From Coningham to Project Coningham-Keyes

Did British Forces Relearn Historical Air-land Co-operation Lesssons During Operation TELIC?

By Wg Cdr Harv Smyth RAF

Introduction

Operation TELIC, the UK's contribution to Operation IRAQI FREEDOM, the conflict to liberate Iraq, lasted from 20 March to 22 April 2003.[1] Although Coalition forces emerged victorious, in approximately one month of warfighting the UK military exposed serious inadequacies in its ability to conduct, and understanding of, air-land co-operation. After TELIC, Air Vice Marshal Torpy, the UK's Air Component Commander (ACC) for the Operation, commented that, 'There is no doubt that we need to do more air-land integration. I believe there are lots of lessons that we have learned out of this particular

campaign in terms of the core skill that air-land integration should form for all our fast jet aircraft'[2].

Although British aviators have been providing air-support to ground forces since World War 1 (WW1), there were still many mistakes made in this domain during TELIC. This paper asks the question, 'did we relearn historical air-land co-operation lessons?' To answer this, a comparative study will be completed between the North African Campaign of World War 2 (WW2), arguably the birthplace of true air-land co-operation, and TELIC. This comparison is relevant for 3 main reasons. Firstly, both campaigns were fought over similar desert terrain; therefore, lessons pertaining to operating environment can be discounted. Secondly, British forces entered each campaign ill prepared to conduct air-land operations. Finally, air-support doctrine utilised in TELIC was effectively identical to that developed in North Africa, since technology has had minimal impact upon contemporary British air-support methodologies.

A chronological examination of the North African Campaign will draw out the key British air-land lessons learnt, and demonstrate how these lessons were addressed. Briefly, the British successfully implemented 2 key enablers, which provided the springboard for successful air-land operations: gaining control of the air and centralised command of air-support assets. However, with specific regard to the implementation of air-land operations, 3 significant areas were lacking: command and control (C2) structures; training and doctrine; and tactical level situational awareness. During TELIC, British forces achieved identical successes and failures in the air-support arena to those of North Africa. Hence, it can be determined that British forces operating in Iraq in 2003, did relearn historical air-land lessons.

What Is It?

Current doctrine lists Anti-Surface Force Air Operations (ASFAO, or generically, air-support) as a core capability of airpower and defines it as either direct or indirect air operations that may be employed in the air-land environment. Indirect air operations are those intended to disrupt and destroy an opponent's military assets and infrastructure in the rear area whereas direct air operations are those intended to directly affect the outcome of a contact engagement between friendly and opposing forces. Direct air operations against an opposing force are normally conducted under the procedures for Close Air Support (CAS), which is defined as, 'air action against hostile targets that are in close proximity to friendly forces, and requires detailed integration of each mission with the fire and movement of those forces' [3]. During TELIC, the British implementation of CAS was most lacking.

Why Study It?

In 1943 General Montgomery stated, 'If you can knit up the power of the Army on the land and the power of the air in the sky then nothing will stand against you and you will never lose a battle'[4]. In contemporary warfare, the success of airpower in providing day, night, adverse-weather, precision air-support for ground forces has convinced Army leadership that it can make its forces more deployable and agile by reducing its own organic fire support, such as artillery, and relying more heavily on airpower.[5] This was reflected in Iraq in 2003: of 19,898 targets struck, over 15,000 were through CAS missions.[6] Moreover, as British forces suffer from defence cuts, it has become necessary for

components to add weight of effort to the joint scheme of manoeuvre in order to maintain capability. All components operating in this joint arena must have a common understanding of each other's doctrine if agility (both in command and execution), tactical synergy and exponential capability are to be achieved. Integrated Air Operations, of which air-support is a part, is one of the 6 core air and space power roles; hence, it must be studied and understood.[7]

Since the end of the Cold War, there have been few real-world opportunities to test air-land co-operation within conventional operations.[8] Cold War joint air-land organisations, such as developed in 1 BR Corps in West Germany, were disbanded in the mid 1990s and not replaced. Hence, as stated by Air Vice Marshal Torpy after TELIC, '…we have forgotten some of the things we were quite good at during the Cold War…we have neglected the exercising of those [air-land operations] over the years'[9]. In 1940, the RAF similarly entered the North African Campaign poorly placed to conduct air-land operations. It is from this common baseline of ill preparedness that comparisons can be drawn.

The North African Campaign and Air-Land Development

Before North Africa

During WW1 relations between the RAF and the Army were relatively good. However, the period post WW1 brought with it intense inter-service rivalry as the British government began a process of large-scale defence cuts.[10] The RAF was desperate to maintain its independent status and hence, grasped the doctrine of strategic bombing as a proclaimed panacea for future warfare. Therefore, with overshadowing budget constraints, the RAF set about developing both doctrine and aircraft that could support the strategic bombing principles whilst air-land integration lessons learned during WW1 were largely sidelined.

Hence, since the RAF firmly rejected the concept of air-support during the interwar period, it was inadequately equipped and poorly trained to conduct air-land operations at the beginning of WW2. During the German invasion of the Low Countries and France, army requests for air-support had to pass through an unwieldy chain of command, involving assessment at both Army and RAF headquarters. The system proved completely inadequate to counter the rapid pace of German Blitzkrieg operations and broke down after German armour punched through the Allied Front and encircled the Anglo-French Armies.[11]

Conversely, German air-land warfare during the Blitzkrieg had been most impressive and inspired the British to concentrate its efforts in developing doctrine that would succeed in future air-land campaigns. What was noteworthy about the German campaign was its synergistic blend of firepower on the battlefield, termed Schwerpunkt, or 'joint fires' in contemporary parlance.[12] The Germans placed air-ground control teams in corps/divisional headquarters and with advancing infantry and Panzer units on the ground.[13] The overwhelming effect of German air-land integration is encapsulated in the following comment made by France's Pierre Cot: 'The Battle of France demonstrated the importance of air power in modern warfare; it proved that an army can do nothing without the support of an adequate air force'[14].

Army Co-operation Command

Defeat in 1940, and subsequent escape from the Dunkirk beaches, exposed the fundamental weaknesses of British air-land doctrine: insufficient contact

between the Army and the RAF staffs, a situation exacerbated by dislocated positioning of their headquarters and the lack of a reliable communications and C2 network.[15] However, there is no doubt that the RAF made a definite contribution to the successful withdrawal to Dunkirk and eventual evacuation, despite Army claims to the contrary and subsequent renaming of the junior service as the 'Royal Absent Force'. Importantly though, the experiences of this campaign gave a powerful impetus to the development of an air-support organisation and resulted in the formation of Army Co-Operation Command in December 1940.[16]

The true function of the RAF, according to the pre-WW2 creed, was 'to generally create disorganisation and confusion behind the enemy front while the ground forces achieved their objectives'[17]. However, this philosophy had not worked in France and worse still, the contradictory German doctrine had been seen to work only too well. Hence, amidst continuing Army/RAF debate, Army Co-operation Command was formed, its purpose being to control policy, training and administration of all air-support matters. However, the AOC-in-C, Air Marshal Sir Arthur Barratt, had no operational responsibility and hence was excluded from discussions of policy in respect of such problems as the employment of bomber squadrons in close support.[18] Therefore, many saw Army Co-operation Command as a token effort to appease the Army during the post-Dunkirk depression and the situation in which Barratt found himself, did nothing for his quest to further air-land integration.

Nevertheless, during this same period, the Air Ministry sanctioned a number of air-support experiments and it was in Barratt's 'Cinderella' Command that some the most significant theoretical work on air-land co-operation was done. In September 1940, under the guidance of Colonel J.D. Woodhall and Group Captain A. Wann, the 'Wann-Woodhall Report' was produced.[19] Bomber Command's Army Liaison Officer described it as:

Moreover, the system called for the joint staff at the control centre (ASSU) to evaluate air-support requests as they came in, checking the proposed target locations in relation to the 'bombline'. A deconfliction measure to reduce fratricide, the bombline was based on a physical feature easily identifiable to both airmen and soldiers, projected forward of friendly troops, beyond which aircraft were permitted to engage targets. If the target was accepted by the ASSU, the squadron designated for the task was contacted via direct communications, and the Air Liaison Officers (ALOs) attached to the squadron were alerted to brief the pilots, who had then to identify their targets by means of photographic maps with grid references.[21]

Whilst this system was being developed in the UK, a parallel air-support system was being forged in North Africa. Unfortunately, due to poor communications with the UK, many of the theoretical lessons identified in the Wann-Woodhall Report were not promulgated to the desert forces; consequently, lessons were learnt the hard way in the tough test of desert battle.

North Africa 1940-41

After the fall of France, Britain felt powerless against the might of Germany. However, Italy's entry into the war in 1940, turned the Middle East into an active area of operations and provided a subsidiary theatre, where British forces could be employed to harass or even inflict some damage on the enemy. Churchill boldly reinforced the region

Photo: RAF AHB

Hurricane fighters of No 274 Sqn being serviced at Amriya, Egypt, November 1940

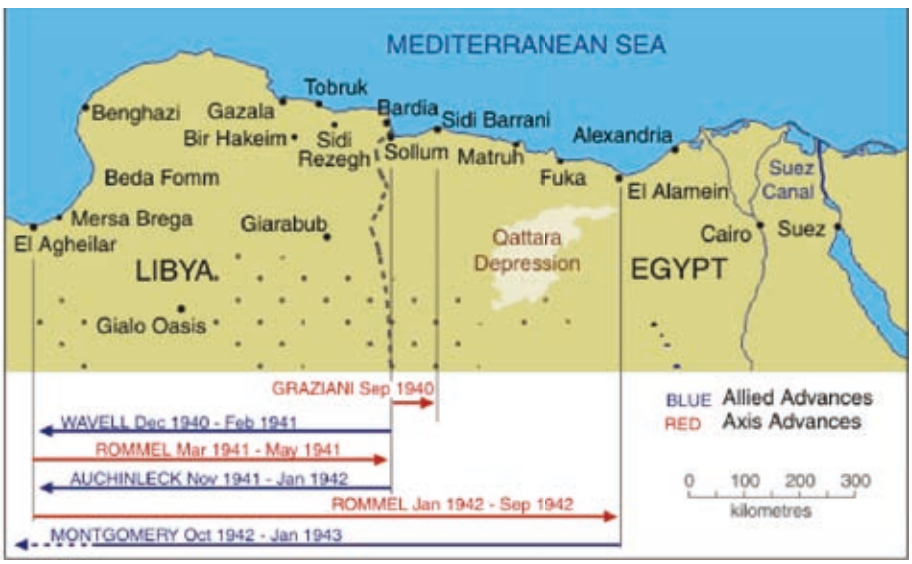
even though the German threat to mainland Britain was far from removed. He resolutely declared that the British would fight for Egypt, describing the desert flank as the 'peg in the sand on which all else hung'[22].

With Hitler's heart set on undertaking Operation BARBAROSSA on the Eastern Front, the British were once more able to indulge in their predilection of the indirect approach. They responded to Graziani's 10th Army's advance into Egypt in September 1940 and thus, the stage was set for a constant 'toing and froing' across the sands of North Africa for the next 2 ½ years. It would be upon this stage that the British 8th Army and the Desert Air Force (DAF) would hone the doctrine of air-support.[23]

At the start of the Italian offensive, the British were in no position to counter attack. However, air-support, in the form of reconnaissance and bombing, in conjunction with ground attacks, of Italian strong points, ensured a safe withdrawal of British forces from the frontier. The primary air effort, which contributed enormously to the land battle, was attacks on enemy motor transport, in an attempt to disrupt the Italian supply chain and stretch lines of communication. Consequently, the Italian forces culminated by mid

Figure 1: Overview of North African campaign 1940-43

(Taken from the Anzac Day Website)



September in the area of Sidi Barrani.[24] The prevailing RAF doctrine, which was doggedly anti air-land, defined air's primary role as action against the Italian Air Forces, their bases and supply lines; in effect, a strategic offensive.[25] Of the 5 stated objectives for RAF Middle East, 'full support for British Army operations' was listed fourth.[26] However, what the Italian advance had brought about was a recognition (which would become enduring) of what the RAF's main role in the Middle East should be: 'if the situation demanded [support to the Army] should be given first priority for as long as necessary'[27]. The Italian advance had denied the RAF forward operating bases, thereby reducing air's combat effectiveness. Thus, it emerged that 'modern war might take the form of a war for aerodromes' and since aerodromes are not in the sky, but on the land, what happened in the land battle bore direct effect upon the Air Force. Air-land co-operation had become a necessity.[28]

Operation COMPASS demonstrated the first satisfactory co-operative air-land enterprise of the War. A brilliantly orchestrated offensive by the British, COMPASS saw the Army advance 500 miles with only 2 divisions, routing an enemy army 5 times its size. The RAF established air superiority over the British forces, enabling the tanks and armour of Major-General O'Conner's tiny force to outflank the enemy without interruption by air attack.[29] The operation, said Wavell, 'could not have been executed without the magnificent support given by the Royal Air Force…it had been a triumph of inter-Service co-operation'[30].

Early 1941 saw Churchill strip resources from North Africa to support the campaign in Greece. This, coupled with the arrival of the German Afrika Korps, under the formidable command of Rommel, meant that the British were on the 'back foot' for the first German offensive in March. With the British in full retreat once more, Tedder concluded that the RAF must do something to stop the enemy, and urged the use of fighters to strafe Axis transport columns.[31] This reversal of fortune brought with it a number of command changes within the British desert force. The first was the appointment of Air Marshal Sir Arthur Tedder as AOC-in-C of RAF Middle East. 'Co-operation…and flexibility were the keynotes of Tedder's air strategy' and the first man he called for, to command 204 Group in the Western Desert, was Air Vice-Marshal 'Mary' Coningham. Coningham, a WW1 veteran, had a no-nonsense, common-sense approach to business.[32] Tedder's first instruction to him was to 'get together' with the Army.[33]

Undoubtedly, the proactive, 'non- stove piped' characters of both Tedder and Coningham contributed massively to the development of air-land co-operation over the next few years in North Africa. Both men understood the need for integration and appreciated the synergy that could be achieved when the effects of land and air forces were amalgamated. Coningham especially, had a reputation for talent in co-operation, and the achievement of a workable air-land support system is generally (and fairly) credited to him.[34] Moreover, Tedder had a good relationship with the army GOC-in-C, General Sir Claude Auchinleck: 'he made an immediate partnership …and from that moment Army/RAF misunderstandings in the theatre were for practical purposes at an end'[35]. Even when Lieutenant General Sir Bernard Montgomery later replaced Auchinleck, the cohesive trinity of air-land commanders remained intact. This is arguably the first air-land lesson gleaned from the North African Campaign: commanders must have a common understanding of each other, and what

each component 'brings to the party'. Moreover, they must fully appreciate how to integrate the strengths of each component to offset the weaknesses of others. This understanding can only be achieved through joint training and establishment of robust joint doctrine.

During the summer of 1941, Operations BREVITY and BATTLEAXE would further test the air-land interface. Both offensives were designed to relieve the Allied-held Tobruk, but due to their shortness, they offered little scope for the practical development of integration techniques. However, there were lessons learned in retrospect:

The main difficulty in providing air-support was the almost complete lack of information from the Army. This was caused by the failure of the air-ground recognition system, brought about mainly by lack of response to aircraft signal by ground formations… failure of the wireless communications between forward troops and their headquarters had meant a serious lack of information at the headquarters regarding the dispositions of formations so that it was frequently impossible to give even a conservative bombline.[36]

Additionally, another cogent reason for the break down of air-land co-operation was that the Army and RAF headquarters had been sited some 80 miles apart.[37] The lack of information flow between the 2 components was a direct result of dislocated headquarters and poor quality communications.

BREVITY and BATTLEAXE exposed many of the difficulties encountered when attempting to conduct dynamic air-support operations: combat identification (CID) of friend from foe; unreliable communications between engaged forces; lack of situational awareness at the headquarters level, leading to stifled decision-making; and the emotive subject of bombline placement. These enduring problems are equally apparent in modern air-land warfare.

On arrival in North Africa in July 1941, Coningham noted that, 'my headquarters was a small hole in the ground 5 miles away from the Army Commander. There was no combined headquarters.' Therefore, with agreement from the Army, he initiated the establishment of a joint Army-Air headquarters when the 8th Army was formed 2 months later. This decision, wrote Coningham, 'was of fundamental importance and had a direct bearing on the combined fighting of the 2 Services until the end of the war'[38]. Coningham knew that in order to harness true air-land jointery, his headquarters must be joint.

Coningham's initial efforts also focussed on a joint air-land conference held in Cairo on 4 September to discuss the policy to be adopted in the Middle East for the provision of Air Support for the Army.[39] A memorandum issued by Churchill the next day regarding air-land integration backed up the efforts of this conference. Not only did his comments break the Army's belief that only aircraft visible overhead were really helping, but they expressed the principle command relationship required to enable successful air-land co-operation:

Nevermore must ground troops expect, as a matter of course, to be protected against the air by aircraft…the idea of keeping standing patrols of aircraft above moving columns should be abandoned…Upon announcing that a battle is in prospect, the AOC-in-C will give him [the army commander] all possible aid irrespective of other targets, however attractive. The Army…will specify…the targets and

tasks which he requires to be performed [and] it will be for the AOC-in-C to use his maximum force on these objects in the manner most effective…the sole object being the success of the military operation.[40]

These rulings, which bore resemblance to the Schwerpunkt concept, were widely published and vigorously enforced by both Tedder and Coningham, giving the RAF assistance in 'sealing the deal' on its propositions from the September conference; the results of which were embodied in the Air Support Directive of 30 September 1941. This significant directive detailed the conceptual principles that informed co-operation between the Desert Air Force and the 8th Army for the forthcoming CRUSADER offensive in November 1941 and more importantly, for the remainder of the war.[41]

The Directive detailed the concepts of indirect and direct air support, conveying the message that not all support to the Army would be conducted by aircraft located immediately overhead.[42] These 2 concepts continue to form the bedrock of contemporary Anti Surface Force Air Operations (ASFAO) doctrine as detailed in the current RAF Operations Manual.[43] The additional principles of the Directive began with the merging of headquarters and associated development of intimate working relationships amongst component commanders. Coningham had by this stage already co-located his headquarters with that of the 8th Army and Tedder had merged his with that of General Auchinleck. Tedder, demonstrating a taster of today's joint approach, stated that, 'In my opinion… the Middle East theatre is now so closely inter-related that effective co-ordination will only be possible if the campaign is considered and controlled as a combined operation'[44].

The Directive also called for the establishment of Air Support Controls (ASCs) that could 'meet, modify or reject the requests for support' ensuring 'that the maximum effort is obtained from the available …aircraft'[45]. Finally, guidance was given regards bomber attack profiles, target selection, allocation of effort, bombline placement and air/ground communication and recognition signals.[46] Overall, the Directive provided a relevant doctrinal one-stop-shop for all air-land co-operation practitioners.

The formation of the ASCs arguably provided the solution to the majority of air-land problems in North Africa (similar in concept to the ASSUs proffered by the 'Wann-Woodhall Report'). A 'tentacle' concept was also adopted which established wireless communication between front line units and appropriate headquarters. In addition to the Tentacles, 'Forward Air Support Links' (FASLs) were developed for controlling air-support aircraft in the air, the equivalent of today's Forward Air Controllers (FACs). Tentacles and FASLs were assigned to infantry divisions to enable commanders in the field to call for air-support when needed. ASC headquarters would pass accepted requests to the appropriate airfields, effectively scrambling aircraft, and then inform the relevant Tentacle of the strength and intended arrival time of the support on its way. Pilots could be passed target details before take-off, shepherded to the target area by a reconnaissance aircraft or, most often, a FASL would give them a 'target talk-on' once established in the overhead.[47] This flow of information, from request, to tasking, to talk-on, is identical to that used in modern air-support operations. Through meticulous training and constant refinement by exposure to combat, Coningham was able to drill this system into the North African

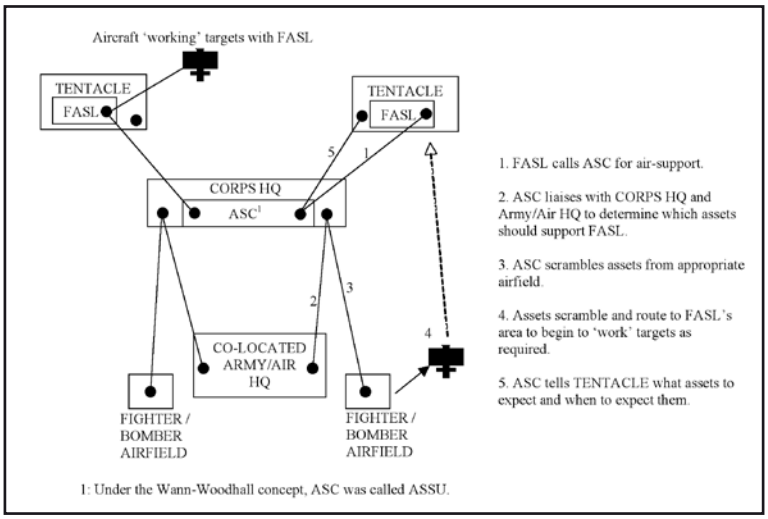
forces. Moreover, by December 1941, Air Liaison Officers (ALOs) began to arrive in the Desert, specially trained to explain to both aviators and soldiers the intricacies of air-support.[48] (Figure 2).

The summer of 1941 saw both sides prepare for decisive encounter and by November, Operation CRUSADER provided Coningham with the ideal test ground for the improved air-support system. The objectives of the Operation were to destroy Rommel's forces, relieve Tobruk and open Tripolitana to invasion. Whilst on the ground CRUSADER was a disappointment, resulting in the eventual withdrawal to the Gazala Line, in the air the air-support system generally functioned well. The British established air superiority early on and heavy rains caused the enemy armour to bog down, providing perfect targets for the DAF. The introduction of new technology, in the form of the Hurribomber, and implementation of newly developed dive bombing skills, allowed the DAF to harass German columns with 250lb bombs and cannon fire.[49] The introduction of the fighter-bomber (today known as swing-role) was, 'an important step in the development of what proved to be a formidable weapon for supporting the Army'[50]. Moreover, the shift in dogmatic thinking, from a reluctance to perform dive-bombing to a recognised need for this art, was a welcome development. The fighter-bomber soon demonstrated that it could rival the famed Stuka, with parallel success and survivbility.[51]

However, the air-support system had its share of difficulties during CRUSADER. For the greater part of the offensive, there was an average time lag of 2½ to 3 hours between initial call from the Tentacle to the employment of aircraft ordnance with the FASL. Clearly, this was hardly 'direct or close' support in the preferred meaning of the words.[52] The average distance from airfield to FASL was 200 miles, therefore increasing transit time, and on reaching the target area, many aircrew found it impossible

Figure 2: North African campaign Example of C2 Flow for Air Support

(Based on a diagram in Middle East (Army and RAF) Directive on Direct Air support)



to identify friendly forces from the enemy. Thus deprived of targets, pilots endured the further frustration of long waits for 'impromptu' support calls, as the Army itself battled with CID: a theme that was also apparent during Op TELIC in 2003.[53] There were unacceptable delays in the relay of messages from ASC to headquarters and unavoidable hold-ups caused by rendezvousing with fighter escorts on the way to the designated target area.[54] Target recognition, CID and fluidity of information flow stood out as the main areas that required attention post CRUSADER. For all its apparent 'paper symmetry', the air-support system still required much streamlining.[55] Nevertheless, 'none of this alters the fact that during CRUSADER the Army enjoyed the best air-support it had ever had'[56].

North Africa 1942-43

The Battle of Gazala followed in May 1942 and continued through to July with the 1st Battle of El Alamein. From an air perspective, common themes were developing. The Army again fell into great confusion, with commanders uncertain of the location of their own forces, and intercommunication between units fragmentary. Additionally, crews found it impossible to identify the bombline; conditions were extremely unfavourable for air-land support. However, at El Alamein, Rommel was forced into defence from which he was never able to escape; this signalled the turning point in the Desert campaign. 'The Air Force participated fully in the fierce battles of early July, in which Rommel's army was at last decisively checked'[57]. The refined air-support system worked extremely well throughout the battle and got better and better. 'The speed with which the Air Force answered calls for support steadily increased, until the average time of delay between request…and aircraft…was…35 minutes'[58]. As a result of a combination of doctrinal theory, experimentation, peacetime training in the UK, and operational experience in North Africa, an effective British air-support system had been developed by 1942, and essentially remained the same throughout the remainder of the war.[59] Moreover, its tenets still ring true in contemporary air-support doctrine.

By mid 1942, air-land co-operation had, as near as possible, been perfected, but it was the arrival of Montgomery that added the final, and arguably most crucial, element to the command relationship between the DAF and 8th Army. Montgomery had an innate understanding of the qualities air-land co-operation and he understood precisely the role of the DAF.[60] He handsomely acknowledged his reliance on the air arm by stating 'any officer who aspires to hold high command in war must understand…the use of air power'[61]. He amplified with, '… concentrated use of the air striking force is a battle winning factor…it follows that control of the available air power must be centralised, and command must be exercised through RAF channels…'[62]

He sited his headquarters with that of Coningham and encouraged continuous liaison between air and land. Tedder was later to comment that Montgomery put air co-operation as 'first in the order of priority'[63]. Although later in the war relations with Montgomery diminished, due mostly to his over-inflated ego, at this point in North Africa he complemented Tedder and Coningham perfectly, demonstrating once again the need for joint commanders who appreciate the 'business' of the other Services.

The Battle of Alam el Halfa in the late summer of 1942 saw Rommel's last attempt to break his defensive shackles however, this battle proved the climax of

air-land co-operation and to all intents sealed the fate of Axis forces in North Africa.[64] It exemplified the use of air power on efficient and economical lines and was a proving ground for policies and theories for the handling of an air force.[65] Indirect air support began 9 days before the enemy attack and then, in a perfectly co-ordinated and integrated effort, the guns and armour of the 8th Army made a ring around the enemy and airpower gave the punch inside the ring. At the pinnacle of the operation, bombs were being dropped at an average of one every 40 seconds.[66] By 2 September, Rommel gave orders for retreat, largely because of British air superiority.[67] From the air perspective, the theory of indirect and direct support to the Army was proven. According to Montgomery, 'the tremendous power of the air arm in co-operation with the land battle was well demonstrated'[68]. In short, the battle of Alam el Halfa fully vindicated the new air-support organisation and stands out as a landmark in the development of air-land co-operation.[69]

With Rommel in full retreat, guaranteed air superiority and a slick, battle-proven air-support organisation, the 8th Army continued on the offensive, pushing Rommel further west. The 2nd Battle of El Alamein and subsequent advance to the West witnessed full integration of air power and by February 1943 the 8th Army entered Tunisia. At this point, Operation TORCH saw the determined entry of the USA into North Africa but unfortunately witnessed the heartbreaking relearning of lessons hard-won by the British in the previous 2 years. At Kasserine, a timid US ground commander committed to keeping his air assets close to his own troops, and not freeing them to prosecute indirect support. The Axis forces exploited this and thus set the stage for the greatest disaster ever to befall US ground forces in battle, proving the disastrous results that can emerge from poor air-land co-operation.[70] After this, and with vast input from the British, the Americans redeveloped their air-support doctrine in line with that of the DAF, in the form of FM 100-20.[71] With all Allied forces now operating 'off the same hymn sheet', Rommel's forces were once more defeated at the Mareth Line and eventually, by 13 May 1943, the last remnants of Axis resistance in Africa had ended. Tedder's Order of the Day summarised the indispensable contribution of the DAF and other air formations to victory in the campaign by stating, 'by magnificent teamwork between commands, units, officers and men…you have shown the world the unity and strength of air power'[72].

Air-Land Lessons Learnt from North Africa

Whilst the lessons drawn from the North African Campaign are numerous, 5 main air-land co-operation lessons are of relevance to contemporary military campaigns. The first 2 are concerned with enabling air-land operations whilst the remainder are specific to the actual conduct of air-support.

Firstly, and of overarching significance, control of the air must be achieved before successful air-support can be provided. The British enjoyed almost total air superiority throughout the North African Campaign, which afforded the manoeuvring room to develop, perfect and ultimately provide air-support to the 8th Army. Montgomery concluded that, 'if we lose the war in the air, we lose the war, and we lose it very quickly'[73].

Secondly, command of air assets must be centralised and maintained within the specialist realms of the Airman. Montgomery amplifies this point with his remark, 'the commander of an army in the field should have an

Air Headquarters…[but] air resources will be in support of his army, not under his command'[74]. He recognised that dedicating air assets solely to army support reduced their inherent flexibility hence, diminishing their overall combat effectiveness within the joint campaign. This recognition proved Montgomery's innate joint understanding of cross component capability. Even if the command of air remains within the domain of the Airman, this does not relinquish the Soldier from understanding airpower intimately.

Thirdly, and of prime importance to the effective conduct of air-support, is the need for robust C2. Commanders at the operational level need to understand the capabilities of each component, and recognize how to harness these into synergistic air-land effect. Moreover, joint planning and decision making, achieved in North Africa by co-location of headquarters, must be sought in order to exponentially increase integration and co-operation. Additionally, fluid communications and C2 between the operational and tactical levels are essential. For air-support to be successful, a system that connects operational decision-makers with tactical war-fighters must be in place to allow the right aircraft, to get to the right area, talk to the right person and prosecute the right target, all in as short a time as possible. No mean feat, and one that is continually grappled with in today's network-centric world of time-sensitive-targeting, and aspired to in the HQ Strike Command 2015 vision of 'precise campaign effects, at range, in time'[75].

The fourth lesson is that maintaining situational awareness (SA) at both the operational and tactical level is extremely difficult in the 'fog and friction' of war.[76] Systems must be in place to afford operational commanders the ability to maintain SA of friendly forces, especially concerning location. Only with this SA can sensible decisions, such as bombline placement, be made; hence, affording air the ability to conduct relevant indirect support operations. Furthermore, at the tactical level, robust recognition procedures are required to enable aviators to readily distinguish between friend and foe and therefore, bring air power to bear in a safe, timely and precise manner.

Lastly, but by no means least, the joint development, practice and proving of theoretical doctrine through relevant and frequent training is essential if air-land integration is to be successful. Moreover, doctrine must evolve and develop with time and capability in order to prevent it from becoming irrelevant dogma.

Operation TELIC Comparison

Operational Overview

There were 2 geographical objectives for this campaign: Baghdad and the Rumailia Oilfields. The Coalition Force Land Component Commander's (CFLCC's) plan was based on a two-pronged attack on Baghdad from Kuwait. V (US) Corps would attack on the left, approaching Baghdad from the South West. The 1st US Marine Expeditionary Force (1 MEF), a composite air-ground task force which included a dedicated Marine Air Wing (MAW) consisting of attack helicopters and fast-air, would approach Baghdad from the South and South East. The MEF included the 1st (UK) Armoured Division (1 Div): the UK's contribution to CFLCC's land scheme of manoeuvre. The synergistic integration of airpower into the land plan was fundamental for achievement of rapid, decisive success. Moreover, the speed and tempo associated with

this campaign was of a different magnitude to that experienced during preceding contemporary operations. Using 'shock and awe'[77] as its bedrock, this plan was designed to overwhelm the Iraqi Regime. Therefore, joint decision-making and targeting had to be unrestrained.[78] Success depended upon deployment and integration of fast moving light forces, highly mobile armoured capabilities and Close Air Support (CAS).[79] Hence, a true understanding of air-support and air-land co-operation was essential if the planned momentum for the operation was to be maintained. Unfortunately, the UK military entered TELIC with a less than adequate grasp of air-support, especially concerning C2, and relearnt the key air-land integration lessons of their North African forebears identifid in the case study above.

Figure 3: Op TELIC Land Scheme of Manoeuvre
(Based on a map in British Army electronic Battle Box 8th edition, Disk 1, (2005))

A MiG-25RB Foxbat-B reconnaissance aircraft buried by the Iraqi Air Force

Control of the Air

As in the North African Campaign, coalition forces in Op TELIC enjoyed a very high degree of control of the air, thus enabling air-support operations. However, unlike North Africa, where the Allies had to conduct air-to-air engagements to gain air superiority, coalition forces in Iraq achieved air supremacy without having to fight a single enemy aircraft: this was due to 2 main factors. Firstly, the establishment of the Northern and Southern No-Fly Zones after the 1991 Gulf War banned the Iraqis from operating all aircraft in exclusion zones north of the 36th parallel and south of the 33rd parallel. To that end, the Coalition had control of the majority of Iraqi airspace even before TELIC began.[80] Secondly, the Iraqi Air Force was no match for that of the Coalition. Once combat operations began, no enemy aircraft got airborne. In fact, the Iraqis attempted to save as many of their air assets through ground dispersion, and even buried fighters at bases such as Al Taqqadum.[81]

However, with their airspace denied, the Iraqis invested heavily in establishing a robust Integrated Air Defence

System (IADS). This consisted of multi-linked fibre optics that afforded secure communications and hybrid surface to air missile systems (SAMS) that did not solely rely upon radars for guidance, thereby rendering them invisible to coalition Suppression of Enemy Air Defence (SEAD) aircraft. A 'Super-MEZ' (missile engagement zone) of overlapping, complementary SAMS protected the heart of Iraq and was deemed a serious threat to allied aircraft. However, precursor shaping operations destroyed key installations, communications and IADS nodes, therefore affording a favourable air situation above 20,000 feet from very early on in the Campaign. By 6 April 2003, coalition forces declared air supremacy over the whole of Iraq and considered the 'Super-MEZ' no longer a factor.[82]

Almost complete air dominance afforded commanders the luxury of concentrating air effort towards the support of the land component. In comparison with Gulf War 1, the proportion of air sorties flown in support of land forces increased from 55% to 78%.[83] Owning the air allowed for unhindered implementation of air-land operations from enemy air attack however, freedom of action was not absolute during TELIC, and the threat to coalition aircraft operating at lower levels was considerable due to an inability to completely suppress enemy shoulder-launched SAMS and anti-aircraft-artillery (AAA). The DAF were also exposed to AAA however, in the1940s, both politicians and the public anticipated friendly losses in combat therefore, pilots were expected to press home attacks at low level despite the threat. This is the opposite to contemporary warfare where the downing of even one coalition pilot would gain disproportionate media attention and have great strategic effect upon public opinion towards the campaign. Hence, British aircraft in TELIC were politically shackled to operate at medium altitudes above the threat however, at such heights, most targeting sensors did not perform optimally. Therefore, aircrew ability to achieve CID or find and positively identify targets was markedly reduced due to sensor technological limitations.[84] The vast proliferation of shoulder-launched SAMS throughout the world, coupled with Western governments' aspiration to fight zero casualty wars, means that future air-support will most probably be constrained to operate at medium altitudes. Thus, if British air-support is to be more credible, RAF CAS aircraft need to be fitted with more technologically advanced equipment.

Centralised Control of Air Assets

In Iraq, British land forces did not get priority for air-support because they were not on the CFLCC's main effort. However, many British Army officers claimed the shortfall in air-support for land forces had been because of a lack of organic, dedicated fast-air. The USMC MAW concept was hailed as the panacea to UK air-support post TELIC, mainly because the MAW had provided dedicated air for the MEF throughout the operation. Many British Army officers claimed that the future of UK air-support lay in the concept of dedicated Army fast-air.[85] However, the USMC operates in a fundamentally different way from the British Army. With no organic, indirect depth fire, such as UK forces have with artillery, the USMC relies solely on airpower to provide depth effects hence, it has its own dedicated fast-air.[86]

The argument for using UK fast-air to support only UK land forces, or more drastically, permanent allocation of 'CAS only' assets to the British Army, has endured since TELIC.[87] This argument is fundamentally flawed and would prove an inefficient use of British air

assets and detract from one of the key tenets of airpower: agility.[88] Moreover, the UK's ACC for TELIC commented that, '…we would not have sufficient UK assets to provide cover to a UK land component 24 hrs a day. That is why airpower has always been used and planned on centralised methodology. It is trying to make the best use of the resources across the battle space'[89]. This was the approach to implementation of airpower during the North African Campaign, encapsulated by Montgomery when he said, 'the greatest asset of airpower is its flexibility and this enables it to be switched quickly from one objective to another. It follows that control of the available airpower must be centralised and command must be exercised through RAF channels'[90]. Undoubtedly, the argument regards organic air-support for the British Army will continue. However, TELIC proved Montgomery's guidance to be true, and centralising the RAF's air contribution for air-support during the Operation worked well.[91]

Command and Control (C2)

Lessons learnt from the North African campaign prove that successful air-land co-operation is reliant upon a robust C2 network that links together all necessary elements to ensure timely, effective and accurate support. During TELIC, air-land C2 was well catered for horizontally between components however, vertically, at the Divisional level and below, it was sadly lacking.[92] A major lesson identified during combat operations in Afghanistan in 2001, was that in high manoeuvre, high tempo warfare, such as that planned for TELIC, the relationship between air and land is extremely important; therefore, all senior commanders understood and appreciated the need for air-land co-operation.[93] Hence, at the operational level, C2 was well catered for. Within the Joint Force Air Component Command Headquarters (JFACHQ) the Army was represented by the Battlefield Co-ordination Detachment (Air) (BCD(A)). Conversely, an Air Operations Co-Ordination Centre (Land) (AOCC(L)) acted as the Air representative within the Joint Forces Land Component Headquarters (JFLCHQ).[94] Both the AOCC(L) and BCD(A) provided coherent cross-component C2, and using real-time communications and networking, effectively emulated the collocated nature of the Army and RAF headquarters, demonstrated as essential during the North African Campaign.

However, TELIC outlined the woeful state of the UK's capability to provide vertical air-land C2, between the operational and tactical levels. This was arguably the UK's biggest weakness concerning air-land co-operation during the Operation and was described by Chief AOCC(L) as 'not so much a capability gap as a gaping chasm'[95]. 1 Div deployed to TELIC expecting co-ordination of all air-land C2, from divisional level downwards, to be completed by a handful of Air Liaison Officers (ALOs). In peacetime, the ALOs provide the essential link between the Army and the RAF but during operations, their meagre manpower and resources are completely inadequate to fulfil a demanding, high tempo, C2 role.[96] The US chain of command recognised this shortfall and, since 1 Div was operating within the MEF, allocated a United States Marine Corps (USMC) ANGLICO (Air, Naval, Gunfire Liaison Company), to act as an Air Support Element (ASE) to fill the capability gap, hence masking the problem. The ASE consisted of over 60 Marines plus their associated communications suite and provided a substantial reinforcement to the inadequate UK air-land C2 structure.[97] It was widely acknowledged that had UK land forces received air-support in greater quantities during

TELIC than they did, they would have lacked the capability to control it without the assistance provided by the USMC ASE. [98]

Fortunately, plugging the C2 gap with the USMC ASE allowed UK forces to adopt a robust and flexible air-support network that was implemented with relative success throughout the Operation. The procedures for requesting air-support during TELIC effectively mirrored that utilised during the North African Campaign and the role of the USMC ASE in this procedure was pivotal, just as the role of its historical equivalent, the ASC, had been in North Africa. However, the lack of and end-to-end air-support C2 network was a fundamental oversight of UK forces during TELIC; this was undoubtedly the most apparent relearning of history during the Operation.

Situational Awareness (SA)

TELIC proved that contemporary conflict is more chaotic, complex and dangerous than previously thought.[99] Attaining and maintaining SA at both the operational and tactical levels is as challenging in the modern age as it was during the 1940s. Even though 60 years have elapsed since the DAF grappled with CID in North Africa, technology has only partially solved this conundrum.

At the operational level, one of the high points of TELIC was the successful fielding of the Blue Force Tracker (BFT) system. BFT is a transmitter carried by friendly forces that sends their position, via satellite, to their headquarters. It not only affords commanders near real-time SA of campaign progress but also allows them to know where their forces are at all times, hence making the 'fog and friction' of battle more transparent. [100] However, BFT is employed at unit level only; individual soldiers do not carry a transmitter, due to its weight and size.[101] Therefore, the fidelity of information provided is not accurate enough to allow for CID of individual troops on the ground. Moreover, there is currently no technological solution to allow UK air-support pilots to determine friend from foe on the battlefield. During TELIC, many CAS pilots found it extremely difficult to distinguish friendly troops from enemy forces, especially when engaged in dynamic and confusing close combat.[102] Inherently, it is in this situation when air-support and airpower effect is most urgently required hence, increasing the likelihood of fratricide. Whilst recognition markings and panels are painted or attached to friendly equipment, they are of limited use to aircrew when operating in the preferred environments of medium altitude or night.[103] Therefore, at the tactical level, and most especially in the air-ground environment, CID remains as difficult today as it was for the DAF. Until affordable technology can provide a solution to this problem, it will be vital to develop joint understanding through training and doctrine to militate against the possibilities of blue-on-blue. [104]

Training and Doctrine

Prior to TELIC, British air-support training and doctrine was anachronistic; it did not reflect advances in weapon and sensor technology and was steeped in Cold War methodology. Training was conducted on an ad hoc basis and air-support for Army exercises was viewed as a beneficial add-on vice an essential requirement. Apart from air-support provided for development of new FACs, no dedicated front line air-land training was conducted in the UK. Hence, joint understanding in 4 main areas of the air-land interface, especially from the land perspective, was lacking prior to operations in Iraq. [105]

Firstly, the Air Tasking Order (ATO) process of air allocation to the joint campaign was deemed inflexible. This was due mostly to a poor understanding of the process rather than the process itself however, it has been widely recognised that ATO flexibility could be improved.[106] Secondly, the notion of air-land integration was misunderstood. On many occasions during TELIC, the synergistic effect of joint fires was not achieved because air and land effort had been deconflicted rather than integrated. Whilst some UK doctrine describes the concept of choreographed joint fire effect in the form of the Joint Air Attack Team (JAAT), UK forces very seldom practice it.[107] Therefore, throughout TELIC, it appeared that some land commanders would exhaust all organic fire options, such as artillery, before attempting to utilise air-support.[108] Paradoxically, the JAAT concept is not detailed in current Joint Warfare Publications.[109] Thirdly, during TELIC, 2 new doctrinal concepts were introduced to British forces: Killbox Interdiction Close Air Support (KICAS) and Urban CAS. The UK had no detailed concepts for conducting either of these disciplines, whilst their US comrades appeared well practiced, thereby demonstrating the lack of emphasis UK forces had placed on air-land integration before the Operation.[110] Lastly, under current British doctrine, the Fire Support and Co-ordination Line (FSCL) has replaced the 'bombline' used during WW2 to prevent fratricide. Simply put, airspace beyond the FSCL is the domain of the air commander whilst that short of it belongs to the land commander. However, during TELIC, the FSCL appeared to be an outdated air control measure that could not be utilised with ease in the high-tempo of modern warfare. US forces almost overran the FSCL because it could not be adjusted quickly enough, whilst at other times the line was placed too far ahead of friendly forces, imposing unnecessary and counterproductive constraints on air attack.[111] The contentious use of the FSCL is a pan air-support issue; however, US doctrine is soon to modify this concept for the modern digitised battlefield, introducing a system of killboxes that can be opened and closed as required, to allow for seamless integration of joint fires.[112] Whilst the WW2 bombline concept has been an appropriate measure until recently, it will soon become obsolete due to the changing face of contemporary warfare, and British forces must acknowledge this fact.

Overall, the paying of 'lip service' to the development and understanding of relevant air-land doctrine and corresponding dearth of realistic joint training before TELIC, left UK forces poorly placed for air-land operations in Iraq. Whilst US forces discovered a new 'sweet spot'[113] in combat co-operation, the British completed TELIC stating, 'there is a lack of experience in requesting, co-ordinating and delivering CAS, the prevalence of which proves a need to conduct more CAS training.'[114]

Impact of Technology on Contemporary Air-Support

Exponential advances in technology since WW2 now allow air-land co-operation to be seamlessly rapid, precise and decisive.[115] Unfortunately however, British air-support assets are yet to benefit wholly from this fact. On the one hand, TELIC saw a significant change in the nature of the ordnance delivered by the RAF, with a shift towards precision-guided munitions (PGMs). Of all munitions employed, 85% were PGMs (compared to only 10% in Gulf War 1) and 90% of these hit their intended targets.[116] Conversely, sensors and targeting equipment fitted to RAF aircraft are outdated and incapable of achieving CID when employed at

medium altitudes against small tactical targets. Hence, during TELIC, many RAF aircrew wasted valuable time attempting to find and then identify enemy targets from medium altitudes. This frustration, coupled with poor communications because of outdated and unreliable radio equipment, left British aircrew and FACs conducting air-support at the same technological level as DAF pilots and FASLs in North Africa. Whilst technology is not the panacea, it can go a long way to expedite air-support and alleviate the inherent danger involved with employing high explosives within hundreds of metres from friendly forces.

The RAF is slowly staggering into the world of data-linked CAS and enhanced resolution targeting pods, which has now become the norm for US forces. Until sensor and communication equipment is updated, the fundamentals of contemporary air-support in the British forces will remain practically identical to that of the DAF and 8th Army: a soldier on the battlefield, trying to talk a pilot's eyes onto enemy targets, using poor radios, amidst the 'fog and friction' of combat. With no affordable technological solution inbound, only rigorous training and the development and understanding of joint doctrine will prevent CID from becoming the hurdle that prevents British air-land co-operation from advancing apace. This was demonstrated extremely well during the discrete counter-SCUD operations conducted in Iraq's Western Desert during TELIC. Coalition Special Forces and air-support squadrons trained intensively together before the Operation, developing and refining a robust C2 network, a flexible airspace control system and specific 'scud-hunting' doctrine, that allowed for fluid joint fires effect.[117] Over 100 'danger-close' CAS missions were successfully conducted with no instances of blue-on-blue.[118]

History Relearnt?

The comparative study above demonstrates that British forces relearnt historical air-land co-operation lessons during TELIC. With specific regard to the conduct of air-support, the areas of C2, training and doctrine and tactical level SA were extremely lacking. Primarily, the lack of a robust air-support C2 network was a fundamental omission. Had the US not provided support in the form of the USMC ASE, the British air-support network would have been at best, rudimentary. Moreover, the lack of joint air-land training prior to combat, accompanied with outdated and misunderstood doctrine, left British forces poorly placed to conduct synergistic joint operations. Technology is often hailed as the fix-all solution to these issues, yet with current pressures on the British Defence Budget and a Government focus on health and education reform, it may be beyond the power of the MOD to supply cutting-edge technology in the near future. Hence, contemporary practitioners of air-support will have to focus on the basics, such as those learned in North Africa and subsequently relearnt in present-day Iraq, if air-land co-operation is to improve. Project Coningham-Keyes is attempting to bring these basics to the fore.

Project Coningham-Keyes and the Future

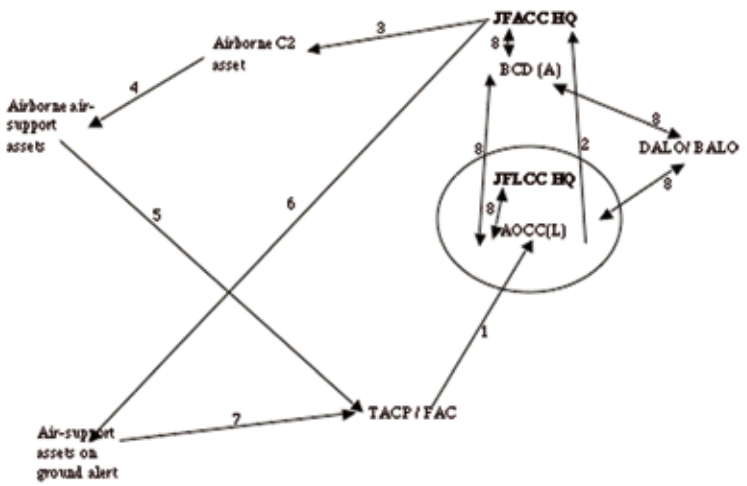
The initiation of Project Coningham-Keyes (PC-K) in 2003, a tri-Service, 2-Star led joint venture, was an attempt to address the air-land lessons identified from TELIC. It consists of 3 separate working groups; Concepts and C2, led by Land; Battlespace and ISTAR (Intelligence, Surveillance, Target Acquisition and Reconnaissance), led by Fleet; and Training and Simulation led by Air.[119] PC-K has resulted in many positive steps forward towards a more

robust and capable British air-support system.

The creation of a Joint Air Land Organisation (JALO) now acts as a central body to develop tri-Service air-land integration. The JALO is also attempting to bring together hitherto stove piped equipment development programmes to produce interoperable technological solutions for future air-support.[120] Additionally, extra

Figure 4: TACS: proposed by Project Coningham-Keyes

(Based on a diagram in AOCC(L)/J5 plans/Doctrine)



1. FAC calls AOCC(L) for CAS.

2. AOCC(L) contacts JFACC HQ, requests air-support and relays FAC's details.

3. JFACC HQ calls airborne C2 asset and either delegates authority to it to allocate the most appropriate airborne asset for the air-support request or orders it to assign a particular airborne asset.

EITHER…

4. Airborne C2 asset either re-tasks an asset already airborne on an alternative mission to support the CAS request or tasks an air-support aircraft that is currently airborne-holding awaiting an air-support request.

5. Airborne air-support assets receive FAC details, route to FAC's location, attain contact with the FAC and begin to 'work' the target area.

OR…

6. JFACC HQ contacts appropriate airbase and scrambles assets that are holding on the ground awaiting an air-support request.

7. Airborne air-support assets receive FAC details, route to FAC's location, attain contact with the FAC and begin to 'work' the target area.

8. Constant communication from operational to tactical levels to maintain SA.

Tactical Air Control Parties (TACPs) and FACs are being trained for the front line commands. Moreover, properly integrated, air-land exercises are being conducted, both in the UK and on overseas deployments such as in BATUS, Canada.[121] Finally, and most importantly, the development of an overarching Tactical Air Control System (TACS) will plug the Air C2 gap. Unsurprisingly, the TACS closely resembles the Air C2 network developed and utilised during the North African Campaign (Figure 2). It includes the full range of C2 agencies involved in the air-support network, from soldier on the battlefield to joint headquarters. Moreover, the establishment of additional ALOs at Brigade and Divisional levels (BALOs and DALOs), to co-ordinate air-support requests into a bolstered BCD(A) and AOCC(L), allows for the development of a robust and efficient air-land C2 network.[122] (Figure 4).

Although PC-K has gone a long way to plug the majority of air-land co-operation gaps, there is still one major area that requires development: CID. The Battlespace and ISTAR Working Group within PC-K is attempting to provide solutions for future tactical level CID, but these are heavily reliant on technology and at present are costly. The need for upgraded targeting pods and data link CID solutions is acknowledged but this is subject to the priorities placed upon the Defence Equipment Programme.[123] However, optimistically, MOD's policy for equipment procurement remains focussed on this area and 'alongside precision strategic attack…air-land co-operation are [sic] the biggest focus for future equipment capability'[124].

Fortunately, the continuous tempo of current operations in both Iraq and Afghanistan maintains the focus on air-land co-operation. British forces have witnessed a quantum leap forward in jointery and a realisation of the importance of the air-land interface, especially for urban and counter-insurgency operations.[125] A British officer recently serving in Afghanistan had this advice to offer his comrades: 'anyone deploying [to Afghanistan]… down to the rank of Platoon Sergeant, must do…TACP practice. The one thing that can get to you in time in Afghanistan is air'[126].

If the British Army of the future is to fight successfully as lighter and faster forces, in a large, distributed battlespace, it must understand the basics of air-support. Conversely, tomorrow's RAF must become more adept at Integrated Air Operations.[127] Only then will the lessons identified from TELIC become lessons learnt. However, this will not be easy. As inter-component tensions endure, especially in the domain of defence spending, air-land interaction will remain difficult. Co-operation is 'a slow-growing and delicate plant, requiring time, much goodwill, regular human contact and careful training. It is a mood, not to be conjured into existence by decree at a moment's notice'[128]. Unfortunately, historical lessons were relearnt in Iraq in 2003. Only a joint approach towards air-land co-operation will prevent British forces from relearning the lessons identified during TELIC in the next major conflict.

Glossary

1 Div	1ST (UK) Armoured Division.
AAA	Anti-Aircraft-Artillery.
ACC	Air Component Commander.
Air-support	Generic term for Anti Surface Force Air Operations (ASFAO).
ALO	Air Liaison Officer. Normally an Air Force officer permanently assigned to a land unit (either at Division or Brigade level) to act as the link between air and land.
ANGLICO	Air Naval Gunfire Liaison Company. A USMC concept consisting of personnel specially trained in the art of bringing joint fires to bear.
AOC-in-C	Air Officer Commander in Chief.
AOCC (L)	Air Operation Co-ordination Centre (Land). An organisation consisting of approximately 20 personnel that represents the JFACC within the JFLCC Headquarters. Co-ordinates and directs air-support to Land forces in order to integrate air operations with the supported Land formation.
ASFAO	Anti Surface Force Air Operations. Defined as a core capability of airpower: either direct or indirect air operations that may be employed in the air-land environment.
ASC	Air Support Control. A concept developed in the North African Campaign and detailed in the Middle East (Army & RAF) Directive on Direct Air Support, to facilitate C2 of assets for air-support.
ASE	Air Support Element. A concept utilised by the USMC describing a team ascribed for integrating air-support with a land unit. Normally consists of an ANGLICO. This concept is shortly to be adopted by UK forces whereby members of the AOCC(L) will form an ASE and attach to a designated land unit as required.
ASSU	Air Support Signals Unit. The forerunner of the ASC concept developed in the 1940s during the Wann-Woodhall air-land co-operation experiments.
ATO	Air Tasking Order. A set of orders disseminated to airpower force elements detailing mission and assigned targets etc.
BALO	Brigade Air Liaison Officer.
BCD(A)	Battlefield Co-ordination Detachment (Air). An organisation that represents the JFLCC within the JFACC Headquarters. It fills 2 broad functions: passage of LCC's intent and concept of operations and passage of tactical detail to allow co-ordination of air-land operations.

BFT	Blue Force Tracker. A system that transmits location information.
Blue-on-blue	Fratricide. Friendly forces mistakenly attacking other friendly forces.
Bombline	An air-land deconfliction method used during WW2. A line, where possible based on a physical feature easily identifiable to both airmen and soldiers, projected forward of friendly troops, beyond which aircraft were permitted to engage targets, therefore providing for deconfliction between ordnance employed by air and friendly land forces. Similar in concept to the modern day FSCL.
C2	Command and Control.
CAS	Close Air Support. Defined as air action against hostile targets that are in close proximity to friendly forces, and requires detailed integration of each mission with the fire and movement of those forces.
CID	Combat Identification. The ability to determine the identity of friendly and enemy elements in the battlespace.
CFACC	Coalition Forces Air Component Commander.
CFLCC	Coalition Forces Land Component Commander.
DAF	Desert Air Force. The Air Force used in the North African Campaign of WW2.
DALO	Divisional Air Liaison Officer.
Danger close CAS	CAS which involves ordnance being employing within 1000 metres of friendly forces.
Direct Air Operations	Direct air operations are those intended to directly affect the outcome of a contact engagement between friendly and opposing forces.
FAC	Forward Air Controller. The FAC's principle function is the control and prosecution of CAS. The FAC can be either on the ground or airborne. During TELIC, only British ground FACs were used.
FASL	Forward Air Support Link. The FAC equivalent used during the North African campaign.
FM 100-20	An US field manual published in 1943 describing the command and employment of air power with particular reference to air-land integration.
Fratricide	Blue-on-blue. Friendly forces mistakenly attacking other f riendly forces.

FSCL	Fire Support and Co-ordination Line. A line established by the LCC to denote co-ordination requirements for fire by other force elements, which may affect his current operations. The FSCL applies to the fire of air, land or sea weapon systems. A modern equivalent to the bombline of WW2.
IADS	Integrated Air defence System.
Indirect Air Operations	Indirect air operations are those intended to disrupt and destroy an opponent's military assets and infrastructure in the rear area.
ISTAR	Intelligence, Surveillance, Target Acquisition and Reconnaissance.
JAAT	Joint Air Attack Team. UK doctrinal description of the concept of choreographed joint fires.
JALO	Joint Air Land Organisation. Acts as a central body to develop tri-Service air-land integration.
Joint Fires	The choreography of employing different fires effect, from air, land or sea systems, onto a target.
KICAS	Killbox Interdiction Close Air Support. A system of grids which can be opened or closed for CAS. If open, air can prosecute targets within a killbox safe in the knowledge that there are no friendly forces within the same killbox. If closed, air must co-ordinate with the local land commander to deconflict from friendly land forces before engaging enemy targets.
Killbox	A coded grid, normally 30 minutes of longitude by 30 minutes of latitude, used as an airspace control measure.
LCC	Land Component Commander.
MAW	Marine Air Wing.
MEF	Marine Expeditionary Force.
Montgomery	General Bernard Montgomery.
North African Campaign	The WW2 campaign fought in the deserts of North Africa between 1940 and 1943.
OIF	Operation IRAQI FREEDOM. The US name given to the 2003 campaign to liberate Iraq.
OODA Loop	Observe, Orientate, Decide, Action Loop. A decision-action cycle devised by Colonel John Boyd, describing methodology to employ to force the enemy to become reactive to the initiative of friendly forces.

PC-K	Project Coningham-Keyes. A project initiated after Op TELIC to investigate and implement methods of improving British air-land co-operation.
SA	Situational Awareness.
SAM	Surface to Air Missile.
Schwerpunkt	The German WW2 concept of synergistically blending firepower on the battlefield. Equivalent to Joint Fires in contemporary parlance.
SCUD	A long range, tactical, surface to surface ballistic missile system.
Super-MEZ	The Missile Engagement Zone that protected the heartland of Iraq during Op TELIC.
TACP	Tactical Air Control Party. A team of 4 personnel which generally includes 2 FACs and 2 signallers. The TACP is the 'point of the spear' in the prosecution of CAS.
TACS	Tactical Air Control System. The overall air C2 structure that supports UK operations at the tactical level.
TELIC	Operation TELIC. The British name for the campaign to liberate Iraq in 2003.
USMC	United States Marine Corps.
Wann-Woodhall Report	A report written describing the results and recommendations of air-land co-operation experiments conducted in 1940.

Bibliography

Books

Abbott, Gp Capt, Steve (2003), More Than Accepted Doctrine, the Personality and Personal Relationships of Air and Land Commanders Accounts for Successful Air/Land Co-operation in the Second World War, (UK: JSCSC Exercise Staff Ride Paper).

Air Publication 3000 (1999), Air Power Doctrine 3rd Edition, (UK: MOD).

Air Publication 3003 (2004), A Brief History of the Royal Air Force, (UK: MOD).

Air Publication 3235 (1955), The Second World War 1939-1945 Royal Air Force: Air Support (UK: The Air Ministry (AHB)).

Bracknell Paper No3, (1992), The End of the Beginning: A Symposium on the Land/Air Co-operation in the Mediterranean War 1940-43, (UK: Royal Air Force Historical Society/Hastings Printing Company Ltd).

Bickers, Richard, Townsend (1991), The Desert Air War 1939-1945, (UK: Leo Cooper).

Bidwell, S and Graham, D (1989), Fire-Power: British Army Weapons and Theories of War 1904-1945, (UK: Allen and Unwin).

Cooling, B. Franklin (1990), Case Studies in the Development of Close Air Support, (USA:

USAF Office of Air Force History).

Cot, Pierre (1944), Triumph of Treason, (USA: Ziff-Davis Publishing)

Cull, Brian (1999), Hurricanes Over Tobruk, (UK: British Library).

Dudgeon, AG (1987), Wings Over North Africa, (UK: Airlife Publishing Ltd).

Gooderson, I (1998), Airpower at the Battlefront: Allied Close Air Support in Europe 1943-45, (UK: Frank Cass Publishers).

Hallion, Richard P (1989), Strike From the Sky: The History of Battlefield Air Attack, 1911-1945, (USA: Smithsonian Institution).

Howard, Michael and Paret, Peter eds. (1976), Carl Von Clausewitz: On War, (USA/New Jersey: Princeton University Press), Book 1, Chapter 1.

Jordan, David and Sheffield, Gary (2003), The British Army and Air Power in Gray, Peter W ed. British Air Power, (UK: MOD) pp 67-89.

JWP 0-01, British Defence Doctrine (Second Edition), (UK: JDCC).

JWP 3-00, Joint Operations Execution (Second Edition), (UK: JDCC).

JWP 3-30, Joint Air Operations, (UK: JDCC).

Lambert, Gp Capt, Andrew and Williamson, Arthur, eds. (1996), The Dynamics of Air Power, (UK: MOD).

Lewis, Wg Cdr, KA (2005), Land/Air Integration: Have We Stepped Backwards?, (UK/JSCSC: ACSC8 DRP).

Luftwaffe General Staff (1938), Tactical Requirements Summary, (Freiburg, West Germany: Militargeschichtliches Forschungsamt Archives).

Middle East (Army and RAF) Directive on Direct Air Support issued by GHQ MEF and HQ RAF ME (30 Sep 41) as found at Appendix 7 of Air Publication 3235 (1955), The Second World War 1939-1945 Royal Air Force: Air Support, (UK: The Air Ministry (AHB)).

Moseley, Lt Gen, Michael T (2003), Operation IRAQI FREEDOM – By The Numbers, (CENTAF PSAB, Saudi Arabia: USAF Assessment and Analysis Division).

Orange, Vincent (1990), Coningham: A Biography of Air Marshal Sir Arthur Coningham, (UK: Methuen).

Owen, Roderic (1948), The Desert Air Force, (UK: Hutchinson & Co (Publishers) Ltd).

Pirnie, Bruce R, Vick, Alan, Grissom, Adam, Mueller, Karl P, Orletsky, David T (2005), Beyond Close Air Support: Forging a New Air-Ground Partnership, (USA: Rand Corporation).

RAF Narrative (First Draft), The Middle East Campaigns Volume II: Operations in Libya and The Western Desert, June 1941-January 1942, (UK: Air Historical Branch).

RAF Narrative (First Draft), The Middle East Campaigns Volume IV: Operations in Libya, The Western Desert and Tunisia, July 1942-May 1943, (UK: Air Historical Branch).

RAF Operations Manual (2000), 2nd Edition, MOD (UK: RAF Air Warfare Centre).

Robinson, Major CW (1994), Airland Battle Tactics: An Analysis of Doctrine and Experience, (USA (Fort Leavenworth KA): Command and General Staff College).

Smith, Peter, C (1990), Close Air Support: An Illustrated History, 1914 to Present, (USA: Orion Books a division of Crown Publishers).

Strawson, Major General, John (1992), The Shape and Course of the Mediterranean War 1940-43, in Bracknell Paper No3 (1992) The End of the Beginning: A Symposium on the Land/Air Co-operation in the Mediterranean War 1940-43, (UK: Royal Air Force Historical Society/Hastings Printing Company Ltd).

Syrett, David, (1990), The Tunisian Campaign: 1942-43, in Cooling, B. Franklin (1990), Case Studies in the Development of Close Air Support, (USA: USAF Office of Air Force History).

Tedder, Arthur, William (1966), With Prejudice: The War Memoirs of the Marshal of

the Air Force, Lord Tedder, (UK: Cassell).
Terraine, John (1985), The Right of the Line, (UK: Hodder & Stoughton Ltd).

Articles & Journals

Commander in Chief Strike Command's Monthly Bulletin (2005), 'Project Coningham-Keyes', Oct/Nov 2005, p 1.

Grant, Rebecca (Jan 2003), 'The Clash About CAS', in Airforce Magazine, January 2003, pp 54-59.

Grant, Rebecca (Jul 2003), 'Hand in Glove', in Airforce Magazine, July 2003, pp 31-35.

Green, Colonel, Robert B (2005), 'Joint Fires Support, The Joint Fires Element and the CGRS: Keys to Success for CJSOTF-West', in Special Warfare, April 2005, pp 12-17.

Hallion, Richard P (1991), 'Armour, Ground Movement and Air Attack: Lessons From Previous Conflicts', in Air Clues, July 1991, pp 244-250.

Isby, David, C (2004), 'Getting Dirty: The Close Air Support Battle in Iraq 2003', in Air Forces Monthly, March 2004, pp 20-25

King, Major, Philip H (1996), 'CAS Innovations: Digital Data Burst and ATHS', in Marine Corps Gazette, May 1996, pp 60-62.

Quintrall, Lt Col, Mick (2002), 'A Change Challenge: The Fire-Support Coordination Box', in Air & Space Power Journal, Fall 2002, pp 7-16.

Vallence, Gp Capt AGB (1989), 'RAF Air Power Doctrinal Priorites – Past Evolution and Future Trends', in Hawk, Apr 1989, pp 33-45.

Wallace, Lt Gen W Scott (2003), 'Trained, Adaptable, Flexible Forces – Victory in Iraq: Lt Gen Scott Wallace CG of V Corps in Iraq during OIF – Interview', in Field Artillery Journal, Sep-Oct 2003, pp 14-16.

Miscellaneous references

Bell, Gp Capt, Sean – Stn Cdr RAF Cottesmore / Joint Force Harrier Commander (2003), Point Brief on Land/Air Challenges: Op TELIC, (Gp Capt Bell operated as SO1 Air for HQ 1(UK) Armoured Div Fwd during Op TELIC, 2003).

Operations in Iraq: First Reflections, July 2003, produced by Director General Corporate Communications, MOD.

Operations in Iraq: Lessons for the Future, December 2003, produced by Director General Corporate Communications, MOD.

PRO Air 20/2970, Air Vice Marshal J.C. Slessor, Use of Bombers in Close Air Support of the Army, unpublished memorandum, 6 May 1941.

PRO Air 37/876, General Bernard Montgomery, Notes on Air Support of an Army in the Field, folio 66, 27 December 1943.

Walters, Wg Cdr, Andy, (2006), Report on Close Air Support Conference: 28/29 Sep 05, JSCSC/ICap/1/7 (ACSC Staff: JSCSC).

Internet and electronic sources

British Army Electronic Battle Box 8th Edition, Disk 1, (2005), Doctrine: Operations in Iraq, An Analysis from the Land Perspective, (UK: MOD).

Containment: The Iraqi No-Fly Zones, BBC News Website, 29 December 1998. Accessed on 7 Feb 06 at: http://news.bbc.co.uk/1/hi/events/crisis_in_the_gulf/forces_and_firepower/244364.stm

Defence Committee Third Report of Session 2003-04 Volume II, (2004), Lessons of Iraq (HC 57), (UK (House of Commons): The Stationary Office). Accessed on 10 Jan 06 at: http://www.publications.parliament.uk/pa/cm200304/cmselect/cmdfence/57/5702.htm

Defence Committee First Special Report of Session 2003-04, (2004), Government Response to Defence Committee Third Report of Session 2003-04 Volume II, (UK (House of Commons): The Stationary Office). Accessed on 27 Jan 06 at: http://www.

publications.parliament.uk/pa/cm200304/cmselect/cmdfence/635/63504.htmw

Iraqi Aircraft Buried in Desert, BBC News Website, 1 August 2003.
Accessed on 7 Feb 06 at:
http://news.bbc.co.uk/2/hi/middle_east/3116259.stm

FASOC (Future Air and Space Operational Concept), RAF Website, 2005.
Accessed on 16 Feb 06 at:
http://www.raf.mod.uk/downloads/documents/fasoc.pdf

Massive Firestorm Targets Iraqi Leadership, CNN Website, 21 March 2003.
Accessed on 7 Feb 06 at:
http://www.cnn.com/2003/WORLD/meast/03/21/sprj.irq.war.main/

Minutes of Evidence (Brims) ordered by the House of Commons for Defence Committee Third Report of Session 2003-04 Volume II, 25 June 2003, Examination of Witness Major General Brims CBE, UK Land Component Commander, Op TELIC. (Questions 619-692).
Accessed on 9 Feb 06 at:
http://www.publications.parliament.uk/pa/cm200304/cmselect/cmdfence/57/3062501.htm

Minutes of Evidence (Burridge) ordered by the House of Commons for Defence Committee Third Report of Session 2003-04 Volume II, 11 June 2003, Examination of Witness Air Marshal Brian Burridge CBE, UK National Component Commander, Op TELIC. (Questions 380-399).
Accessed on 15 Jan 06 at:
http://www.publications.parliament.uk/pa/cm200304/cmselect/cmdfence/57/3061101.htm

Minutes of Evidence (Torpy) ordered by the House of Commons for Defence Committee Third Report of Session 2003-04 Volume II, 5 November 2003, Examination of Witness Air Marshal Glenn Torpy CBE, DSO, UK Air Component Commander, Op TELIC. (Questions 1253-1319).
Accessed on 15 Jan 06 at:
http://www.publications.parliament.uk/pa/cm200304/cmselect/cmdfence/57/3061101.htm

Anzac Day Website.
Accessed on 23 Feb 06 at:
http://www.anzacday.org.au/education/maps/WW2/nthafrica.html

Interviews and presentations

Hay, Wg Cdr, Nick, SO1 Future Combat Air Capability, DEC(DTA), MOD: Presentation given at MOD on 16 Feb 06.

Pearce, Wg Cdr, Lester, Chief AOCC(L), Air Operations Co-Ordination Centre (Land): Interview conducted at Airfield Camp, Netheravon, on 11 Jan 06.

Private informal discussions with members of Number 3(Fighter) Squadron, (2003-04). The author served as an RAF Harrier GR7 Qualified Weapons Instructor Pilot and Executive Officer with 3(F) Sqn during both Op TELIC, Iraq (Feb-Apr 2003) and Op HERRICK, Afghanistan (Sep-Oct 2004).

Notes

1 Operations in Iraq: First Reflections, (2003), p 42. On 22 Apr 03, UK area of operations was declared "permissive" by UN for humanitarian operations to commence.
2 Minutes of Evidence (Torpy), (2003), Question 1253.
3 RAF Operations Manual, (2000), pp 5.III.1-5.III.2.
4 PRO Air 37/876
5 Pirnie et al, (2005), p 3.
6 Isby, (2004), p 21.
7 FASOC, (2005), p 5-8.
8 Grant, (July 2003), p 32.
9 Defence Committee Third Report of Session 2003-04, (2004), para 101.
10 Jordan, (2003), pp 67-73.
11 Gooderson, (1998), pp 22-23.
12 Luftwaffe General Staff (1938).
13 Hallion, (1989), pp 145-148.
14 Cot, (1944), p 274.
15 Gooderson, op cit, pp 23-24.
16 AP3235, (1955), p 22.
17 Terraine, (1985), p 349.
18 AP3235, op cit, p 25.
19 Terraine, op cit, p 351.
20 Id.
21 Bidwell and Graham, (1985), p 265.
22 Strawson, (1992), p 14.
23 Id.
24 AP3235, op cit, p 48.
25 Terraine, op cit, p 312.
26 Owen, (1948), p 30.
27 Terraine, op cit, p 313.

28 Id.
29 Strawson, op cit, p 16.
30 Terraine, op cit, p 316.
31 Ibid, p 336.
32 Owen, op cit, p 60.
33 Orange, (1990), pp 77-79.
34 Hallion, op cit, p 152.
35 Terraine, op cit, p 340.
36 Ibid, p 345.
37 Id.
38 Orange, op cit p 79.
39 AP3235, op cit, p 55.
40 Terraine, op cit, p 347.
41 Lewis, (2005), p 5.
42 Middle East (Army and RAF) Directive on Direct Air Support, (1941), paras 2 & 3.
43 Royal Air Force Operations, (2000), p 5.III.1.
44 Terraine, op cit, p 344.
45 Middle East (Army and RAF) Directive on Direct Air Support, op cit, paras 14 - 72
46 Id.
47 Orange, op cit, p 82.
48 Ibid, pp 82-83.
49 Hallion, op cit, p 156.
50 Terraine, op cit, p 357.
51 Hallion, op cit, pp 49-50.
52 Ibid, pp 359-360.
53 Minutes of Evidence (Brims), (2003), Question 681-692.
54 AP3235, op cit, p 62.
55 Terraine, op cit, p 359.
56 Ibid, p 362.
57 Ibid, pp 365-377.
58 Id.
59 Gooderson, op cit, p 26.
60 Jordan, op cit, p 80.
61 Bickers, (1991), p 125.
62 Id.
63 Jordan, op cit, p 81.
64 Terraine, op cit, p 381.
65 RAF Narrative (First Draft), The Middle East Campaigns Volume IV, p 218.
66 Ibid, p 191.
67 AP3235, op cit, p 71.
68 Ibid, p 72.
69 Id.
70 Hallion (article), pp 245-246.
71 Syrett, (1990), p 185.
72 Bickers, op cit, p 134.
73 RAF Operations Manual, op cit, p 5.II.1.
74 Ibid, p 125.
75 C-in-C Strike Command's Monthly Bulletin, (2005), p 1.
76 Howard, (1976), pp 75-89.
77 'Massive Firestorm Targets Iraqi Leadership': CNN Website, (2003).
78 Defence Committee Third Report of Session 2003-04, op cit, para 97.
79 Operations in Iraq: First Reflections, op cit, p 19.
80 'Containment: The Iraqi No-Fly Zones', BBC News Website, (1998).
81 'Iraqi Aircraft Buried in Desert', BBC News Website, (2003).
82 Moseley, (2003), p 15.
83 British Army Electronic Battle Box, op cit, para 309.
84 Private informal discussions with members of 3(Fighter) Squadron, (2003-04).
85 British Army Electronic Battle Box, op cit, para 315.
86 Unclassified Internal MoD Documents.
87 Minutes of Evidence (Torpy), op cit, Question 1316.
88 FASOC, op cit, p 20.
89 Defence Committee Third Report of Session 2003-04, op cit, para 103.
90 Bickers, op cit, p 125.
91 Defence Committee Third Report of Session 2003-04, op cit, para 104.
92 Unclassified Internal MoD Documents.
93 Minutes of Evidence (Burridge), 2003, Question 399.
94 Unclassified Internal MoD Documents.
95 Pearce Interview (2006),.
96 Unclassified Internal MoD Documents.
97 Bell, (2003), pp 1-2.
98 Unclassified Internal MoD Documents.
99 British Army Electronic Battle Box, op cit, para 302.
100 Isby, op cit, p 25.
101 Minutes of Evidence (Brims), op cit, Question 683.
102 Private informal discussions with members of 3(Fighter) Squadron, (2003-04).
103 Bell, op cit, p 16.
104 Operations in Iraq: First Reflections, op cit, p 25.
105 Pearce Interview, op cit.
106 British Army Electronic Battle Box, op cit, para 314.
107 RAF Operations Manual, op cit, p 5.III.3.
108 Grant, (Jan 2003), p58.
109 JWP3-30 or JWP 3-00.
110 Bell, op cit, pp 12-18.
111 Pirnie et al, op cit, p xviii.
112 Ibid, p 82.
113 Grant, (Jul 2003), p 30.
114 Unclassified Internal MoD Documents.
115 Isby, op cit, p 25.
116 Defence Committee Third Report of Session 2003-04, op cit, para 99.
117 Green, (2005), pp12-17.
118 Private informal discussions with members of 3(Fighter) Squadron, (2003-04). 'Danger-close' CAS is conducted when ordnance is employed within 1000 metres of friendly forces.
119 Unclassified Internal MoD Documents.
120 Pearce Interview, op cit.
121 C-in-C Strike Command's Monthly Bulletin, op cit, p 1.
122 Unclassified Internal MoD Documents.
123 Defence Committee First Special Report of Session 2003-04, op cit, para 31.
124 Hay, (2006), MOD Presentation.
125 Walters, (2006), p 7.
126 Unclassified Internal MoD Documents.
127 FASOC, op cit, p 8
128 Orange, (1990), p 79.