Odyssey Dawn, and from Odyssey Dawn to the NATO-led Operation Unified Protector (UK Operation Ellamy). This raised many similar problems, and others besides, which might perhaps have caused rather less surprise if the experience of the Resinate-to-Telic transition had been more widely studied. In this particular respect, there was a strong case for learning the lessons of history.

Operation Telic was just sustainable. However, while the RAF possessed better expeditionary capabilities in 2003 than in 1991, the US provided indispensable support at several DOBs, and the RAF was entirely dependent on the USAF in certain operational spheres – particularly SEAD. Otherwise, the key pinch-points identified in this study affected the Harrier GR7s at Al Jaber, the Tornado GR4s at Al Udeid, and the E-3Ds, PR9s and Nimrod MR2s. There were barely enough TIALD-capable aircraft and TIALD pods to sustain the Al Jaber GR7 detachment for the full period of major combat operations. The pressure that intensive flying from Al Udeid imposed on the Tornado GR4 detachment led to many planned sorties being aborted on the ground or in the air due to unserviceabilities. The four E-3Ds deployable to support 24-hour ABCCC coverage over western Iraq could only just maintain the operational task throughout the period of major combat operations, while the very small detachments of PR9s and EO-capable Nimrod MR2s sometimes struggled to provide planned levels of air reconnaissance support. What has since been referred to as the 'tyranny' of small aircraft fleets already confronted the RAF in 2003.

Looking beyond equipment sustainability, qualified aircrew were available in sufficient numbers, but resources were stretched, and there were barely enough trained personnel to cover commitments in such fields as command and control, intelligence and targeting. Moreover, in terms of both aircraft and personnel, the scale of Operation Telic left very little in reserve. The RAF numbered 90,000 personnel in 1990 but 49,000 in 2003; over the same period, the engineering and industrial infrastructure that sustained the RAF in the first Gulf War shrank considerably. Thus, while press releases and other official public statements openly compared the size of Telic deployments with comparable statistics from

1990-91, the headline figures were somewhat misleading. A large-scale deployment to the Gulf could have been sustained for considerably longer in 1991 than 2003. By then, for an operation of the Telic scale, the RAF had only one shot left in the locker.

In Operation Telic, the Air Component did not fight the war it was expecting. Nothing in the post-Cold War experience of the RAF and the USAF had prepared them for the supporting role in which they were cast in 2003. The key challenge was to adapt rapidly, and they succeeded in doing so despite the difficulties involved. Nevertheless, there is a long-established lesson here that is worth emphasising. One of the key measures of any operation plan lies in flexibility, and flexibility will primarily stem from the capacity of committed forces to react to unanticipated developments with speed and agility.

The campaign as a whole succeeded in its chief aim of rapidly overthrowing Saddam Hussein's regime. The Air Component provided abundant support for coalition ground forces and also delivered the combat and ISR capabilities required over western Iraq, as well as air presence. Mission success in turn lent strong support to the concept of 'simultaneous attack'. At the time, it was frequently claimed that future operations would not require conventional preliminary air campaigns to shape the battlespace before a ground offensive began.

Such arguments oversimplified the true course of events in 2003, ignoring the NFZ operations that had permitted at least some targeting of the Iraqi IADS before Telic and the effects of prolonged UN sanctions on the Iraqi military machine. They also ignored the extensive air targeting of Republican Guard divisions around Baghdad during the Land Component's unintended pause at the end of March. Equally, by comparison with planned attack or interdiction strikes, KI/CAS did not exactly lend itself to economy of effort. Tasking agencies struggled to handle all the air assets made available to them; the Air Component expended huge efforts on launching aircraft that were not allocated targets and later brought their weapons back to base.

The assertion that Telic provided a model for subsequent large-scale ground manoeuvre campaigns proved wrong. There has been no repetition since. The key problem lay in finding an exit strategy and in the costs and casualties involved in achieving reconstruction and stabilisation. Between 2003 and 2011, the US suffered casualties of 3,481 personnel killed in action in Iraq and 31,994 wounded in action; the number killed in major combat operations in 2003 totalled just 139, and only 551 were wounded. Operations in Afghanistan (UK Operation Herrick) meanwhile resulted in further massive financial outlays and still more casualties. Ground forces incurred the overwhelming majority of these losses. It is therefore

understandable that in more recent operations – in Libya, Iraq and Syria – the conventional ground footprint has been limited to training and advisory activity, while the combat role was largely fulfilled by proxy forces. Once again, the leading western combat contribution has come from the air.

And yet, as suggested in the introduction to this study, Telic exerted a long-term impact on the application of combat air power. Since 2003, offensive air tasking has largely been executed on a dynamic basis and has taken the form of CAS or interdiction close to major battle fronts. The scope for planned strikes on deeper targets has been far more limited.

The tactical and capability implications of this change have been far-reaching. CAS capabilities have improved considerably. The RAF has replaced the TIALD pod with vastly superior systems and now possesses far more suitable (smaller and more accurate) weapons than PW/EPW II; Full-Motion Video (FMV) has revolutionised the interaction between air and ground: through FMV, the shared situational awareness of higher command nodes, the GFAC (now normally referred to as the JTAC[47]) and the pilot has helped to solve long-standing problems at almost every stage of the sensor-to-shooter cycle. However, the demand for FMV and other modern ISR products to support targeting has generated intense competition for available resources and differences of opinion on how (and often where) they can be utilised most effectively.

Much else has changed since Telic. Strike Command has been assigned to the history books, and Air Command now stands in its place. The RAF's strength has declined further to just 29,000 personnel at the time of writing, and virtually all the major capabilities fielded by the RAF in 2003 have been retired. The Tornado GR4s and Harrier GR7s have made way for Typhoons and F-35 Lightnings, with RPAS also providing a valuable precision-attack option. The Nimrod MR2 overland surveillance role has passed to RPAS and the Shadow R1. The E-3Ds, VC10 and Tristar tankers have all been replaced; A400M Atlas transport aircraft will take over most duties from the RAF's last C-130s, which were put up for sale in October 2022.

ALARM has been retired and, while general-purpose PGMs can be used against enemy air defences, the RAF no longer has a dedicated SEAD weapon. Maverick was withdrawn with the Harrier force, and non-precision weapons disappeared during Operation Herrick. With the demise of the PR9, the RAF's association with dedicated reconnaissance fast jets ended. Its RADEOS system is

47. JTAC – Joint Terminal Attack Controller; defined in USAF doctrine as a qualified (certified Service member) who, from a forward position, directs the action of combat aircraft engaged in CAS and other offensive air operations.

no more, and the RAF's RAPTORs and JRPs have also been withdrawn. RPAS have meanwhile provided hugely valuable ISR capabilities in recent years, but they are potentially vulnerable in contested air environments. The more survivable fast jets have employed their targeting pods for reconnaissance, but they have not always proved as capable as bespoke reconnaissance sensors like RAPTOR.

Forward basing in both Gulf Wars was partly enabled by the RAF's Rapier SAM capability, but Rapier ownership passed to the Army in 2004 and the UK's contingent Short-Range Air Defence capability was eliminated after the 2010 Strategic Defence and Security Review. Since 2003, no UK GBAD has been deployed to forward bases other than Mount Pleasant in the Falklands in defence of RAF aircraft, facilities or personnel.

All these developments impact on our long-term perceptions of Telic. At its current strength, the RAF could no longer dream of mounting an operation on such a scale. Modern aircraft, equipment and weapons are more technologically advanced, but today's smaller combat air fleets limit the amount of air cover that can be maintained, although RPAS, with its long endurance, filled at least part of the vacuum in Herrick and Shader. These constraints also mean that the haphazard launch of offensive aircraft on CAS tasks that will only be defined at the last moment (if at all) by the relevant tasking agencies has had to make way for more selective and economical approaches, albeit with a higher accompanying demand for ISR. The Counter-TBM operation would also be conducted very differently now. Assuming non-contested airspace, a far greater role would be assigned to RPAS; if airspace was contested, it would be extremely difficult to mount an operation similar to the 2003 Scud hunt.

Nevertheless, the major combat phase of Operation Telic still marks a key milestone in the development of post-Cold War air power. It launched a new chapter in the story of ALI, inaugurating a pronounced and enduring shift towards dynamic offensive air tasking, and it demonstrated for the first time how PGMs could revolutionise the provision of direct air support for conventional ground manoeuvre. It also reinforced the case for closer air and SF collaboration along the lines first witnessed in Afghanistan in 2001. The experience helped to shape subsequent capability advances and their operational application in the later phases of Telic, Herrick, Ellamy and Shader. Thus, while Telic did not influence operational design in the way many commentators expected, its legacy at the tactical level has proved both significant and lasting, and its place in the RAF's history should primarily be assessed on this basis.

ANNEX A: MAJOR COMBAT OPERATIONS STATISTICS

a) Aircraft Deployed

Fast jets:	
Canberra PR9	2
Harrier GR7	20
Tornado F3	14
Tornado GR4	31
Total	67
Other aircraft:	
Nimrod MR2	7
Nimrod R1	1
C-130	5
E-3D	4
HS125	2
Tristar	4
VC10	9
Chinook	20
Puma	7
Total	59

b) Operational Sorties

Total:	2,519
Offensive sorties:	
Harrier GR7	655
Tornado GR4	744
Total	1,399
Other roles:	
Air defence	169
Airborne early warning	87
Reconnaissance	296
Air-to-air refuelling	355
Airlift within theatre (fixed-wing)	263
Aero-medical	18
Total	1,188

c) Munitions Released

540 lb Freefall	53
1000 lb Freefall	15
ALARM	47
EPW II	394
EPW III	10
Maverick	38
PW II	265
RBL755	70
Storm Shadow	27
Total	919

d) RAF Personnel

Approximately 8,000 RAF personnel deployed in theatre at 21 March 2003.

GLOSSARY OF ABBREVIATIONS

AAJ	-	Ahmed Al Jaber
AAR	-	Air-to-Air Refuelling
ABCCC	-	Airborne Command, Control and Communication
ACA	-	Airspace Co-ordination Area
ACAS	-	Assistant Chief of the Air Staff
ACHQ	-	Air Contingent Headquarters
ACO	-	Airspace Control Order
ADOCS	-	Automated Deep Operations Co-ordination System
AEW	-	Airborne Early Warning
AFAC	-	Airborne Forward Air Controller
ALARM	-	Air-Launched Anti-Radiation Missile
ALARP	-	Advance Landing, Arming and Refuelling Point
ALI	-	Air-Land Integration
ANG	-	Air National Guard
AO	-	Area of Operation
AOR	-	Area of Responsibility
APC	-	Armoured Personnel Carrier
APOD	-	Air Point of Disembarkation
ARCENT	-	US Army Central Command
ARM	-	Anti-Radiation Missile
ASOC	-	Air Support Operations Centre
ATC	-	Air Traffic Control

ATO	-	Air Tasking Order
AWC	-	Air Warfare Centre
BAES	-	British Aerospace Systems
BCL	-	Battlefield Co-ordination Line
BDA	-	Battle Damage Assessment
BIAP	-	Baghdad International Airport
C2	-	Command and Control
CALCM	-	Conventional Air Launched Cruise Missile
CAOC	-	Combined Air Operations Centre
CAP	-	Combat Air Patrol
CAS	-	Chief of the Air Staff
CAS	-	Close Air Support
CBF (R-S)	-	Commander British Forces (Resinate South)
CDE	-	Collateral Damage Estimate
CDL	-	Common Data-Link
CENTAF	-	US Central Air Force Command
CENTCOM	-	US Central Command
CFACC	-	Combined Forces Air Component Commander
CFC	-	Combined Forces Commander
CFLCC	-	Combined Forces Land Component Commander
CFSOCC	-	Combined Forces Special Operations Component Commander (CFSOCC)
CIS	-	Communications and Information Systems
CJO	-	Chief of Joint Operations

CJSOTF-N	-	Commander Joint Special Operations Task Force North
CJSOTF-W	-	Commander Joint Special Operations Task Force West
CJTW OSW	-	Commander Joint Task Force Operation Southern Watch
CME	-	Counter-Mass Effect
COBRA	-	Cabinet Office Briefing Room
COLPRO	-	Collective Protection
COMAO	-	Composite Air Operations
Comms Rebro	-	Communications Rebroadcast
CONOPS	-	Concept of Operations
CPLS	-	Covert Personal Locator System
CR	-	Combat Ready
CRC	-	Control and Reporting Centre
CSAR	-	Combat Search and Rescue
DASC	-	Direct Air Support Centre
DCA	-	Defensive Counter-Air
DEAD	-	Destruction of Enemy Air Defences
DMPI	-	Desired Mean Point of Impact
DOB	-	Deployed Operating Base
DSF	-	Director Special Forces
DZ	-	Drop Zone
EBO	-	Effects-Based Operations
ECM	-	Electronic Counter-Measures
EDW	-	Expeditionary Duty Wing

EO	-	Electro-Optical
EPW	-	Enhanced Paveway
ESM	-	Electronic Surveillance Measures
EW	-	Electronic Warfare
FAC	-	Forward Air Control/Controller
FARP	-	Forward Arming and Refuelling Point
FLC	-	Front-Line Command
FLIR	-	Forward-Looking Infra-Red
FLOT	-	Forward Line of Own Troops
FO	-	Fibre-Optic
FOB	-	Forward Operating Base
FOC	-	Full Operational Capability
FOD	-	Foreign Object Damage
FSCL	-	Fire Support Co-ordination line
FST	-	Field Surgical Team
GATM	-	Ground/Air Training Missiles
GBAD	-	Ground-Based Air Defences
GFAC	-	Ground Forward Air Controller
GLO	-	Ground Liaison Officer
GPS	-	Global Positioning System
HARM	-	High-Speed Anti-Radiation Missile
HAS	-	Hardened Aircraft Shelter
HIMARS	-	Highly Mobile Aerial Rocket System
HQ STC	-	Headquarters Strike Command
IADS	-	Integrated Air Defence System
IFF	-	Identification Friend or Foe

IOC	-	Intercept Operations Centre
IR	-	Infra-Red
ISO	-	International Standards Organisation
ISR	-	Intelligence, Surveillance and Reconnaissance
ISRD	-	ISR Division of the CAOC
JC	-	Joint Commander
JDAM	-	Joint Direct Attack Munition
JFAC	-	Joint Forces Air Component
JFE	-	Joint Fires Element
JRP	-	Joint Reconnaissance Pod
JSFAW	-	Joint Special Forces Aviation Wing
JSOA	-	Joint Special Operations Area
JSOTF-N	-	Joint Special Operations Task Force-North
JSTARS	-	Joint Surveillance Target Attack Radar System
JTAC	-	Joint Terminal Attack Controller
JTIDS	-	Joint Tactical Information Distribution Centre
KI/CAS	-	Killbox Interdiction/Close Air Support
LALO	-	Low Ambient Light Operations
LOAC	-	Law of Armed Conflict
MANPAD	-	Man-Portable Air Defence System
MBDA	-	Matra BAe Dynamics
MEF	-	Marine Expeditionary Force
MEZ	-	Missile Engagement Zone
MIOP	-	Maritime Interdiction Operations
MOA	-	Military Operating Area
MSC	-	Mission Support Cell

MTI	-	Moving Target Indicator
NBC	-	Nuclear, Biological, or Chemical
NCC	-	National Contingent Commander
NCHQ	-	National Contingent Headquarters
NEP	-	Night Enhancement Package
NFZ	-	No-Fly Zone
NTISR	-	Non-Traditional Intelligence, Surveillance and Reconnaissance
NVGs	-	Night Vision Goggles
OC	-	Officer Commanding
OPCOM	-	Operational Command
OPCON	-	Operational Control
OPSEC	-	Operational Security
ORT	-	Operational Response Team
OSW	-	Operation Southern Watch
PFA	-	Post-Flight Analysis
PGM	-	Precision-Guided Munition
PID	-	Positive Identification/Positively Identify
PJHQ	-	Permanent Joint Headquarters
POI	-	Point of Interest
POL	-	Petrol, Oil, Lubricants
PSAB	-	Prince Sultan Air Base
PW	-	Paveway
QFI	-	Qualified Flying Instructor
QWI	-	Qualified Weapons Instructor
RADEOS	-	Rapid Deployment Electro-Optical System

RAPTOR	-	Reconnaissance Airborne Pod Tornado
RCS	-	Radar Cross-Section
RCT	-	Regimental Combat Team
RHWR	-	Radar Homing Warning Receiver
RJAF	-	Royal Jordanian Air Force
ROE	-	Rules of Engagement
ROZ	-	Restricted Operating Zone
RPAS	-	Remotely Piloted Air System
SAM	-	Surface-to-Air Missile
SCAR	-	Strike Co-ordination and Reconnaissance
SCIF	-	Secure Compartmentalised Information Facility
SEAD	-	Suppression of Enemy Air Defences
SF	-	Special Forces
SIGINT	-	Signals Intelligence
SIPRNET	-	Secret Internet Protocol Router Network
SME	-	Subject-Matter Expert
SMT	-	Special Monitoring Team
SOF	-	Show of Force
SOLE	-	Special Operations Liaison Element
SOP	-	Standard Operating Procedures
SPINS	-	Special Instructions
SPOD	-	Sea Point of Disembarkation
SR(A)	-	Statement of Requirements (Air)
SSCMPF	-	Storm Shadow Central Mission Planning Facility
SSCTF	-	Storm Shadow Central Training Facility

SSM	-	Surface-to-Surface Missile
STO	-	Survive to Operate
TACOM	-	Tactical Command
TACON	-	Tactical Control
TACP	-	Tactical Air Control Party
Tac STO	-	Tactical Survive to Operate
TAMPA	-	Tornado Advanced Mission Planning Aid
TAOC	-	Tactical Air Operations Centre
TBM	-	Theatre Ballistic Missile
TCA	-	Tactical Assistance Officer
TCO	-	Tactical Control Officer
TEL	-	Transporter Erector Launcher
TF	-	Task Force
TI	-	Thermal Imager
TIALD	-	Thermal Imaging Airborne Laser Designator
TIF	-	Tactical Imagery Flight
TIRRS	-	Tornado Infra-Red Reconnaissance System
TLAM	-	Tomahawk Land Attack Missile
TLZ	-	Tactical Landing Zone
T-SCIF	-	Tactical Sensitive Compartmented Intelligence Facility
TSOP	-	Tactical Standard Operating Procedures
TST	-	Time-Sensitive Target
TTPs	-	Tactics, Techniques and Procedures
TTW	-	Transition to War
UKACC	-	UK Air Contingent Commander

UKMAMS	-	UK Mobile Air Movements Squadron
UNMOVIC	-	UN Monitoring, Verification and Inspection Commission
UOR	-	Urgent Operational Requirement
USAF	-	United States Air Force
USMC	-	United States Marine Corps
USN	-	United States Navy
VTC	-	Video Conference
WMD	-	Weapons of Mass Destruction
WMIK	-	Weapons Mounted Installation Kit

GLOSSARY OF OPERATION NAMES

Granby	-	The first Gulf War, 1990-1991
Jural	-	Southern Iraq NFZ, 1992-1998
Deliberate Force	-	Bosnia-Herzegovina, 1995
Bolton	-	Southern Iraq NFZ, 1997-2000
Desert Fox	-	Iraq, 1998
Kingower	-	Kosovo, 1999
Resinate	-	Iraq NFZs, 2001-2003
Oracle	-	Afghanistan, 2001-2002
Telic	-	Iraq, 2003-2009
Herrick	-	Afghanistan, 2004-2014
Ellamy	-	Libya, 2011
Shader	-	Iraq and Syria, from 2014