

THE ROYAL AIR FORCE

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The Royal Air Force Air Power Review is published under the auspices of the Director of Defence Studies (RAF) and has the sponsorship of the Assistant Chief of the Air Staff. It is intended to provide an open forum for study which stimulates discussion and thought on air power in its broadest context. This publication is also intended to support the British armed forces in general and the Royal Air Force in particular with respect to the development and application of air power.

Quality contributions from both service and civilian authors are sought which will contribute to existing knowledge and understanding of the subject. Any topic relevant to the study of contemporary or historical air power will be considered by the Air Power Review Management Board and a payment of £200 will be made for each article published.

Articles should be original and preferably not previously published, although those of sufficient merit will not be precluded. Between 2,000 and 10,000 words in length, articles should list bibliographical references as end notes. Lengthy articles may be published in instalments. Contributions from serving military personnel should be in accordance with DCI GEN 313 dated 26 November 1999.

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Foreword

Air Chief Marshal Sir Peter Squire GCB DFC AFC ADC DSc FRAeS RAF



This Foreword marks the fourth complete volume of the Royal Air Force Air Power Review. In his foreword to the inaugural edition, my predecessor highlighted the importance of debate on the exploitation of air power in the unpredictable and uncertain strategic environment. The tragic events of 11 September, and the tensions that have followed, have emphasised the need for debate, the need for doctrine and the vital conceptual thinking that we must have if we are to avoid a mesmeric descent into dogma and unthinking reaction. Nor must we forget that, horrific though the events in America were, the vast majority of our strategic posture and doctrine remains absolutely valid.

As we contemplate how air power can be employed in future conflicts, we must remember that little in warfare is new. The scale may change and the lengths to which belligerents are prepared to go may also vary. A wary eye on history will help us to keep some things in proportion and the pages of this Journal have helped in this part of the process. Clausewitz is well known for his utterances on war being an extension of politics by other means. The same is true across the complete spectrum of conflict. War, conflict and terrorism are all forms of human activity. We may talk all too glibly about people coming first and so forth; when we actually need to fight, this apparent truism becomes of vital importance.

As this Journal continues to explore wider issues and new areas of the air power spectrum, I would strongly urge you all to continue to engage in debate and to participate in the underlying conceptual thinking that will enable us to meet future challenges.

Peter Squire



Keen students of military history, strategic studies and international relations do not need to be reminded of the range of written material that confronts them on each and every visit to the bookstore or the internet. The history of the Second World War is always popular with students and casual readers alike. Interest may be thematic, casual or obsessive. Whatever the motivation for interest, the Combined Bomber Offensive is almost invariably of interest to most. The efficacy of the campaign, its legality, the ethical dimension and the progress in technology have all been debated across the intervening years. In all areas of warfare, the human dimension is the most critical – after all it is mankind that goes to war, not machinery or technology. Out of all of the senior leaders in the Second World War the acerbic personality of ‘Bomber’ Harris, combined with the controversial nature of his Command’s role, have ensured that he has been at the centre of the debate since its inception in the dying days of the War. The absence of an authoritative biography on Harris has meant that misperceptions, bias and even bigotry have been able to flourish relatively unchecked. The publication of Air Commodore Henry Probert’s book on Harris has hopefully filled this gap. The book has taken six years to research and is well-balanced, thoroughly informative and essential air power reading. This edition of the *Air Power Review* opens with a review essay on Harris highlighting some of the areas where balance has been provided.

The second article has been provided by Major J Takacs whose Staff College paper provides an invaluable insight into the Russian air operations over Chechnya. Major Takacs is a member of the Slovak Armed Forces and, among the many benefits that publication of his piece brings, one of the more important is confirmation that perceptions and perspectives are bound to be different depending on background, culture, national interests and domestic pressures. We cannot afford to confront the prospect of the air power across a global battlespace if we only see things from a parochial western-centric perspective.

This theme is continued with the article on Sun Tzu submitted by Wing Commander Soonthornkit of the Royal Thai Air Force. This work was completed while he was a student at the Australian Defence Force Academy.

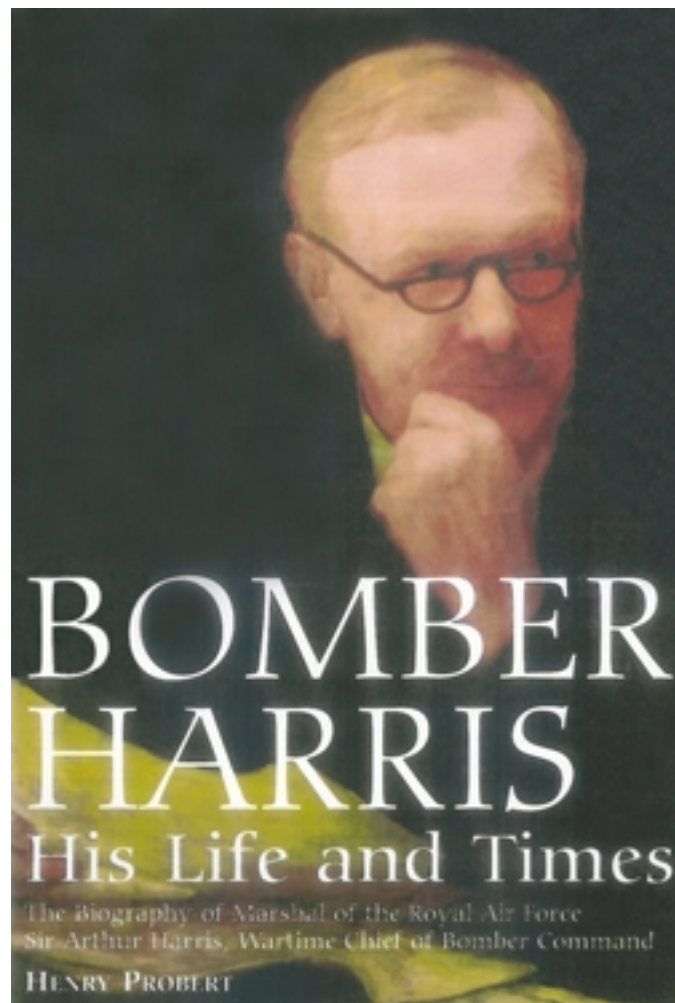
The fourth article has been submitted by Lieutenant Colonel ‘Goldie’ Haun and is based on his thesis for the USAF School of Advanced Air Power Studies at Maxwell. While some of the arguments in this thesis will be familiar to regular readers, there are some interesting and completely new insights there as well.

The *Air Power Review* has a long tradition in publishing historical pieces and the fifth article, by Squadron Leader Chris Goss, maintains the trend. This was again based on an academic thesis, in this case for the MA degree in War Studies at King’s College London, which Squadron Leader Goss attended as part of the Royal Air Force High Level Defence Studies Programme.



We then go further back in time for an excellent review of the role of the Royal Flying Corps in the Battle of Amiens. Dr Alfred Price has become a regular contributor to the *Air Power Review* and this article is a further example of his historical prowess. The final article per se is by Nick Lee-Frampton and chronicles the demise of New Zealand's fast jet force. The deliberate move towards making one potential component commander the permanently supported commander is an interesting one. It is not consistent with our normal understanding of command and control doctrine in which circumstances will dictate which is the supported component. Trenchard probably shuddered in his grave at such a move and his distinguished Kiwi successors in the pantheon of Royal Air Force senior officers would have recoiled in horror at the removal of the offensive element of a nation's air power.

D Def S (RAF)



REVIEW ESSAY BY GROUP CAPTAIN PETER W GRAY RAF

Bomber Harris, His Life and Times

Air Commodore Henry Probert MBE MA
Greenhill Books
London, 2001
ISBN 1-85367-473-7

Sir Arthur Harris had many nicknames and epithets over his Service career and during his subsequent years of fame, or infamy depending on one's viewpoint. He was totally indifferent to many of these sobriquets, only objecting to 'Ginger'. Air Commodore Probert uses 'Bomber' as it coincides most closely with public perceptions and common usage. Yet in his own day, Harris was almost uniformly known as 'Bert' – by his crews, colleagues and by the likes of USAAF Generals Hap Arnold and Ira Eaker.

On the face of it, one could be forgiven for thinking that the exploits of Bomber Command, and its irascible leader, have been more than adequately covered with a surfeit of books, television programmes, journal articles, theses and the like. Indeed Probert makes this point at the very beginning of his book in the opening sentence of the Preface. Arguably, however, the very proliferation of material is good cause for the administration of an occasional douche

of common sense to bring the debate back to serious levels. This authoritative biography on Harris certainly meets this objective. It also serves to highlight the previous lacuna in the field and should make many academics, commentators and authors review their earlier material for balance, content and the risk of preconceptions. Harris did not write a full autobiography, understandably preferring to chronicle his views on wartime matters in his formal missive – *Despatch on War Operations 23rd February 1942 to 8th May 1945*, (published with a preface and introduction by Sebastian Cox, Cass, 1995). This represents Harris's own testament to his tenure at the head of Bomber Command; it was not published at the time because of what Tedder, who was CAS when it was completed, called 'insurmountable security objections'. Harris acquiesced in this decision, but drew heavily on the work to produce *Bomber Offensive* (Collins, 1947). There was then a considerable gap until the only hitherto authorised biography on Harris was completed by Dudley Saward in 1984 (*Bomber Harris*, Buchan and Enright). Saward had been the Chief Radar Officer at Bomber Command and had proven his literary skills in writing *The Bomber's Eye* (Cassell, 1959) describing the use of radar by bombers in World War II. Probert suggests that he would also be highly likely to complete the work under his master's supervision and be amenable to direction (page 403). Harris forbade publication until after



his death thereby exacerbating the fallow period in which liberal consciences, and other axe-grinders, had full rein to lambast Bomber Command and its erstwhile Chief.

The absence of comprehensive coverage has also allowed some historians to make causal links between events in Harris's life and his performance as Commander-in-Chief. Probert covers many of these areas in commendable detail. Aspects of Harris's childhood and school days risk misinterpretation and must be seen in the light of existing practice – not in a modern context. The boarding out of children from colonial outposts, unnatural as it now seems, was as commonplace as using a four-by-four for the half-mile school run of today. The resulting difference in self-reliance should not be surprising.

Harris joined the army at the outbreak of the Great War and his experiences of route marches in Africa certainly resulted in him, in later life, never walking if he could drive! It also confirmed that, at least for him, the soldier was perhaps not the best offensive weapons system. Equally his earliest flying experiences attempting to shoot down Zeppelins at night must have influenced later thinking, both in terms of the air defence of the United Kingdom and the relative safety of attempting to bomb by night. Skill at night flying does not come easily, or by accident – Harris was a staunch believer in making people practise. His later penchant for showing aerial photographs that he had taken of Passchendaele provides eloquent testament to the impact on him of this battle and his ensuing wish never to repeat the horrors of Trench warfare. Arguably, the legacy of Harris's experiences in Mesopotamia had more to do with the need for rigorous training and decent equipment than over the efficacy of bombing to destroy enemy morale.

Many myths and misunderstandings have grown up over the years concerning Harris and his stewardship of what for a significant portion of the war was Britain's only means of striking Nazi Germany directly. These myths have inevitably been exacerbated by lack of understanding and a willingness to accept elements of lore at face value. The commonly held view that the US 8th Air Force only engaged in precision bombing in contrast to the RAF policy of area bombing is a classic example. Academic research clearly shows that the Mighty 8th was certainly capable of accurate bombing (thanks to the Norden bombsight which Harris desperately tried to get the Americans to sell to us as early as 1938), but like Bomber Command, had to default to less precise means when the weather was anything other than perfect. There is also a tendency to focus on the later years of the war, rather than applying balance across the whole. Bombing policy in 1945 when, with benefit of hindsight, the war in Europe was all but won, overshadows the grim realities of operations in 1939 through to 1942. Similarly, it is all too easy to focus on Harris's debate over bombing policy with Portal in the last months of the war, allowing this spat to eclipse years of genuine respect, friendship and loyal service.

The beginning of the end of the War also saw something of an unseemly scramble for the moral high ground with senior politicians – such as Churchill – manoeuvring with indecent haste to distance themselves from the less politically correct war-winning tools, their exponents and sadly their practitioners. That the same politicians had been vocal advocates for their employment, and responsible for the accompanying directives and policy, could only serve to disillusion straightforward officers



and men who formed the vast majority of Bomber Command. The relative lack of recognition for Bomber Command personnel added greatly to the bitterness and Probert's treatment of this aspect is both sensitive and comprehensive.

HARRIS AS A WAR CRIMINAL

To some commentators, Bomber Command and its leadership should have been more in line for an appearance at the Nuremberg War Crimes Tribunal than for honours and awards. At a more rational level, however, Harris has been widely criticised on a range of counts. The first of these is that he was indeed a war criminal, particularly for his role as the prime architect of area bombing. This essay is neither the time nor the place for a detailed review of RAF inter-war strategic bombing doctrine, or for a discussion on the relative merits of air power theories. Suffice it to say that, from the perceptions of those responsible for the direction of higher level policy, strategic bombing was a valid and inevitable means of waging war. Stanley Baldwin summed up the widespread belief in the House of Commons in 1932 stating that 'the bomber would always get through' – he went on to add, with evident regret, that 'The only defence is offence, which means that you have to kill more women and children more quickly than the enemy,' (House of Commons, 10 November 1932. 270 Parliamentary Debates (House of Commons), Official report 5th Series, c632). The ethical issues, however, were not consigned to the dustbin as is commonly thought. In a paper that started as a presentation to the Imperial Defence College in 1928, and was then circulated to fellow Chiefs, Trenchard dealt at length with the need to target military objectives and avoiding 'indiscriminate bombing of a city for the sole purpose of terrorising the civilian population'; this address has subsequently been termed his 'last will and testament'. A decade later, Chamberlain cited international law in his formal guidelines to Bomber Command. He stated unequivocally that:

1. It is against international law to bomb civilians as such and to make deliberate attacks on the civilian population.
2. Targets which are aimed at from the air must be legitimate military objectives and must be capable of identification.
3. Reasonable care must be taken in attacking those military objectives so that by carelessness a civilian population in the neighbourhood is not bombed.

Chamberlain went on to state in the House of Commons that not only was bombing civilian populations contrary to international law, but that in his opinion such action would not be a successful war winning tool. His ethical and legal approach was heavily influenced by the practicalities of the matter. These concerns over practical capabilities were equally evident to the air staff. Slessor points out that our capabilities were such that decisive results could not then be achieved. Chamberlain's directives were translated, after much debate, into operations orders that could be issued to the Command; considerable doubt remained as to what could be reasonably described as military objectives. Slessor concluded, however, that, without doubt, 'sooner or later, the gloves would have to come off'.



The early days of the War saw a natural reluctance to remove the 'gloves' – partly over concerns of retaliation, but also acknowledging the limited capabilities possessed by Bomber Command. The ensuing constraints were gradually removed over time and industrial areas were attacked through 1940, as well as obvious targets such as concentrations of invasion barges in channel ports. Writing in July 1940, Churchill was unequivocal in his determination that the only way to get through to the enemy was through 'an absolutely devastating, exterminating attack by heavy bombers from this country upon the Nazi homeland'. The move to area bombing was consolidated by the Air Ministry in a directive to Sir Richard Peirse (Harris's predecessor as C-in-C) dated 9 July 1941. This missive accepted the difficulties of finding and hitting precise targets in Germany by night; it proposed that, in reality, concentration on large towns and cities would mean that the military installations and economic facilities contained therein would be suitably attacked. The move to 'area' targets also allowed morale of civilian workers, and of the population as a whole, to be attacked.

Discussions between Churchill and Stalin in August 1942 confirmed the Grand Strategic level direction for Bomber Command. The leaders agreed that not only should German industry be bombed, but also the population and its morale. Stalin stressed the importance of attacking Berlin and this cascaded down to Harris later that month. Stalin's appreciation of the efforts of Bomber Command was reinforced by Harris sending the Russian leader a book of aerial photographs of the damage wrought. The air of mutual satisfaction continued through to the Casablanca conference in February 1943. Strategic bombing policy was discussed, but it was not the top item on the agenda – a key strategic area for discussion was confirmation of 'Germany first' and the ensuing argument over the desirability of an early land offensive in Northern Europe versus a Mediterranean policy. The resulting bombing directive read:

'The primary objective will be the progressive destruction and dislocation of the German military, industrial and economic system, and the undermining of the morale of the German people to a point where their capacity for armed resistance is fatally weakened'.

As Professor Biddle has pointed out, this contained something for everyone and gave the commanders a deal of latitude, both in target sets and methodology. As far as Harris was concerned, this constituted ideal mission command guidance (to use the language of current doctrine) – what had to be achieved, but not how to do it.

Some unity of purpose was imposed on the scene in the lead-up to the Normandy landings with the attacks on the German transportation system. Once the land offensive was established, however, differences of opinion again surfaced over priorities. Tedder (as Deputy to Eisenhower) advocated that priority continue to be given to transportation and communications targets. Spaatz (Commander of the USAAF Eighth Air Force) favoured attacks on oil, while Harris continued to insist on the maintenance of area bombing. Throughout this debate, Harris fervently believed that the carnage that he had witnessed in the Great War could be avoided through the application of undiluted air power – with no diversions to panacea targets.



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Nevertheless, when he had had his say, and was overruled, he applied Bomber Command to the given task with appropriate dedication.

The Nuremburg War Crimes Tribunals established that following orders did not constitute a legal defence. Had Harris been indicted formally, it is unlikely that he would even have attempted such an argument. In total war, he considered that the resolute application of air power – i.e. Bomber Command – could shorten the conflict and prevent needless slaughter. Even the brief scope for overview provided by this review essay suggests that had Harris been summoned to the dock, he would not have been short of company.

AN UNRECONSTRUCTED BOMBER ZEALOT?

From the doctrinal perspective, and from the more serious matter of allocation of resources, Harris is perceived as being an entrenched member of the heavy bomber mafia. The theory was that the Royal Air Force of the inter-war years was largely populated by short-sighted exponents of the Douhetian theory that bombers would win wars without the need for armies and navies. This thesis falls at the first hurdle in that few, if any, senior British airmen had heard of, let alone read, Douhet – even though his work had some influence in America. Similarly, the citation of Trenchard as coming from the same school of thought is flawed. Appropriate quotations are widely available from speeches, lectures, notes and files; these can be taken to prove almost any thesis. But allowance must be made for the fact that, on the vast majority of occasions, Trenchard was speaking politically in the defence of his Service, and indeed for its very survival. His broader perspective, that air power was an essentially offensive weapon, was a matter of faith with which few air power advocates would disagree today. The Trenchard suggestion that a football team comprised of eleven goalkeepers would win no matches did not mean that he was selecting only centre forwards to play ‘up front’. The key was in the balance. Arguably the same is true in the ‘war against terrorism’ with a hard balance to be struck between force/home protection and the need to strike at the roots of evil.

In the lean inter-war years, there was considerable debate over the ratio of fighter squadrons to bombers. There was no question of the nation being left undefended; the key question was again one of balance. Denis Richards describes a young Squadron Leader Portal being summoned by Trenchard to take part in meetings on this balance (*Portal of Hungerford*, Heineman, 1978). The junior staff officer was anything but a bomber zealot in arguing for far more fighters than his Chief would countenance. The unbroken line of fighter operational requirements, and the development of radar make questionable the premise that the Royal Air Force only focused on bombers.

From Harris’s perspective it should also be remembered that he started his flying career flying night fighters in defence of the homeland. Although he went on to other roles – and they were not so specifically delimited as they are today – there is bound to have been some impact on his experience base. Likewise, Harris must have been influenced to some degree by his attendance at Army Staff College at Camberley (rather than the RAF equivalent at Andover). Little of his staff work has survived,



but from the little that Probert has unearthed, it is evident that Harris saw aerial bombardment as a natural extension of the development of projectiles from apes throwing rocks, through archery to firearms. He described 'the exploitation of range' as being a principle of war. This type of thinking almost certainly owes more to the doctrinal heritage of Fuller and Liddell-Hart than to Douhet and Mitchell. Harris also spent a most enjoyable interlude as CO of 210 Squadron, a flying boat unit where he first met Donald Bennett; hardly the normal stamping ground for the bomber zealots! Rising tension saw Harris promoted and destined for the Air Ministry. As Deputy Director of Plans, Harris was a staunch advocate of the replacement of light and medium bombers with a credible heavy bomber force; this again must be seen in the light of Navy and Army scepticism. The debate over the ratio of fighters to bombers continued. His other work included a formal appreciation of the likely situation in the event of war with Germany. Again bombers feature heavily in the work, but in balance with other forms and means of warfare. Baldwin's dictum on the bomber getting through set the mood – not the other way round.

In June 1938, Harris's planned posting to Palestine was replaced with a surprise move to Fighter Command as Senior Air Staff Officer (SASO) to Dowding. Neither posting was a likely stamping ground for bomber zealots. Harris objected to the switch primarily because he did not see himself getting on with 'Stuffy' Dowding, but it was only his new wife's entirely sub-tropical trousseau that persuaded the CAS to relent. Keith Park went to Fighter Command in his place.

Harris was less than sympathetic to demands on his assets from other Commands. He has been criticised for considering sending aircraft to Army Co-operation Command as a 'gross misuse of the RAF'. Likewise he has been quoted as calling Coastal Command an 'obstacle to victory'. Strong stuff indeed. Yet actions speak louder than words and it must be recorded that Harris did not begrudge his Command's employment on mining duties. These continued throughout the war, were not glamorous, but had undoubted **effect**. It was the lack of **effect** that so frustrated him in having to bomb U-boat pens against which his crews were endangered for little result. Likewise, when told to support the army in Normandy, he did so with full resources.

As AOC 5 Group and then C-in-C Bomber Command, it was very much part of Harris's primary duties to extol the virtues, capabilities and potential of his Commands. Equally, it would be surprising if he had not protected his assets (and in particular his crews) and deplored their utilisation elsewhere. Historians would be more entitled to look askance at his performance as a leader had he done otherwise.

HARRIS AS A LEADER AND SUBORDINATE

Many of the critics of Harris's style of leadership run the risk of confusing leadership with command and management. They also fail to take proper account of any one individual's capacity and the number of hours in a day. During the Franco-Prussian War, Marshal Bazaine led cavalry skirmishes and fired cannon at his Prussian foes: this was fine theatre, but poor use of a commander's time. Harris was altogether more focused. As AOC 5 Group he frequently visited his squadrons and was strongly



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proactive in seeking to improve the lot of his people – as he had consistently been as a squadron commander. As a Commander-in-Chief he had relatively little time to visit and furthermore saw this as the AOC's prerogative rather than his. Unit commanders were almost certainly relieved not to have Bert turning up on their patch on a regular basis!

It must also be remembered that he was sending his crews in harm's way on a daily basis and, as Probert makes very clear, Harris saw the responsibility as being his alone. He was not prepared to shirk this awesome task, or to delegate. What is more he was at pains to ensure that his boys were not put at risk unnecessarily. In no way can Harris be seen through the Blackadder cameo of sweeping men and machines off the table like a latter day Haig. Harris did not shrink from the responsibility, but nor did he wear his heart on his sleeve. The personal pressure on him must have been enormous; he was under considerable personal financial stress (partly because of the stringencies of having to entertain on wartime rationing and part on the high alimony bills he was paying to his first wife). These pressures were exacerbated by an untreated duodenal ulcer – like many aircrew, Harris was a reluctant visitor of the medical centre! It may be a difference in the biographers' art, but Probert does not recount Harris as enjoying the fishing, shooting and bird watching interludes that Portal and Alanbrooke had the odd occasion to enjoy. Harris did not socialise in the Mess at High Wycombe, but was keen on the feedback provided by those who did so. He was, however, a convivial host at home and canvassed unceasingly for Bomber Command in the process.

Much has been made of individual instances such as Operation Millennium (the attack on Cologne with 1,000 bombers on the night of 30/31 May 1942). His efforts in accumulating the necessary numbers of aircraft have been revisited frequently. As with many individual raids the extent of the damage was not as great as originally thought. But, to use modern parlance, the **effect** achieved in Germany, in the United Kingdom and amongst our allies was immense. Rather than cover the debate in detail, the comments of John Terraine (*The Right of the Line*, Hodder & Stoughton, 1985), one of this nation's most outstanding historians should suffice: 'Harris's calm and deliberate decision to stake his whole force and its future on that night showed the true quality of command'.

Notwithstanding the subtleties of command styles and leadership, one cannot doubt that working for Harris as a staff officer was probably not the most pleasant of tasks. In such a position, one can conclude that one was doing all right – or you would have been sacked! There is little doubt, however, to his crews Harris was a hero to be followed to the ends of the earth.

Having Harris as a subordinate cannot have been an easy task either. He had a reputation for being prickly and did not suffer fools gladly – irrespective of their seniority. One area where Harris was particularly difficult was when officers junior to him wrote to him, 'trying to do his job for him', but with the authority of a higher formation; he objected vehemently to the use of Air Ministry 'directed letters' in which the phrasing 'Sir, I am directed by the Air Council to instruct you to..' prefaced yet another interference that was seen as unwarranted. Harris's dealings with the Air Ministry in general and Bufton (Director of Bomber



Operations) and Bottomley (DCAS) were often acerbic. Portal tried on a number of occasions to calm the waters, but was not always able to produce lasting peace. Harris had seen Dowding win what he described as one of the Nation's greatest victories only to be sacked for his pains and be replaced by Judas like plotters from the Ministry. As the War approached its climax, the correspondence between Portal and Harris became increasingly tense. Commentators since have questioned whether or not Harris should have been replaced at this point. One must add, however, that the areas of agreement between the two men were, even at that stage, greater than the rifts. Furthermore, they had been very good friends for many years and had huge respect for each other's talents. From Portal's viewpoint one must consider first of all whether or not Churchill would have sanctioned such a move. Harris had been very close to the Prime Minister early in his tenure, dining regularly at Chequers (but always back-briefing Portal on the discussions). Churchill and Harris had drifted apart as the war progressed and the PM had other priorities, but it is far from certain that the removal would have been allowed. Portal was also well aware of the high esteem in which Harris was held throughout his Command and the detrimental effect that his sacking would have. He also had to consider what benefit would have been achieved in replacing Harris with someone new. He was after all still an outstanding Commander and Portal was too great a leader himself to move someone just to get a quiet life in the corridors of the Air Ministry.

There can be little doubt that the historiography of the Bomber offensive will continue to grow and that its prime architects – Churchill, Portal, Harris, Spaatz and Arnold – will continue to attract attention. Hopefully as the debate continues, the extremes of oscillation will even out as discussion becomes more rational. Balanced biographies that bring new and interesting material are vital to this process and Air Commodore Probert has certainly succeeded in fulfilling both of these fields. The book adds considerably to the sum of knowledge with excellent coverage of Harris's early life and of his post-war activities. There are areas still worthy of research and Probert highlights these. An example of this is on the issue of Harris's peerage and other awards although many of the issues are covered very clearly.

Probert does not pretend that his book represents a comprehensive survey of the bomber war; that has been covered many times. Noble Frankland (co-author of the Official History of the Strategic Bomber Offensive) wrote that people preferred to feel rather than know about strategic bombing. The same has been true over 'Bert' Harris. This excellent biography should help to shift the balance.



The aim of this paper is to examine and analyse the RuAF's present and future doctrinal and operational situation and perspectives, using as a basis its involvement in the Chechen Wars (1994 – 96 and 1999 – present) and the forgotten Afghanistan War (1979 – 89), and looking ahead to 2010 – 15

THE Russian Air Force in Chechnya –

have lessons been learnt and what are the future perspectives?

More than fifteen years ago Mikhail Gorbachov, the new, relatively young and energetic General Secretary of the mighty Communist Party began his attempt to extensively reform the whole structure of the politically and economically rapidly declining Soviet Union. Without a clearly defined end state, goals, identified ways or available means this attempt completely failed as many similarly constructed reform efforts had also done in the past. He paradoxically became the first and the last President of the Soviet Union. The unsuccessful coup against Gorbachov in August 1991 could not save the old regime; on the contrary it expedited the collapse of the USSR. Fifteen new, differently 'independent' countries have since emerged from the ruins of the biggest state formation of the world. The main successor state, Russia, was literally thrown back hundreds of years, whereupon she started her long lasting struggle to re-create and safeguard an imperium based on fear, and where inner cohesion was maintained mainly by force, manipulation, division, and by adapting various levels of religious and ideological pressure.

Boris Yeltzin, the first Russian President (1992-1999), inherited a widespread crisis situation that was poorly managed by his administration. Extensive reforms, not only of the political and economical sphere, but also the whole society, turned out to be inevitable. The new Russia, with her fragile democracy, could not rely any more on the old-style power approach towards its allies, neighbours and other partners on the international scene to retain at best a fraction of her previous influence. There were no longer such 'useful' institutions like the Warsaw Pact, COMECON,¹ former Soviet buffer states in western and southern regions of Russia and '*special relations*' with many Third World countries. The once mighty and feared Soviet Armed Forces in their current Russian 'format' were no longer the solid pillar of the political system and the whole society as they used to be. Moreover, Russia had to cope with a huge number of international commitments, treaties and obligations, most of which transferred from the former USSR. These commitments created very tight and legally binding boundaries that Russia could move within.

Russia had been trying hard to form a defence policy and an appropriate military doctrine consistent with its foreign and domestic policy, economic resources and the aforementioned commitments to the international community. Russia had remained a major player on the international scene, but was no longer a real superpower. The first Military Doctrine from 1993 (MD1993) failed to recognize this reality. It was based on false perceptions and unrealistic expectations. Moreover, the long and painful period of transition and reform of the armed forces was re-defining an appropriate military doctrine with an 'open architecture' more closely reflecting this period. The MD1993 did not become a system of views on the prevention of wars and armed conflicts, nor on the development of the Russian armed forces, nor the country's preparation to defend itself. It did not examine threats to the military security of the state or the use of armed forces to defend the state's 'vital interests'. This doctrine did not answer questions emerging from the difficult situation of the Russian Federation (RF) as a state, its armed forces and the most negatively affected military branch, the Russian Air Force (RuAF). The MD1993 also failed to provide the necessary rudder to control the armed forces, proving to be anachronistic and unrealistic.

THE RUAF PRIOR TO THE FIRST CHECHEN WAR

Within quite a short period of time (1992-93), the former Soviet Air Force was transformed into the RuAF, which was significantly smaller in terms of numbers, size and more importantly, in operational resources. The first 'earthquake-like' changes after the disappearance of the USSR brought about a huge decrease in numbers of pilots, from about 20,000 to 13,000, and aircraft from 13,000 to 5,000. Russia lost many of these assets to the Ukraine and Belarus; approximately 37 percent of all former Soviet Air Force MiG-29s, 23 percent of Su-27s, half of Il-78



The Ukrainian Air Force operates approximately 60 Sukhoi Su-27 FLANKER aircraft.

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flight refuelling tankers, almost half of Il-76 transport aircraft, most of the Tu-95s, and all but three of its flight-worthy Tu-160 strategic bombers went to these countries.² These assets were the best and most modern combat equipment in the RuAF inventory. However, another very sensitive loss was the dismantling of the massive integrated air defence and air force structure built up during a long period of time and spread throughout the former USSR and in many Warsaw Pact allied countries.

The most important commitment inherited from the Soviet Union was the Conventional Forces in Europe Treaty (CFE), which came into force in July 1992. It had an immediate effect on the composition of the newly emerging RuAF. In order to retain as many aircraft as possible, Russia joined the Tashkent Treaty (May 1993), which divided the former USSR's quotas among the former Soviet States. These treaties together meant the reduction of aircraft to 3,450 by the year 1995.

Russia's aviation manpower also underwent an unprecedented decline from its former Soviet level. From a total of about one million personnel in the Soviet Air Force, Air Defence Forces and naval aviation, the overall number for the three Russian Air Arms by 1998 was down to 335,000.³

From a total of about one million personnel in the Soviet Air Force, Air Defence Forces and naval aviation, the overall number for the three Russian Air Arms by 1998 was down to 335,000

While numbers of aircraft, personnel and equipment were dramatically falling during huge defence budget cutbacks, the organizational structure of the new RuAF remained practically the same as it was under the previous Soviet era.

General Pyotr Deynekin, the CinC of the RuAF (1992-1997) made some attempts in 1993 to gain greater coherence and efficiency in the RuAF organization by rearranging the Frontal Aviation Command and creating a new Reserve and Training Command. At the same time, he left untouched the Long Range Aviation and Military Transport Aviation Commands. The Air Defence Forces also retained their separate service status until 1998. These changes, however, were aimed to consolidate the evolving crisis situation rather than lay down a firm base for future deep and systematic reforms.

Traditional Soviet military doctrine provided air power with only a supporting role in a combined-arms type of war fought mainly by infantry and armoured forces. However, the 1993 doctrine outlined a shift in the operational focus for Russian armed forces from theatre offensive warfare to regional power projection, where air power could naturally play a very important role. The success of Coalition air operations against Iraq in the Gulf War clearly helped, at least to a group of progressive thinking Russian military experts, who recognized and acknowledged the capabilities of air power, when it was properly used, in determining outcomes of joint operations. Unfortunately, this recognition and acknowledgment had not materialised in the RuAF's structures, equipment, training and operational and tactical approaches before the first Chechen War, and there still remains a long way to go (as we will see later).

In 1994, the RuAF Central Research Institute published an unprecedented analysis describing the RuAF's roles, missions, organizational status and force development plans up to the year 2015. This analysis openly concluded that the RuAF's current structure, aircraft, weapon platforms, its industrial support, its deployment, basing and maintenance infrastructure, its command, control, communications, intelligence and its redeployment capabilities were completely inadequate to respond to the requirements outlined by the MD1993.⁴

Few months after publication of the analysis, the RuAF took part in a conflict in Chechnya (known as the first Chechen War in 1994-96), which fully bore out all the problems and shortcomings described in this document.

AIR CAMPAIGNS

The origins of the Chechen '*problems*' were very complex and dated back to the period of Russian expansion in the Caucasus in the 18th and 19th Centuries. Since the forced annexation to the Russian Empire, the Chechens never willingly accepted Russian rule. They utilized, in more or less organized forms, every possible opportunity to get rid of Russian control;

unsurprisingly, this happened again in 1991 in the wake of the USSR demise. Although Chechnya was legally a part of the Russian Federation, it remained a '*foreign body*' inside Russia. The tragedy results from the inability of both sides to recognize each other's interests and establish conditions for long-term, mutually acceptable political solutions.

Since the forced annexation to the Russian Empire, the Chechens never willingly accepted Russian rule. They utilized, in more or less organized forms, every possible opportunity to get rid off the Russian control...



Chechnya declared itself independent from the Russian Federation in September 1991 under the leadership of Dzhokhar Dudayev, a former Soviet bomber pilot. When several Russian-backed attempts to overthrow Dudayev's government and reinstall a pro-Russian one had failed during 1993-94, a wide-scale conventional military operation became the only '*available*' solution to this problem. Whilst making preparations for this operation, Russian political and military leaders had the opportunity to take full advantage of the lessons which could be learnt from a number of recent conflicts, with or without Russian involvement. Knowledge and ramifications of wars, campaigns and conflicts, like those between Arabic states and Israel (1967, 1973, 1982), the Afghanistan War (1979-89) and the Gulf War (1991) offered an excellent

Closer examination of the air operations in support of the land forces engaged in destroying rebel resistance throughout the Chechen conflict, indicated a repeat of all the old problems and mistakes so apparent during the Soviet era...

way towards practical military applications. Closer examination of the air operations in support of the land forces engaged in destroying rebel resistance throughout the Chechen conflict, indicated a repeat of all the old problems and mistakes so apparent during the Soviet era multiplied by turbulences caused by the ongoing military reforms of the RuAF.

Analysis of the 'Afghan experience' demonstrated many of the fundamental problems associated with air force operations, such as the inherent inflexibility of air and ground crew training blinded with formalism and stereotypic approaches. Many of the lessons learned in Afghanistan were ignored, highlighted problems remained unresolved or no solutions were found. The Air Force Command failed to capitalise on the enormous potential gained through the combat experience of thousands of pilots, ground support and maintenance personnel. To minimize the possible 'bad impact' of the Afghan veterans on the moral and tactical training programs of combat units, they were spread all over the Soviet Air Force structure. Therefore, changes in

standard and rigid operating procedures were insignificant, remained restricted to the Afghan combat theatre itself, and not implemented in Air Force training schemes.

Although the first Chechen conflict was clearly a failed attempt by Russian ground forces to suppress the Chechen rebels with overwhelming power, the RuAF played an important role either supporting the ground contingent or conducting independent offensive air operations. This conflict offered a test of the RuAF's primary role expressed in the MD1993, which required sufficient air power projection into areas of interest alongside the periphery of the former Soviet Union.



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Air operations were conducted mainly by units from the 4th Air Army deployed on a number of air bases of the North Caucasus Military District (NCMD) reinforced with frontal, transport and long-range aviation assets. Assets of the separate Air Defence Aviation (ADA) and helicopters of the Army Aviation (AA) took part as well. Problems of co-ordination among these different units were further complicated by the involvement of helicopters used by troops of the Ministry of Internal Affairs (MIA). By the end of November 1994, almost 140 combat aircraft,⁵ 55 Army Aviation helicopters,⁶ up to 30 transport aircraft⁷ and 12 Mi-8 helicopters of the MIA were dedicated for air operations against Chechen rebels. Numbers of sorties carried out by specialized reconnaissance version of the Su-24 (limited to carry out only visual and photographic recce) were flown to build up a current picture of Chechen forces' deployment, their movements, status of their air and air defence assets. As it later became obvious, information obtained by this way was neither precise nor flexibly distributed to fighting units; therefore it added very little value. This was even more evident during operations in urban areas, mainly in Groznyy, where 'old fashioned' airborne reconnaissance methods were completely ineffective and were only partially useful for battle damage assessment (BDA).

Chechnya inherited about 250 aircraft⁸ from the Armavir flight school. The vast majority of them were in poor flying condition, with very limited combat value.⁹ They were deployed on three airfields: Kalinovskaya, Khankala and Groznyy-Severnnyy.

Moreover, Dudayev's 'Air Force' could only rely on less than 40 inadequately trained pilots. However, the RuAF's first step was to eliminate this threat of possible Chechen air attacks on Russian territory. In a three-day airfield attack operation, the RuAF managed to destroy or neutralize all of the Chechen air assets on the ground, mindful of the need to keep damage to runways, taxiways and airfield installations to a minimum for follow-on redeployment of RuAF units closer to areas of operations. This task was a relatively easy one, bearing in mind that Dudayev's forces were not able to pose any substantial counter-air challenge

with their limited, antiquated air defence weapons.¹⁰

Typically flights of four Su-25 Frogfoots in standard tactical formations were used in this operation delivering free-fall, high explosive (HE) fragmentation bombs with a combination of 57mm, 80mm and 240mm unguided rockets. These aircraft, thanks to their massive armour protection, duplication of vital systems and relatively good manoeuvrability close to the ground, were well suited for the mission. In this phase of operations, Chechen rebels did not manage to cause any losses or substantial damage to the attacking aircraft with their small arms and sporadic anti-aircraft gunfire.



Rough and tough; the virtually indestructable Su-25 'FROGFOOT'.

Chechen rebels did not manage to cause any losses or substantial damage to the attacking aircraft with their small arms and sporadic anti-aircraft gunfire

Aircraft from the Russian Air Defence Aviation from the end of December 1994 were constantly monitoring Chechen airspace supported by the A-50 Mainstay AWACS platform. To prevent any transport of military assets by air to the rebels, one to three pairs of MiG-31 Foxhound or Su-27 Flanker interceptors were kept on round-the-clock combat air patrol missions (CAP) over Chechnya. Air Defence radar companies and platoons were also covering low and very low level gaps in the overall radar picture. There was no real recorded attempt to provide any support for Chechen fighters from any country by air throughout the conflict. These preliminary measures taken by the RuAF and Air Defence Aviation allowed Russian troops to conduct ground operations without any Chechen interference from the air. Despite Russian air superiority, and the expectations of RuAF and army aviation high command, Chechen forces were still able to cause high losses to the enemy's air supporting elements, as the follow-on stages of the conflict revealed.

Russian air campaign planners once again underestimated the 'power' of the weather. Winter months in this part of the North Caucasus were extremely severe with long lasting ground fogs, blowing snow, strong icing, heavy cloud build-up, low cloud ceilings and high top levels



The next phase of the air war began in the middle of December with the advance of Russian ground troops towards main Chechen strongholds around and in the capital city Grozny and nearby important towns of Argun and Gudermes. Russian air campaign planners once again underestimated the 'power' of the weather. Winter months (December, January and February) in this part of the North Caucasus were extremely severe with long lasting ground fogs, blowing snow, strong icing, heavy cloud build-up, low cloud ceilings and high top levels. Slowly advancing ground troops were struggling with small rebel units, which flexibly changed their positions and fighting tactics,¹¹ without much-needed close air support (CAS). The weather made it impossible to use Su-25s and Mi-24s for their primary role of CAS (with no all-weather, precision weapon delivery capability and not least without adequately trained crews). Under these conditions, the RuAF could employ only its Su-24s in day and night medium altitude



radar or inertial bombing through clouds. The inaccuracy of these weapon delivery modes resulted in many casualties and collateral damage to their own troops and was indiscriminate against the Chechen civilian population as well. In these early stages of the Chechen war, forgotten lessons from Afghanistan, well-known and widely published experiences of other modern air forces in recent conflicts elsewhere, were frequently recalled through the painful failures of Russian air power. Four years of rapid decline in pilot proficiency, under-funded aircrew training,¹² a small percentage of pilots with night, all-weather, precision weapons delivery preparedness could only end in poor performance. A partial solution was found in the creation of small combat units from the most experienced weapon instructors and test pilots from different RuAF regiments, weapon and flying training centres. This '*concentration*' of force and experience helped to substantially increase the effectiveness of air strikes against high-value targets of Chechen infrastructure, communications and transportation network and some of the militarily and politically important buildings.¹³

Short or longer periods of improved weather were utilised to provide CAS to ground forces struggling to set up the tempo of operations regardless of the overwhelming superiority in numbers of fighting personnel (about 8:1), equipment and firepower. CAS operations in Chechenya once again revealed the problems in co-ordination between ground and supporting air operations. Many of the difficulties experienced in Chechenya were not at all new. Ten years of the Afghan War clearly showed how important well-trained, equipped and able to cope with the demands of the combat environment, forward air controllers (FAC) were for effective and efficient CAS. The RuAF and Army Aviation allocated some forty FACs to ground units to provide the crucial link for co-ordination between ground and air operations. With no previous combined training and operational procedures, the effectiveness of FAC-controlled CAS missions remained low throughout the Chechen conflict and produced numerous '*blue-on-blue*' incidents with many friendly casualties.¹⁴ To make things even worse, poor communications, navigation and transportation equipment further undermined the conduct of CAS operations. Chechen rebels operating the same military '*hardware*' as their Russian counterparts were able to intercept and monitor most of the radio frequencies used by Russian forces. They also made special efforts to find out the FACs' positions and eliminate this important link in the chain of air-ground co-operation. Moreover, information about ground force concentrations, weapons and enemy positions were exploited by Chechen commanders either to quickly change their positions to avoid CAS attacks, or engage Russian positions with artillery and mortar fire. The lack of secure communications and data exchanging lines made many Russian ground force unit commanders unwilling to transfer information through radio links. For the same reason, they were also reluctant to call for CAS, thus severely reducing flexible and joint combat capabilities to deal with Chechen fighting tactics.

The next phase of the campaign can be characterized by the shift towards air interdiction operations. The small number of politically or militarily significant targets that were destroyed or damaged by the RuAF throughout Chechenya had no visible impact on the rebels. They were operating in small groups, exploiting every opportunity and advantage offered by the terrain, weather, and weapons in their possession along with utilizing urban areas to wear down Russian troops. The RuAF lacked the

conceptual and doctrinal framework determining air power utility to contribute to urban warfare.¹⁵ This was clearly visible throughout the Chechen air campaign. Army Aviation commander in chief, General Pavlov, expressed this problem stating that “urban combat is not suited to helicopters”. The same applied to fixed wing assets of the RuAF. Some ‘solutions’ were, however, found in the form of massive, indiscriminate bombing of Chechen cities, infrastructure and transportation lines to support ground troops overcoming the rebels’ resistance. Thousands of casualties and widespread suffering of the civilian population resulted in adverse reactions from the international community, and surprisingly even on the changing domestic Russian political and military scene, against this method of air power ‘application’. Precision weapons played a limited role in the RuAF’s campaign in Chechenya despite their well-known effectiveness and the possibility of minimizing collateral damage.¹⁶ This was mainly due to their high cost, limited number and small percentage of frontline pilots with the appropriate proficiency to use them effectively. Nonetheless, lives and properties of Chechen civilians were valued as little as those of the rebels and there were no special measures taken to avoid unnecessary suffering of the civil population.¹⁷



Despite the well-known shortcomings and trade-offs revealed by air campaigns waged in these conflicts, the overall positive contribution of air power has proved undisputable

The first Chechen War was in many ways a repetition of the same failures in employing air power in a limited, low intensity conflict, as in Afghanistan during the previous decade. Despite the well-known shortcomings and trade-offs revealed by air campaigns waged in these conflicts, the overall positive contribution of air power has proved undisputable. The most

important lessons learned and re-learned in the first Chechen War included the need for complex measures to maintain air superiority and minimize high-value air asset losses in a combat environment with no opposing air force, no integrated air defence systems, but substantial numbers and range of different mobile anti-aircraft weapons.¹⁸ In the absence of ISTAR¹⁹ coverage, it required much flexibility to obtain timely and accurate information along with tactics matching those of the adversary. This war revealed yet another important finding. Although the RuAF was able to maintain its superiority throughout the war, it was much less successful in preventing the rebels from exploiting commercially available communication assets such as cellular phones and radio transceivers to carry out command and control (C2). The RuAF made only a few isolated attempts to employ hi-tech precision weapons against key targets, interrupting the rebels’ C2 system and providing air support

integrated with the advance of ground forces. Vague doctrinal fundamentals and ambiguous operational guidance, without tactical solutions, backed by low-level training, inevitably led to poor performance and extensive losses even when a reasonable number of adequate air assets and weapons were available from the RuAF's inventory to cope with the challenges of the war. The first Chechen War showed that the RuAF was still far from able to effectively and efficiently undertake complex and comprehensive tasks and missions in low intensity conflicts.

At a cost of huge military and civilian losses, Russian ground units managed to occupy Grozny and the other major towns in Chechenya in the first half of 1996. Due to massive and intensive counter attacks launched by the rebels, Russian troops were forced to withdraw from Chechenya in August 1996. The peace agreement gave the Chechen Republic an undefined independence within the Russian Federation. Both sides were completely dissatisfied with this situation and the next attempt to find a long-term solution was just a question of time. Based on the antagonistic Russian and Chechen positions, the only open option was through military force. Tension reached a dangerous level in August 1999 after numerous Chechen incursions into the neighbouring Dagestan and a series of terrorist bomb attacks in Russian cities. The follow-on, large-scale campaign carefully orchestrated by a more jointly thinking and working task force command, achieved most of the planned objectives by the beginning of March 2000.²⁰ Chechen guerrillas were pushed back into the southern mountainous area, losing all their important military and support bases.



Although this war is far from over, some important changes can be identified in the employment of RuAF in this current conflict. First of all, although the task force was again set up of units and formations controlled by the Ministry of Defence (MOD), the Ministry of Internal Affairs (MIA), Federal Security Service, Ministry for Emergencies and so on, through the new concept of “Temporary Operational Groupings” and under one unified C2 structure, the MOD managed to maintain a more effective and

Air power had been employed to minimize contact battles generating massive firepower creating favourable conditions for ground troops' advance. Almost 80% of all fire missions had been carried out by fixed or rotary wing aviation and only about 15% by ground-based artillery...

streamlined chain of command throughout the period of intensive military operations. The main result of this was a more manoeuvrist approach of Russian forces along with the ability to dictate the tempo of operations, which was in sharp contrast with the first Chechen War.

Secondly, since 1997, the reform of Russian armed forces moved on a strategic level as well. Old Military Districts (MD) with their huge administrative and bureaucratic structures had been re-configured into “Operational-Strategic Commands”, which were intended to command all the armed forces on their territory. Although this concept is still evolving, the North Caucasus MD has been able to more flexibly meet the challenges of the second Chechen War waged inside its territorial responsibility.

Thirdly, down to the tactical level, this latest conflict was a confirmation of substantial changes in regiments, battalions and sub-units with much evidence of greater tactical sophistication. Nevertheless, the quality of conscripts (on which Russian ground forces are mainly based) had not improved since the first Chechen War and their ability to match Chechen guerrillas, especially in close combat, was still unsatisfactory.²¹ Air power had been employed to minimize contact battles, generating massive firepower and creating favourable conditions for ground troops’ advance. Almost 80% of all fire missions had been carried out by fixed or rotary wing aviation and only about 15% by ground based artillery.²² Air support of troops in the demanding form of CAS proved not to be any better in this conflict. The lack of adequately trained and equipped forward air controllers (FAC) remained a serious problem. However, more FACs have since been allocated to battalions and companies, thus increasing the responsiveness of CAS to tactical commanders.

It is also worth mentioning that during this conflict the RuAF and the Army Aviation conducted some experimental trials of new weaponry in a limited combat environment using the modernised and improved version of the Su-25TM ‘Frogfoot’ attack aircraft and the Ka-50/52 and Mi-24N attack helicopters. However, except for some very vague information regarding the actual combat effectiveness of these aircraft expressed in terms like “they performed 5 or even 10 times better than their predecessors”, no authentic evaluation results were revealed. Given the well-known Russian defence budget misery, there are no plans to procure any of the aforementioned aircraft or helicopters in significant numbers, at least in the next few years.

Finally, while in the first Chechen War, the Russian military authorities completely lost the information war as well; however, in this recent conflict they have been performing arguably better. Russian public opinion was not prepared for the first war; the MOD’s press centre totally underestimated the possible impact of the domestic media on the Russian population. Russian military leaders treated the press with little respect; on the other hand, the Chechens enabled the media to cover most of the evolving situation, with mainly scenes of destroyed Russian equipment and dead soldiers. They also fully utilized the power of the images showing bombed cities and masses of refugees. The result of this was a *‘public relations disaster’*.

In the early stages of the second Chechen conflict, having properly analysed the previous *‘disaster’*, the Russians won the information war. However, as the conflict went on, it became more and more difficult to maintain an intensive information campaign and the Chechens are ruthlessly exploiting every gap and shortcoming in it.

NATO's 78 days' intensive military campaign "Allied Force" against Yugoslavia in 1999 deeply and seriously affected the political and military establishment of Russia. It was seen as a humiliation and a '*spit in the face*' for Russia.²³ The period of stagnation and rehabilitation after the first Chechen War was replaced by a new wave of reforms and further downsizing in Russian armed forces.

As mentioned before, the 1993 Military Doctrine was not a coherent guide for the Russian armed forces to deal with possible future military challenges. Neither did the 1997 National Security Concept shed any light on the way to approach current and future security issues. The tension between the old Soviet legacy and new circumstances and realities remained. Desperate attempts to maintain a great power status with global reach have been seriously under-funded. These problems, multiplied by the ongoing economic and social reforms and underpinned by the very fragile nature of Russia's emerging democracy, inevitably led to the need to rethink security and military ramifications. Revised versions of Russia's National Security Concept (approved by a Presidential Decree in January 2000) and the Russian Federation Military Doctrine (approved by a Presidential Decree in April 2000) were aimed to more closely match and tackle possible external and internal threats during a period of transition of Russia into a politically and economically stable, democratic statehood. While still regarding itself as a major power with global influence (seen primarily through its massive strategic nuclear arsenal), the main emphasis in these documents was placed on the identification of internal and regional threats (mainly in areas inside or close to the borders of the former Soviet Union). This theoretical and conceptual appreciation of probable future military challenges, though painfully slow, is finding its way into strategic and operational outcomes, as the recent Chechen conflict has revealed. Air power is seen as not merely a support element of ground troops but as a force, which can be decisive when utilized in an effective and efficient manner.

The RuAF performed arguably better during the opening phase of the second Chechen War. Partially based on previous experiences from Afghanistan, from the first Chechen War and partially on lessons learned by the Allied Air Forces in the Gulf and in Kosovo, the RuAF's operations were more focused, coherent and integrated into the overall campaign plan. Except for the occasional employment of precision-guided munitions (PGM), the bulk of firepower was projected through non-precision bombs and rockets, thus confirming the existence of a substantial technological gap between the RuAF and its most developed NATO or Western counterparts. This gap is likely to remain or even to widen in the foreseeable future. Despite these well-known shortcomings, the RuAF's role in low intensity conflicts, and local or regional wars, will certainly rise, bearing in mind the framework given by the 2000 Security Concept and Military Doctrine.

FUTURE PERSPECTIVES

At the end of Yeltzin's presidency (1998-99), military reforms were both inconsistent and lacked any systematic, conceptual

approach. Continuing economic problems, miserable financial funding and budgeting further reduced the effectiveness of this process. The new President of Russia, Vladimir Putin (elected in March 2000), promised in his political programme to enhance and boost the reforms of Russia's armed forces. He seemed to clearly understand the importance of desperately needed complex and radical changes in the whole defence structure of the Russian Federation. Two key principles were recognized by Putin's administration as a basic requirement for any feasible and successful military reform. First of all, that any measures taken during a comprehensive process of reforms must be backed by a realistic and balanced economic assessment aimed to use available funds much more efficiently. Secondly, that the whole structure of the armed forces should correspond to current and foreseeable future threats. Nothing revolutionary new, rather a less politicised, more pragmatic and realistic approach.

The earlier-mentioned National Security Concept along with the Military Doctrine, still contain elements of Cold War style perception of some of the external threats (like NATO's capability to project out-of-area operations and its enlargement especially towards Russia's western borders), and are a '*product*' of Russia's changing vision of its own vital national interests. We need to refer here to visions rather than exact and precise definitions because Russia has still a long way to go down the '*doctrinal road*'. The Military Doctrine provides the means and basic guidance on the use of military forces, answering the *when*, *where* and *how* questions. It describes the goals of the use of Russian armed forces as follows:

- *in a large scale (regional) war in the event that it is unleashed by a state (group or coalition of states): to protect the independence, sovereignty and territorial integrity of the Russian Federation (RF) and its allies, to repulse aggression, to effectively engage the enemy and to force it to end its military operations on terms according with the interests of RF and its allies;*
- *in local wars and international armed conflicts: to localize the seat of tension, to create the prerequisites for ending the war or armed conflict or for bringing it to an end at an early stage; to neutralize the aggressor and achieve a settlement on terms according with the interests of RF and its allies;*
- *in internal armed conflicts: to rout and liquidate illegal armed formations, to create the conditions for a full settlement of the conflict on the basis of RF Constitution and federal legislation;*
- *in peacekeeping and peace restoration operations: to disengage the warring factions, to stabilize the situation and to ensure the conditions for a just peace settlement.*

The main ways of utilizing RF armed forces are:

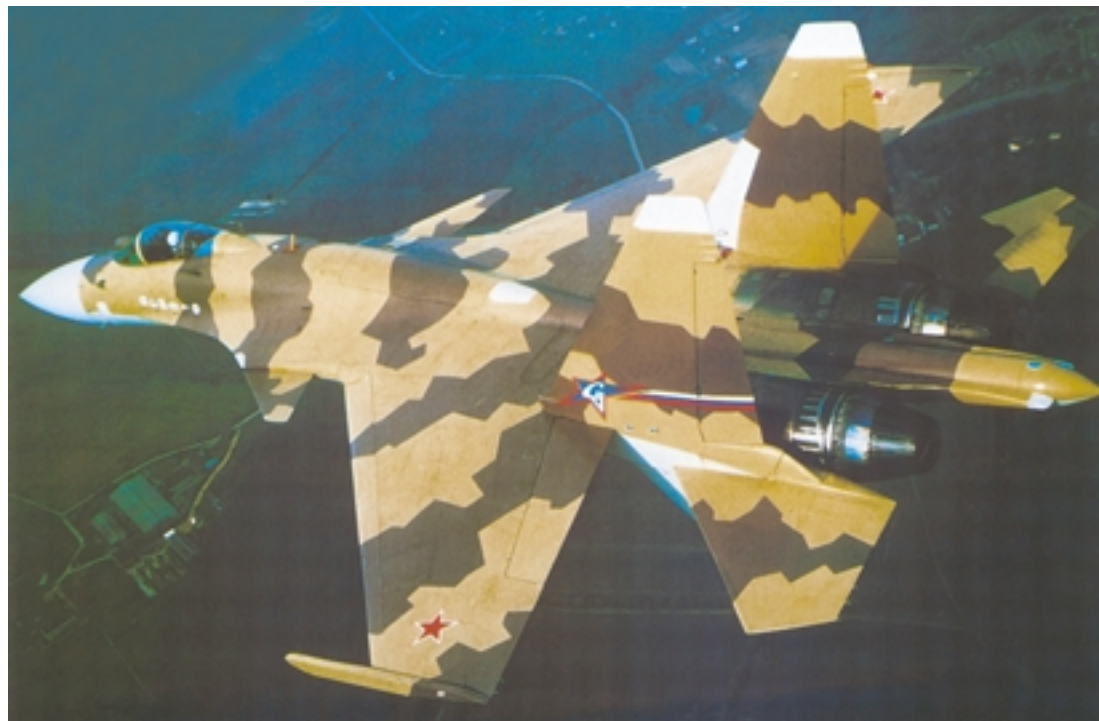
- *strategic operations, operations and combat operations; in large scale and regional wars;*
- *operations and combat operations; in local wars and international armed conflicts;*
- *joint special operations: in internal armed conflicts;*

- counter terrorist operations; in fight against terrorism in accordance with federal legislation;
- peacekeeping operations.²⁴

Air power is recognized as an indisputably key contributor to the success of the aforementioned operations and missions. The RuAF's real current and future capabilities however need to be seen and assessed in the light of Russia's overall situation and position at the beginning of the 21st Century.

Russia's conventional forces were especially weakened by ill-planned reform attempts during the 1990s. The first Chechen War was a confirmation of this. With no time for recovery, evaluation and at least identification of lessons, a new round of downsizing was launched in 1997. The amalgamation of the former Air Defence Troops and Frontal Aviation under one Air Force Command was completed in 2000. A joint, reorganized air defence system now covers Russia and some of the

At the end of 2000 the number of operational combat aircraft went down to 2,300. This was hardly one fourth of the level maintained ten years ago. However, only about 50-80% of the aircraft in the current inventory are serviceable...



members of the Commonwealth of Independent States (CIS) like Belarus, Armenia, Kazakhstan, Kyrgyzstan and Uzbekistan. At the end of 2000, the overall strength of the RuAF's personnel was down to 190,000 and the number of operational combat aircraft went down to 2,300.²⁵

This was hardly one fourth of the level maintained ten years ago. However, only about 50-80% of the aircraft in the current inventory are serviceable, thus severely degrading the projection of combat capabilities (the worst situation is in the transport aviation, improving through the long-range aviation and reaching the highest level in the tactical aviation). The RuAF now consists of two Air Armies (the Long Range Aviation and Military Transport Aviation), seven operational tactical air and air defence formations along with 70 air regiments. Air formations deployed within Military Districts (MD) are subordinate to commanders of MDs, but overall control is the central RuAF command responsibility. In 2001, all of Russia's air force assets, including 37 surface-to-air missile regiments, anti-missile and space defence units were merged into an automatic command and control system based on the former Air Defence Command's enhanced C2 system. However, the current C2 structure desperately needs to be thoroughly modernized to maintain its effectiveness across the whole spectrum of conflict described in the latest Military Doctrine. Further changes, 'rearrangements' and 'streamlining' are likely to follow according to requirements dictated by

not only the evolving operational environment, but also by the available resources for defence expenditure.

Since 1994, only a dozen new combat aircraft have been introduced into frontline service. They were from the family of Su-27 Flankers, modernized into a capable tactical strike (Su-30) and fighter (Su-35) version. The current fleet of aircraft is relatively young (from 10 to 17 years) since the majority of older aircraft was phased out or scrapped. Nevertheless, the situation will become very serious around 2005, when a large number of aircraft reach the end of their service lives.²⁶ There are plans for substantial procurement of new generation combat aircraft from 2005 onwards, but the assumptions, which these plans are based on, lack a great deal of realism. Even the most optimistically constructed economic recovery with a sustained annual growth of GDP around 3-5% allows for only a modest increase in defence spending. Research, development and procurement programs for the RuAF are not at the top of a long list of 'burning' priorities. What is, however, feasible in the coming years is to overhaul, upgrade and modernise at least the core of the current inventory, thus meeting possible internal and external challenges over the next 10-15 years. This solution certainly leads to an increasing technological gap between the RuAF and its advanced counterparts, but this decade is more about realistic survival for the RuAF, rather than keeping pace or competing with the USA, as at the peak of the Cold War. Therefore, a whole range of optimistic and ambitious combat aircraft development programs were either cancelled entirely or indefinitely postponed.²⁷ The only recognized solution currently available and affordable was to keep the present fleet flying as long as possible with targeted upgrade. Platforms like the MiG-29 and Su-27 were perfectly suitable to fulfil the whole range of combat missions after increasing their capabilities by cost effective modernisation. In small numbers, the RuAF already possesses a potent and capable renewed 'family' of aircraft like the truly multirole MiG-29SMT, Su-30 long-range interceptor, Su-34 tactical strike and Su-35/37 fighter aircraft. The ageing Su-25 ground attack aircraft is being replaced by the completely rebuilt version designated as the Su-39. The fleet of Tu-160, Tu-95 and Tu-22 long-range bombers is also gradually being modernised. This trend is most likely to continue in the foreseeable future as the only available solution to provide the RuAF with appropriate 'tools' to fulfil tasks and missions derived from the Military Doctrine.

Russia's defence industry, which comprises around one-fifth of the country's total industrial capacity, remains a huge complex of ineffective and inflexible design bureaux and production facilities. Reforming this area has been the least successful so far. It was, however, more than clear for the present administration that maintaining its status quo seriously undermined upgrading and modernising programs for the RuAF. Moreover, a future capability to produce new generation aircraft was jeopardized by spreading among them the already low level of state funding for research and development. Only a third of the most 'healthy' defence companies from the current number of 1,500 were expected to survive the planned drastic 'cure prescribed' by the new Russian government. To protect and sustain the necessary defence industrial base, the Military Doctrine identified the need for state purchases from a selected group of enterprises with guaranteed fixed prices for equipment. Moreover, it emphasised the importance to retain an independent research and development capability across the range of weapon systems and



platforms, including nuclear and conventional ones. As domestic demand for new weapons was on a historically low level (due to budget constraints), Russia's arms exports will remain a major source of revenue for the defence industry.²⁸

Putin's administration is determined to keep Russia's defence budget on the present level of 4-5% of GDP in the next few years. This seems to be a relatively high number,²⁹ but in real purchasing terms on the domestic market it is still just around \$50 bn. After a long period of decline, Russia's economy in 2000 achieved a remarkable growth of 5% of GDP and in 2001 a similar trend is seen. This growth is, however, very fragile bearing in mind that it is mainly based on high oil, natural gas and raw materials market prices. Nevertheless, it allows carrying on with some of the outlined modernization programs for the RuAF.

Except for the last 2-3 years, when reforms in Russian armed forces took a more coherent and planned form, the steps taken by political and military decision makers throughout the 1990s can be characterized as '*management of chaos*'. It should be acknowledged that management was rather poor, lacking any cohesion and vision. The transition from an authoritarian state and communist party controlled system into a democratic country is still going on after ten years. This process in its complexity is comparable to the creation of Soviet Russia after the communist revolution in 1917. It is an extraordinarily complicated task to build up a democratic statehood with solid institutional pillars especially after seventy years of rigid central control. Economic, political and societal problems are magnified by the painful realization of the loss of superpower status. The RuAF has been one of the most adversely affected branches of the transforming Russian Armed Forces. At the end of a decade characterized by constant cuts in numbers and resources, the RuAF emerged with little respect as a service. In spite of many changes, the RuAF is still seen (by military analysts inside and outside Russia) as a force unable to project full-scale air power.

The first Chechen War revealed many problems and shortcomings from doctrinal down to operational and tactical levels. The 1993 Military Doctrine, still deeply influenced by perceptions from the previous Soviet era, saw air power merely as a support element of massive ground forces. Many useful lessons learned in Afghanistan were either forgotten or ignored by political and military decision-makers and planners. Pilot training schemes were rigid and unimaginative coupled with a low number of flying hours (about one fifth of the amount for NATO operational, combat ready pilots). In addition to poor equipment, lack of appropriate type and sufficient stockpiles of all weather, precision-guided munitions, caused the RuAF to suffer substantial losses in a rather benign combat environment with little challenging Chechen air defence. The second Chechen conflict (still unresolved because the Kremlin's decision makers failed to address themselves to the political end state of this war), though heavily influenced by the need to quickly '*produce*' satisfying results before the oncoming presidential elections in March 2000, can be assessed from an air power perspective as a turning point in the right direction. Unified command and control, changes to force structures, pooling well-trained personnel and forming the most modern air assets into a responsive task force helped to achieve, in a short time, most of the goals and objectives of the air campaign. Better coordination was achieved between various elements of the joint task force grouping comprising units and formations from three ministries, and from numbers of state institutions all of them carrying their differing doctrines, rules of engagements etc. On the other hand, it again highlighted

how limited the RuAF's current operational capabilities were. Starting with aircrew training, continuing through aircraft inventory modernization and ending with a full range of high-accuracy weapons and their delivery capabilities – these were the key areas where substantial improvements and upgrading were essential. The leadership of the RuAF was fully aware of these challenges and its main effort was focused into these directions. It also remains to be seen, what impact ongoing structural changes, reforms, further decreasing of manpower numbers and defence budget constraints will have on the RuAF's operational capabilities.

The latest Military Doctrine is a fundamental document, which tries to reflect (as much as possible) Russia's changed security position after ten years of evolution since the end of the Cold War. New tasks and missions are emerging from it for the RuAF. Air power projection in this decade is most probable in regions of interests along the rim surrounding Russia, rather than beyond it. We are certainly not going to witness Gulf or Kosovo-type '*high-tech*' air operations in the next few years orchestrated by the RuAF. There was no lack of scientific and human invention devoted to aircraft and weapon projects, which can give similarly new dimensions to the utility of air power as it is in countries with highly developed airspace research and manufacturing industries. In the next 10-15 years, the RuAF will mainly rely on current frontline aircraft and weapon platforms³⁰ partially modernized through cost-effective, affordable projects. Cuts in numbers will continue along with improvements in force structures making them leaner and more responsive. The central motive of this decade for the RuAF will be a struggle to retain limited air power projection capabilities and the justification of its own existence.

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NOTES

- 1 Council for Mutual Economic Support; institution promoting economic cooperation among socialist countries under the former Soviet Union 'protection' (1949-91).
- 2 Benjamin S. Lambeth, *Russia's Air Power in Crisis*, Smithsonian Institution, 1999, pp.15.
- 3 Ibid, pp. 39.
- 4 Ibid, pp. 34-43.
- 5 Su-25 (Frogfoot) ground attack, Su-22 (Fitter), fighter-bomber and Su-24 (Fencer) tactical bomber aircraft.
- 6 Mi-24 (Hind) attack, Mi-8/17 (Hip) transport/utility and Mi-6 (Hook) heavy transport helicopters.
- 7 An-12 (Cub), An-22 (Cock), An-26 (Curl), An-124 (Condor) and Il-76 (Candid) transport aircraft.
- 8 152 L-39 and 94 L-29 jet trainers and several MiG-15/17 old, first generation jet fighters.
- 9 Some of the L-39s were configured to carry two 250-pound bombs or two rocket pods each for 16 unguided 57mm rockets
- 10 Altogether 4 mobile ZSU-23/4 radar and optically tracked anti-aircraft guns, 6 ZU-23 and DShK optically sighted machine guns and some SA-7/14 Strela and SA-16 Igla man-portable SAMs.
- 11 Many of the Chechen commanders and fighters were graduates of Soviet military schools and academies, skilfully adopting their knowledge of Russian tactics, using the same weapons (left behind Russian units withdrawn from Chechnya in 1991).
- 12 The average amount of flying time per year for frontline 'combat' pilots for four years prior to the Chechen conflict was well below 30 hours.
- 13 Bridges over the Argun River, presidential palace in Grozny, former Soviet ICBM silos used as ammunition stores, etc.
- 14 N.N. Novichkov: *The Russian Armed Forces in the Chechen Conflict* (Moscow 1995), pp.10.
- 15 See also A. Hills: *The Airpower Taboo: Dialogue Across Perspectives? Airpower and Urban Operations* (Airman Scholar, Spring 2000).
- 16 Precision guided missiles and bombs (mainly the AS 12/14 laser or TV guided missiles and KAB 500L, 1500L, 500KR laser and TV guided bombs) were used in some cases against bridges over the Argun River, industrial infrastructure, defensive positions of the rebels and their military leadership.
- 17 According to Russian sources 6,000 Chechen civilians died in the conflict; Western sources indicate the loss of 20,000 civilian lives.
- 18 The RuAF lost two Su-25s, one Su-24; 26 aircraft sustained battle damage and the Army Aviation lost ten helicopters and every fourth of them were damaged.
- 19 ISTAR – Intelligence, Surveillance, Target Acquisition and Reconnaissance.
- 20 Driven by the enormous political pressure from the Kremlin under the leadership of Prime Minister Putin, the major candidate for the presidential elections held in March 2000.
- 21 The majority of Russian casualties were due to forcing unprepared soldiers to fight the guerrillas in Chechen urban areas.
- 22 Michael Orr: *Second Time Lucky? Evaluating Russian Performance in the Second Chechen War*; www.ppc.pims.org/Projects/csrc/JIRArticle.htm
- 23 G. Arbatov: *The Transformation of Russian Military Doctrine: Lessons Learned from Kosovo and Chechnya*; (The Marshall Center Papers, No.2; 2000).
- 24 See also: G. Arbatov: *The Transformation of Russian Military Doctrine: Lessons Learned from Kosovo and Chechnya*; (The Marshall Center papers, No.2; 2000).
- 25 Military Balance 2000, *Russia*, pp.124.
- 26 It is almost 30% of the fleet, namely the Su-24 Fencer tactical bombers; Su-25 Frogfoot close air support aircraft and the first batch of the MiG-29 Fulcrum, Su-27 Flanker and MiG-31 Foxhound fighters, further reducing the number of effectively available air assets below 2000.
- 27 Like the MiG-MAPO aircraft manufacturer's future multirole frontal fighter known as 'Article 1.42' (MiG-35); or the Sukhoi Design Bureau's forward swept wing interceptor S-37, which in the lack of funding are remaining only in a form of 'technological demonstrators'.
- 28 In 2000 weapons' export achieved the level of \$4bn and is steadily rising.
- 29 For example US defence budget is about 3.5% of GDP in FY2001 (\$305.4 bn).
- 30 Little prospect for small-scale introduction of new generation combat aircraft.

SUN TZU

STRATEGIC PARALYSIS

and SMALL NATIONS



The 1991 Gulf War appeared to mark a significant turning point for modern warfare. For the first time, precision attacks could be conducted successfully against virtually any strategic or tactical targets. Waging total war seemed no longer necessary because the enemy could be quickly paralyzed and forced to make concessions by a strategic paralysis campaign. Strategic paralysis could not only minimize casualties and collateral damage but also avoid protracted war. Advocates of airpower even argued that the air campaign by itself could be decisive without any follow-up ground offensives or territorial occupations despite the fact that airpower cannot seize or hold any territories.¹ It was hoped that future wars would be comparatively shorter, less costly, and more humane.

However, time has revealed that the strategic paralysis campaign was not completely successful since it failed to achieve some of the objectives set by the coalition forces. Dr Grant T. Hammond argues that ‘Iraq did not win militarily, but it did not lose politically.’² It is still debatable whether stability really exists in the Persian Gulf after the war and whether American citizens are now safer abroad. Moreover, neither Iraq’s WMD capability nor the Republican Guard was completely destroyed. Similarly, William M. Arkin points out that while Saddam Hussein might have had great difficulty in directing his war efforts, the attacks against his leadership did not cause his regime to collapse as previously expected.³ After a decade, the remaining fundamental conflicts and psychological hostilities still have a considerable potential to trigger subsequent wars.

While modern theories fail to explain why an overwhelming military success did not lead to the desired end-state, *The Art of War* written by Sun Tzu over two thousand years ago surprisingly accounts for the shortcoming.⁴ Though ‘friction’ such as uncertainties, errors, accidents, technical difficulties, and unforeseen circumstances can adversely affect the outcome of war, Sun Tzu’s strategic concept can approximate to a science on the nature of war because it is an accumulative experience of the Chinese people over thousands of years.⁵ Friction can certainly make the outcome of war unpredictable. Nevertheless, a set of general principles governing various aspects of war can be empirically derived from history, given a sufficient number of historical cases. Even though Sun Tzu’s work has been widely translated into many languages for centuries, not many people profoundly understand his concept.

The term ‘paralysis’ was used by Sir Basil H. Liddell Hart when he wrote, ‘It is thus more potent, as well as more economical, to disarm the enemy than to attempt his destruction by hard fighting. ... A strategist should think in terms of paralyzing, not killing.’⁶ In modern practice, the concept of strategic paralysis was derived from the combined ideas of Col. John R. Boyd’s ‘psychological’ paralysis and Col. John A. Warden III’s ‘physical’ paralysis. The practical concept is probably best defined by the US *Joint Vision 2010* as follows:

Airpower will simultaneously deliver precision weapons against strategic targets in a minimum time frame to inflict strategic paralysis on the enemy. Such parallel attacks will synergistically create both physical and psychological effects. The enemy’s war fighting capability will be quickly reduced to a level that subsequent military operations can be accomplished easily.⁷

According to the definition, strategic paralysis seems to be feasible only for superpowers with sufficient assets to conduct parallel attacks. The objective of this paper is to demonstrate that strategic paralysis pursued in conjunction with Sun Tzu’s concept could prevent failures similar to those of the 1991 Gulf War and might also be feasible for small nations with limited airpower.

The paper consists of seven parts. The first section will indicate the relevancy of Sun Tzu’s concept of war to modern warfare. The second section will briefly discuss Boyd’s psychological paralysis and Warden’s physical paralysis. The third section will identify some possible theoretical flaws in the strategic paralysis concept. The fourth section will examine the practical limitations of military means and strategic paralysis at each level of strategy. The fifth section will discuss the most likely scenarios for small nations with limited airpower. The sixth section will discuss how to apply a prewar strategy prior to the state of war. The seventh section will discuss how to apply strategic paralysis in conjunction with Sun Tzu’s concept. In addition to the thinking of Western scholars, the paper incorporates the practical experiences of some senior officers of the Royal Thai Air Force (RTAF).⁸ Lastly, the conclusion will summarize the alternative approach to strategic thinking, military campaign planning, targeting strategy, and the exploitation of military success.

SUN TZU’S CONCEPT OF WAR

It is quite difficult to interpret Sun Tzu’s *The Art of War* accurately because of two major factors. Firstly, there are a number of ambiguities in any single translation because the Chinese ideograms may have several valid contextual meanings. For example, the ideogram ‘*bing*’ in a particular context could be translated as ‘war’, ‘conflict’, ‘military’, ‘strategy’, ‘tactic’, ‘combat’, ‘battle’, ‘manoeuvre’, or ‘weapon’.⁹ Word-by-word translation sometimes does not make much sense while contextual translation is sometimes inaccurate due to the East-West cultural differences. It is also possible that Sun Tzu might have intentionally chosen these terms so that his work would always remain universally applicable. Secondly, a comprehensive understanding of Chinese



history and culture is essential for a precise translation. The Chinese perception of war in the past might have been different from modern beliefs. In an attempt to avoid misinterpretation, the quotations from *The Art of War* in this paper are based on the comparison of several available sources.

Sun Tzu's concept of war in general still remains relevant to modern warfare. At the grand strategic and military strategic levels, *The Art of War* discusses not only military strategy but also the political and economic aspects of war. At the operational and tactical levels, some of the operational doctrines and tactics are still applicable to modern warfare. For example, some of the principles of war discussed in *The Art of War* remain central to modern military doctrines. Modern guerrilla warfare illustrates a complete application of Sun Tzu's concept at all levels of strategy.¹⁰ The nature of war may have changed significantly in terms of military hardware and the environment; nevertheless, the pattern of conflict and typical human deficiencies remain unchanged.¹¹ Hence, most of Sun Tzu's strategic and tactical concepts are still applicable or adaptable to modern warfare.

Some wars continue for a long period of time as long as the fundamental conflicts remain, although the continuity of armed hostilities may be interrupted by forcible suppressions or domestic problems

Sun Tzu looked at war from a very broad perspective. 'War' not only means the actual state of war but also includes prewar efforts to avoid armed hostilities and postwar efforts to achieve the desired end-state.¹² Some wars continue for a long period of time as long as the fundamental conflicts remain, although the continuity of armed hostilities may be interrupted by forcible suppressions or domestic problems. The apparent peace achieved under these conditions is unlikely to endure. In other words, war may be a series of armed hostilities and other forms of struggle such as political propaganda or isolation, economic sanctions, or cultural/religious rivalries, as well as violence and terrorism. Thus, war in a normal sense may be just a single event of war in the broad sense. The Chinese unification wars (453-221 BC), the Crusades, the Arab-Israeli wars, and the Cold War are good examples of war under this definition.



Sun Tzu believed that the overall strategy to achieve the objectives of war should be comprehensive and consist of three elements: the prewar, war, and postwar strategies.¹³ The overall strategy should utilize all available means to end the conflicts and hostilities as quickly as possible, thus minimizing losses and the residual effects. Non-military means are preferable to the use of force. Examples of non-military means that can be exploited to implement the overall strategy are political, economic, cultural, psychological, and diplomatic measures.



The operational effectiveness of armed forces largely depends on rules that govern the conduct of military operations

Even though Sun Tzu was an expert in warfare, he believed that war should be avoided by all means. The very first lines of *The Art of War* state that war is a vital affair of state because it determines life or death, and survival or ruin; therefore, it should be thoroughly considered.¹⁴ A state should not go to war unless it is absolutely necessary to do so. Whether a state wins or loses, the population and economy will suffer to some degree. The success of a state should be measured by the well being of people, not the predominance over other states.

Sun Tzu placed the greatest emphasis on the grand strategic calculation of war. He believed that the

outcome of war could be predetermined by evaluating the five essential criteria: *tao* (way), heaven, earth, leadership, and rules.¹⁵ We must ensure that our objectives of war, strategy, and conduct of war conform to these principles.

Tao is the most important factor at the grand strategic level. *Tao* means that a sovereign or political leader must be meritorious and his political rationale for war must be legitimate, justified, and convincing to his people. In other words, *tao* is the way to justify the political rationale for war in order to gain public consent and support. *Tao* also serves as a political motivation for the people and troops towards the desired end. *Tao* must remain credible throughout the war.

Apart from *tao*, heaven and earth are also important factors at the lower levels of strategy. The conduct of war must conform to the accepted rules or ethics of war. If the rules are deliberately violated, a just war may become unjust because *tao* no longer exists. Heaven means natural phenomena such as climate and weather. A flawless military strategy must take these uncontrollable factors into account. Earth means the environment such as geography and terrain that one must adapt to and take advantage of. The alteration of environment, if not impossible, is time consuming and requires great effort. The most efficient military strategy is the one that maximizes the exploitation of the existing environment.

Leadership and rules are more relevant to the operational and tactical levels. A military commander should be intelligent and competent. His success depends on careful thoughts rather than intuition (immediate apprehension by the mind without reasoning, or by a sense).¹⁶ The operational effectiveness of armed forces largely depends on rules that govern the conduct of military operations. Examples of rules are laws, orders, doctrines, organizational structures, disciplinary codes, and incentive schemes.



Sun Tzu also placed great emphasis on knowing the enemy physically and mentally.¹⁷ By ‘physically’, he means one must know what the enemy has on hand. This type of information includes the enemy’s assets, strength, capabilities, training, doctrine, logistics, and disposition. By ‘mentally’ he means one must be able to read the enemy’s mind correctly. This requires in-depth knowledge of the enemy’s leadership such as the competency and personal character of the enemy’s leader as well as his objectives and strategy. In addition, one needs to know about the discipline and morale of the enemy’s troops. Knowing the enemy allows us to direct our war efforts precisely at the enemy’s vulnerabilities or weaknesses, and predict accurately how the enemy will react in particular situations. In order to win, we may need to know the enemy even better than he knows himself.

Knowing the enemy might allow us to achieve our objectives of war without engaging in combat, or with minimum effort. Sun Tzu believed that winning a war without fighting at all is better than winning the war by defeating the enemy in one hundred battles.¹⁸ Although there is disagreement whether he suggested that one should just keep ‘his own state and army’ intact or should also keep ‘the enemy state and its army’ intact, both interpretations make sense.¹⁹ While the former obviously makes sense, the latter also does because we might be able to utilize the enemy’s remaining assets or turn him into an ally in future. Sun Tzu believed that the most efficient way to win a war, which he regarded as ‘strategy’, is to foil the enemy’s strategy; the next is to break his alliances; the next is to defeat his armies; and the last is to seize his fortified cities.²⁰ The first two most desirable options are unfeasible if we do not know the enemy mentally. Pursuing these options may not appear as decisive as using brute force but human lives and resources are preserved. In addition, knowing the enemy is also very important at the operational and tactical levels. Sun Tzu believed that the art of war lies in reading the enemy’s intentions.²¹ For example, he suggested that we should attack the enemy at undefended positions, and defend the positions where the enemy would not dare to attack.²²

Sun Tzu believed that winning a war without fighting at all is better than winning the war by defeating the enemy in one hundred battles

Sun Tzu pointed out a significant difference between ‘winning’ and ‘not losing’. The superior side normally aims at ‘winning’ whereas the inferior side may just aim at ‘not losing’. In other words, a stalemate may be regarded as a failure for the former and a success for the latter. Sun Tzu suggested that one should not engage a superior enemy in combat unless certain of victory.²³ ‘Not losing’ depends on whether we make mistakes whereas ‘winning’ depends on whether the enemy exposes his vulnerabilities or weaknesses.²⁴ A winner develops a strategy before engaging in combat while a loser does the opposite.²⁵ That is to say we must be smart not to lose but we need a foolish enemy to win.

Although protracted war should be avoided in general, the inferior side may need to preserve itself and wait for an opportunity.²⁶ One can always choose not to fight by making concessions for the time being.²⁷ Any losses, with the exception of human lives, could be regained or rebuilt. There are no good reasons to engage in combat and be defeated because the enemy will

eventually get what he wants anyway. If time is not a limiting factor and the strategic intentions remain, the objectives of war may be achieved in the long term by continuing to build up the means and seek strategic advantages before engaging the enemy decisively under favorable conditions.²⁸

Apart from military expertise, military commanders in the past also needed other knowledge. The role of a sovereign or political leader in wartime was to ensure that the five essential criteria were met. Once his army was on the march, the total responsibility for the conduct of war rested with his supreme field commander. It was customary that the commander might disregard the commands of his sovereign that did not fit.²⁹ Although the practice might have been largely due to the inadequacy of communications, it offered some practical advantages. It allowed the commander not only to take his own initiative but also to respond to situations in the battlefield more effectively. Sun Tzu believed that political leaders should not interfere with military affairs.³⁰ Since a war strategy could also be implemented by non-military means, military commanders needed political, economic, cultural, and diplomatic knowledge to deal with, or take advantage of, the situations in the theatre.

According to Sun Tzu, war and battles can be won decisively, quickly, and efficiently if we seek strategic advantage and choose correct timing.³¹ Practically, we should adhere to the principles of war such as objective, morale, deception, intelligence, initiative, secrecy, surprise, timing, offensive, defensive, mass, flexibility, and fluidity. For example, Sun Tzu emphasized that the objectives of war must be set and maintained in compliance with the five essential criteria.³² If war is prolonged, troops will be demoralized.³³ He believed that warfare is based on the art of deceit and regarded espionage and intelligence as the essence of warfare.³⁴ We should take the initiative, keep our plans secret, make use of deceptions, and surprise the enemy.³⁵ Straightforward manoeuvres are generally used to engage the enemy while surprise should be used to defeat him decisively.³⁶ 'Strategic advantages' are just a potential for victory but it is 'correct timing' that makes a battle decisive.³⁷ Whether to take the offensive or the defensive depends on the situation and relative strengths.³⁸ Local superiority can be achieved by concealing one's own dispositions and concentrating troops at a pre-selected decisive location.³⁹ Tactics should be flexible and fluid so that the momentum of force can be directed at the enemy's weakest point.⁴⁰

STRATEGIC PARALYSIS

'Strategic paralysis' defined earlier by the US *Joint Vision 2010* is based on Boyd's concept of 'psychological' paralysis and Warden's concept of 'physical' paralysis.⁴¹ It is necessary to understand the theoretical concepts comprehensively in order to analyze the practical concept.

Boyd's concept of 'psychological' paralysis appeared in 'A Discourse on Winning and Losing' produced during 1976-87, and consisted of four slide presentations and one essay: 'Pattern of Conflict'; 'Organic Design for Command and Control'; 'The Strategic Game of 'Destruction and Creation'; and 'Revelation'.⁴² Unfortunately, his work has never been published. Boyd



Boyd served as a fighter pilot during the Korean War operating F-86 aircraft

Boyd's strategic thinking was comprehensive because it covered all levels of strategy. The idea that made him best known was the Observation-Orientation-Decision-Action (OODA) time cycle or loop

served as a fighter pilot in the Korean War in which he was first inspired by the success of the F-86 against the Mig-15 because of its fast transient characteristics. Based on his extensive research in the history of warfare and his engineering background, he analyzed military successes and failures in the past in a scientific way. Boyd's concept in general is largely a modern reinterpretation of *The Art of War*. He was also highly influenced by the successes of the Mongols, Napoleon, Blitzkrieg, and guerrilla warfare. Boyd's strategic thinking was comprehensive because it covered all levels of strategy. The idea that made him best known was the Observation-Orientation-Decision-Action (OODA) time cycle or loop.

At the grand strategic level, Boyd suggested that first of all, political leaders should inspire their followers to take action enthusiastically towards confronting and conquering all obstacles that stand in the way.⁴³ Protracted war, high attrition, and collateral damage should be avoided. While undermining and isolating the enemy, the state should not only increase its own spirit and strength but also influence uncommitted and potential adversaries. The state should make the enemy regime appear corrupt, incompetent, and unfit to govern. That is to say while maintaining its own *tao*, a state should also try to destroy the enemy's *tao* at both the national and international levels. Having defeated the enemy, the state should ensure that the remaining conflicts or the conditions of peace will not lead to future conflicts. In brief, Boyd effectively suggested that the state should pursue a long-term strategy and aim for sustainable peace.

At the operational level, Boyd suggested that the OODA loop could be thought of as being the command and control loop.⁴⁴ The loop can be best explained by using its own origin. In air combat, a pilot continuously executes a cycle of physical/mental tasks. Firstly, he observes the enemy's initial action. Secondly, he orients himself by recognizing the relative energy-manoeuvrability between his aircraft and the opponent. Thirdly, he decides what manoeuvre is most appropriate for that situation. And fourthly, he acts by executing the selected manoeuvre. He then begins his next OODA loop by observing the enemy's reaction to his initial maneuver and continues onto the next phase and cycle, and so on. Naturally, the OODA loop is always executed automatically, repeatedly, and continuously. The process occurs at all levels where strategic or tactical

decisions are made by commanders and passed on to subordinate units or troops to be executed, namely, where there is command and control. Boyd believed that orientation is the most critical phase of the four since it shapes the way one observes, decides, and acts. Orientation itself is shaped by generic heritage, cultural tradition, on previous experiences, and unfolding circumstances.

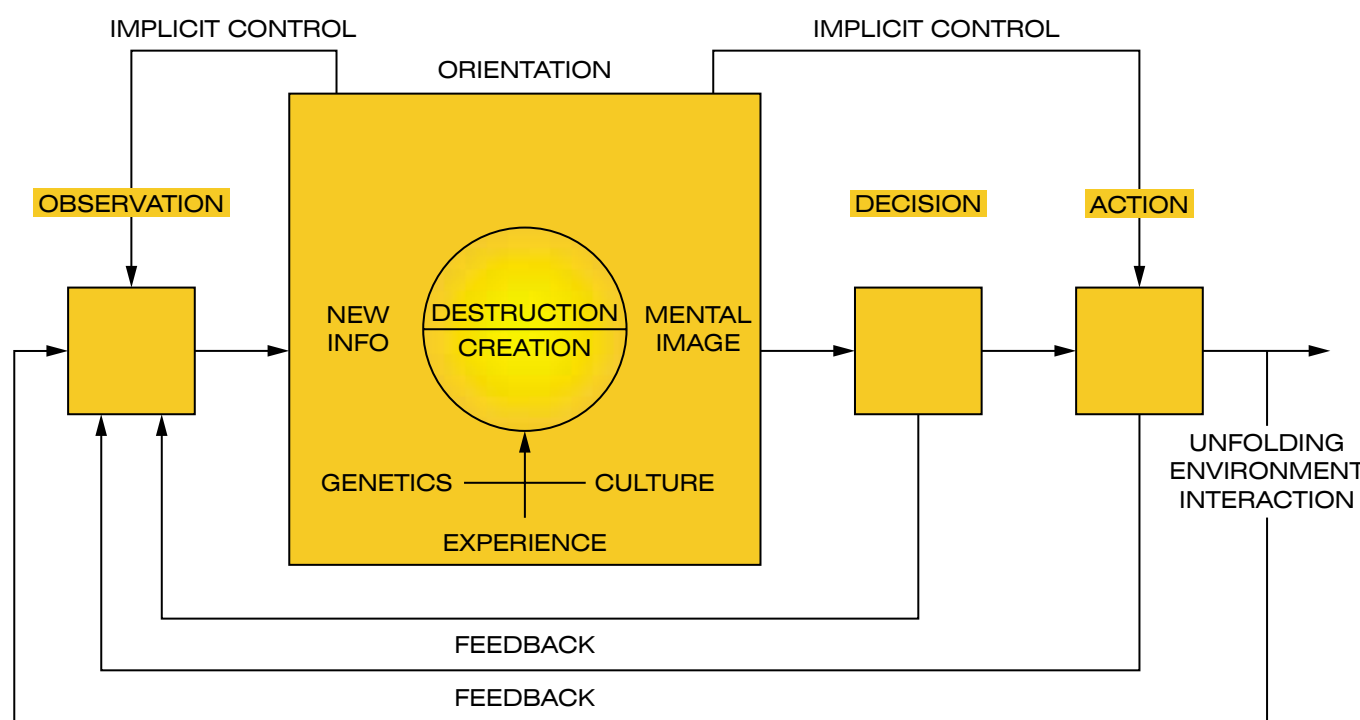


Figure 1: Boyd's OODA Loop⁴⁵

the enemy from his allies and the uncommitted by exploiting his violation of the generally accepted codes of conduct or standards of behaviour that he professes or is expected to uphold.

To achieve the goal, Boyd suggested that we should operate inside the enemy's OODA loop, or get inside the enemy's mind-time-space (grand tactics).⁴⁸ We should OODA more inconspicuously, more quickly, and with more irregularity to maintain our initiative (tactics). As the enemy cannot generate mental images that are consistent with the threatening or non-threatening events/efforts and mismatches among those events/efforts, he will face uncertainty, doubt, mistrust, confusion, disorder, fear, panic, chaos, and so on. Thus, the enemy will over-react or under-react to such ambiguous and unpredictable activities. In other words, we should accelerate our own OODA loop and simultaneously disrupt, decelerate, or interfere with the enemy's OODA loop until it reaches the point that the disoriented enemy is unable to adapt or endure. As the enemy is driven beyond his moral-mental-physical capacity – or is 'psychologically' paralyzed – he will be unable to continue his war efforts.

Boyd discussed his strategic thinking in terms of tactics, grand tactics, strategy, and strategic aim.⁴⁶ Boyd suggested that while we continue to improve our own freedom of action, we should try to diminish the enemy's freedom of action to cope with unfolding events (strategic aim). We should paralyze the enemy and collapse his will to resist by targeting his moral-mental-physical being (strategy). The enemy should be morally-mentally-physically isolated from his allies and any outside support. Similarly, his elements should be isolated from one another. Boyd suggested how to isolate the enemy in practice.⁴⁷ We 'physically' isolate the enemy from the supply of matter-energy-information by cutting both his internal and external links. We 'mentally' isolate the enemy from what is going on around him by presenting him with ambiguous, deceptive, or unusual situations. And we 'morally' isolate



In regard to Sun Tzu's concept of war, Boyd expressed the essence of *The Art of War* by the theme 'harmony, deception, swiftness of action, fluidity of action, dispersion/concentration, surprise, and shock.'⁴⁹ He agreed with Sun Tzu that the art of war is to subdue the enemy without fighting and to avoid protracted war. This could be achieved by probing the enemy to reveal his organization, disposition, patterns of movement, intentions, strengths, and weaknesses; manipulating the enemy by shaping his perceptions; foiling the enemy's plan or strategy as the best option; and employing *cheng* (regular, expected, straightforward, conventional) manoeuvre to expose the enemy's vulnerabilities or weaknesses, and *ch'i* (irregular, unexpected, surprising, unconventional) manoeuvre to defeat him decisively.

Boyd made an interesting observation that modern Western commanders just concentrate on defeating the enemy in battle rather than attempting to foil the enemy's plan or strategy prior to battle

Boyd also made an interesting observation that modern Western commanders just concentrate on defeating the enemy in battle rather than attempting to foil the enemy's plan or strategy prior to battle.⁵⁰ Boyd criticized Clausewitz for his concept of centre of gravity (COG) that had led to 'bloodbath' attrition wars.⁵¹ While Clausewitz believed that the COG is always found where the mass is concentrated most densely, Boyd argued that many non-cooperative COGs could be generated by attacking the enemy's vulnerabilities. From a different perspective, the enemy's perception can also be thought of as the COG.⁵² Moreover, Boyd also criticized the modern principles of war. Boyd argued that the principles are not really principles unless variety, rapidity, harmony, and initiative are emphasized and fully exploited.⁵³

Warden's concept of 'physical' paralysis was first originated in 1988 when he wrote a book titled *The Air Campaign: Planning for Combat* under the influence of the Cold War and from his experience in Vietnam.⁵⁴ To some extent, his concept of the air campaign was successfully applied during the 1991 Gulf War. He has written a few articles since then. 'Employing Air Power in the Twenty-first Century' explained his concept of centre of gravity (COG) by the five concentric rings of COG components: the command structure, essential production, transportation network, population, and military field forces.⁵⁵ The analysis of the enemy as a system and the equation 'Physical x Morale = Outcome' first appeared in 'The Enemy as a System' in which the rings also became known as 'the Basic Five-Ring Model'.⁵⁶ And in 'Planning to Win', Warden suggests the whole planning process for an air campaign.⁵⁷ In contrast to Boyd, Warden is highly influenced by what Clausewitz called the ideal form of war – simultaneous attacks or parallel warfare.⁵⁸ His focus is on the military strategic and operational levels of strategy. Despite their clarity, his works have been criticized for their redefined concept of COG, the simplicity of his model, the selectivity of supporting evidence, and the universality of application.⁵⁹

In *The Air Campaign: Planning for Combat*, Warden uses 'centre of gravity' or COG to describe the 'point where the enemy is most vulnerable and the point where an attack will have the best chance of being decisive.'⁶⁰ He believes that air superiority should be the first priority in any military campaign because it is crucial to the success of subsequent military operations. He



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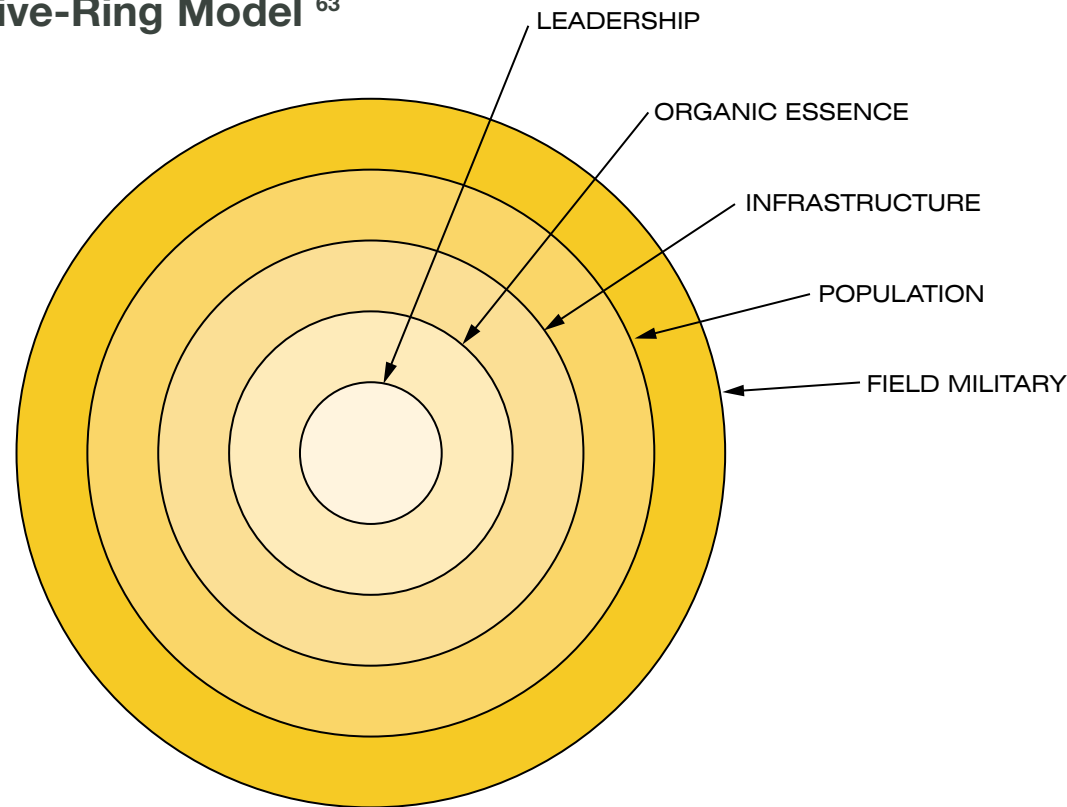
believes that offensive airpower is the strongest form of air warfare. He suggests that offensive operations should be planned 'without concern for defence.' Defensive operations, if unavoidable, should aim to inflict sufficient casualties on the enemy so that he cannot continue his offensive operations. This could be achieved by concentrating airpower locally to achieve numerical superiority over the enemy.

In addition, Warden recognizes that military objectives should serve political objectives that '...can range from demanding unconditional surrender to asking the opponent to grant favourable terms for an armistice.'⁶¹ Military objectives can be the destruction of the enemy's armed forces, economy, or will to resist. He emphasizes that the enemy's COG must be correctly identified and attacked. He points out that airpower can bypass the enemy's surface forces. In a joint campaign, the key force must be identified and all efforts must be orchestrated for synergy. Unnecessary seizure of the enemy's territory and protracted war should be avoided. Airpower must be the key force when surface forces have insufficient strength or cannot reach the enemy's COG. Airpower may be the key force if the enemy's field forces can be isolated, or until ground and/or naval offensives take place.

In 'Employing Air Power in the Twenty-first Century', Warden points out the major advantages of airpower, such as its responsiveness, decisiveness, mobility, firepower, accuracy, and ability to circumvent the enemy's field forces to attack his COG directly.⁶² Airpower can also minimize war casualties and collateral damage. As a political instrument, airpower can be used to threaten the enemy or actually attack his COG to achieve the objectives of war.

Warden believes that all states and military organizations have unique sets of COGs or 'vulnerabilities'.⁶⁴ Nonetheless, it is possible to create a general model of COGs that consists of five concentric circles as mentioned earlier. He believes that the most critical ring is the command structure. All war efforts should aim to affect, whether directly or indirectly, the innermost ring

Figure 2: Warden's Basic Five-Ring Model ⁶³



because that is where concessions are made. In most cases, all the rings exist in that order and the outer rings can be bypassed. He points out that the COGs also exist at the operational level. Warden claims that the Gulf War was the first true 'inside to outside' war in which attacks were conducted against the innermost ring outward to the outermost ring. Iraq was both 'strategically' and 'operationally' paralyzed so it could do nothing to resist the coalition forces. Manoeuvre, mass, and concentration could be effectively achieved by the use of precision weapons in conjunction with stealth technology. Warden believes that it is almost impossible to defend against offensive airpower that has become dominant in 'hyper-warfare'.

In 'The Enemy as a System', Warden argues that airpower and precision weapons have made it possible to separate the physical side and the morale side of the enemy into distinct categories.⁶⁵ The outcome of the enemy's war efforts can be represented by the following equation:

$$\text{Physical} \times \text{Morale} = \text{Outcome}$$

If the physical side can be reduced close to zero, even high morale cannot produce an effective outcome. Warden believes that human behaviour is complex and unpredictable while the physical effects of military action are more predictable. Since it is more difficult to deal with the enemy's morale, war efforts should be primarily directed at his physical side. In brief, Warden believes that we may achieve our objectives in war by causing changes to one or more parts of the enemy's physical system so that the enemy decides to adopt our objectives. In other words, we make it physically impossible for the enemy to oppose us. This is how Warden defines 'physical' paralysis.

Warden suggests that we should look at the enemy as 'a system composed of numerous subsystems.'⁶⁶ He defines a 'strategic entity' as anything that can 'function on its own and is free and able to make decisions as to where it will go and what it will do' or 'any organization that can operate autonomously; that is, it is self-directing and self-sustaining.' An enemy system is a strategic entity that consists of central leadership or direction, organic essentials, infrastructure, population, and fighting mechanisms (or field military). Although Warden renames the five concentric rings as 'the Basic Five-Ring Model', his description of the COG components and their relationships is almost the same.

To paralyze the enemy system, Warden suggests that parallel attacks, as opposed to serial attacks, are more effective because they prevent the enemy from responding effectively, or reacting at all.⁶⁷ Ideally, all of the enemy's vulnerabilities should be attacked simultaneously and modern technology has made this concept possible. Nonetheless, he realizes that the model may be inapplicable in some circumstances such as a struggle against brutal invaders. If people believe that surrendering would not make any difference to their fate, every person will become a strategic entity and fight to death. In Warden's view, strategic paralysis provides the most positive resolution of conflicts.

In 'Planning to Win', Warden defines winning as '... when the opponent ... is in the state we want it to be in and when it can only do what we want it to, or will only do what we want it to.'⁶⁸ In regard to the information revolution, he believes that it is counter-productive trying to keep secrets. Instead, we should try to exploit information faster than our opponent. That is, he disregards the principle of surprise in the traditional way. He believes that parallel warfare will dominate future wars. He suggests that planning to win must be a top-down process starting from the highest level of strategy. Warden favours parallel attacks in a compressed timeframe since he believes that as the time to attack the enemy's key strategic and operational targets increases, the number of incidents that might adversely affect the outcome of war will increase.

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Boyd focuses on the enemy's decision-making process whereas Warden looks at the enemy system from a physical perspective. Despite their differences, there are many common and/or consistent ideas that could be merged into a practical concept. Nonetheless, the practical concept appears to have been dominated by Warden's thinking, and the rest of Boyd's thinking, apart from the OODA loop, seems to have been disregarded. Warden's concept of parallel warfare fits nicely with Boyd's suggestion to accelerate the OODA time cycle because physical and psychological paralysis can be concurrently achieved. However, Boyd's emphasis on the grand strategic level is absent from the practical concept. This is probably one of the reasons why the application of strategic paralysis did not lead to a complete political success and the desired end-state in the 1991 Gulf War.

POSSIBLE THEORETICAL FLAWS IN THE STRATEGIC PARALYSIS CONCEPT

While scientific theories can be both proven theoretically and verified experimentally in a controlled environment, the same approach cannot be applied to military theories because there are many uncontrollable factors in war. Hence, theoretical flaws or weaknesses in a military theory may not be revealed until its application has resulted in failure. Strategic paralysis, like all other military strategies, is not perfect. *The Art of War* implies that the smarter side, not necessarily the superior side, will succeed. If Sun Tzu were correct, strategic paralysis would be ineffective against a smart enemy who did not expose his

vulnerabilities or weaknesses, and might fail if the assailant made his own mistakes. This approach will be used to access the concept theoretically.

Firstly, the enemy's decentralization of command and control may render strategic paralysis ineffective. One can paralyze highly developed living organisms such as human beings but cannot paralyze microorganisms such as germs. This is because human beings have a vulnerable nervous system but germs do not. Similarly, decentralized or independent field forces are less vulnerable to strategic paralysis than highly centralized ones. The enemy could decentralize his war efforts at the tactical level while still centralizing his strategic directions that seldom change. For example, China is interested in the concept of 'guerrilla air war' after having studied the lessons learned in recent wars.⁶⁹ If a well-prepared enemy restructures and operates his field forces in such a way, a strategic paralysis campaign may be unable to degrade his capabilities in a short timeframe. Thus, a quick victory is unlikely.

Secondly, the enemy may not engage in direct combat or compete at a fast pace. The enemy may choose to engage only under favourable conditions such as using hit-and-run tactics. Numerical superiority could also be used to offset the advantages of technological superiority. Though the assailant may have a strategic paralysis capability, there may not be suitable targets to attack. The absence of such targets does not necessarily mean that the enemy's field forces have been rendered ineffective. A smart enemy would fight at his comfortable pace and only engage when he is certain of victory. If he becomes disoriented, he should avoid reacting in a risky way that might lead to disaster. If the enemy pursues this strategy and time is on his side, the assailant may have to abandon his war efforts.

Thirdly, the acceleration of the OODA loop may also create problems for the assailant himself. Most importantly, more mistakes will be made in a given period of time if his strategy is inappropriate. Although future technology might allow near real time corrections to be made in the subsequent loops, the incorrect course of action might be irreversible after the initial action has been taken. For instance, attacking certain targets may inadvertently escalate and prolong the war. Once escalated, the scale of war cannot be brought back to the initial level. Moreover, the outcome of previous attacks may be unavailable or inaccurate when new decisions have to be made. As a result, subsequent attacks may be wasteful and result in a shortage of weapons and other supplies, or create undesired impacts that may lead to additional political implications.

Furthermore, there are likely to be more mistakes in both the planning process and the execution of strategic paralysis. It is a fact that human mental capacity has some limitations. That capacity decreases significantly when human beings have to perform concurrent mental tasks under stress. Military planners may have difficulties in working continuously for several days. There is also a possibility of information overload.⁷⁰ Consequently, there are likely to be more mistakes in the planning process of parallel attacks as compared to sequential attacks simply because parallel operations are more intensive and more complex. Field coordination also becomes a crucial factor to operational success. Since parallel attacks are conducted simultaneously by several branches of effort in a compressed timeframe, the difficulties of coordination will increase as the number of branches

increases, and as the timeframe is compressed. Similarly, there are likely to be more mistakes in the execution of parallel attacks as compared to sequential attacks.

Fourthly, the enemy may try to interfere with the assailant's OODA loop.⁷¹ Since war is interactive, both sides will try every possible way to win. Relying on a highly automated system means that there are fewer personnel and less human time to screen the large amount of incoming information before decisions are made. This might become the assailant's vulnerability. For instance, key staff could be directly targeted and the assailant might be unable to find suitable replacements in time. Even if replacements were readily available, their orientation with the current situation would take some time. The enemy could also indirectly target their loved ones so that the psychological impact would degrade their mental capacity.

In addition, information technology has not only created a superhighway of information for the assailant's decision makers but also provided the enemy with an expressway to reach and deceive them. Although the assailant may know exactly what the enemy is doing by using advanced sensors, he might still be unable to read the enemy's mind correctly and deduce what the enemy is thinking. Hence, strategic deceptions that have been almost impossible may once again become possible.

Fifthly, the Basic Five-Ring Model may be too simplified since it does not take into account some internal relationships between the COG components, and it also disregards any external relationships between the COG components and the outside world. The model represents an orderly strategic entity such as a democracy or an industrialized economy in which the relationships between the COG components are quite predictable.⁷² According to Warden, all war efforts should aim to have either direct or indirect impacts on the enemy's leadership in order to compel the desired concessions. While such attacks may create the desired impacts on the leadership, they may also create undesired impacts on other COG components as well as many strategic entities outside. Other COG components may become significant factors in determining the outcome of war. The affected strategic entities from the outside world may also change their stances in the enemy's favour. These unpredictable impacts may adversely affect the campaign and the outcome of war.

Lastly, the morale side may be a significant factor in the long term. Warden's equation 'Physical x Morale = Outcome' implies that the enemy's morale is an insignificant factor to the outcome of war if the assailant can reduce the enemy's physical effort close to zero.⁷³ While this may be true for a brief event of war, it might not be applicable to war in the broad sense. In fact, physical and psychological wars are always fought simultaneously. Morale determines the output of war efforts that consists of tangible and intangible outcomes. The equation should be more precisely rewritten as follows:

$$(\text{Physical} + \text{Psychological}) \times \text{Morale} = \text{Tangible Outcome} + \text{Intangible Outcome}$$

Even if the physical effort is driven close to zero and there is no significant tangible outcome, the psychological effort may still produce a significant intangible outcome provided that morale is still high. An intangible outcome has the potential to turn into a tangible outcome and vice versa. For example, while devastating damage could turn into fear, hatred may also turn into some

other forms of struggle such as terrorism. The assailant's postwar casualties due to terrorist attacks might be even higher than his field casualties in war. In brief, the enemy's psychological effort and morale should also be dealt with to prevent such after-effects.⁷⁴

THE PRACTICAL LIMITATIONS OF MILITARY MEANS AND STRATEGIC PARALYSIS

When it comes to practice, strategic paralysis has many limitations. At the grand strategic level, military means may be unsuitable for some types of war, especially wars of belief such as religious, ethnic, and ideological conflicts. It is a fact that human beings may continue to fight from generation to generation for their beliefs. Strategic paralysis is not an exception to this

According to Sun Tzu, a true victory is one that can change the enemy's long-term strategic intentions. Defeating the enemy in war may not be an absolute victory if there is still a potential for subsequent war

limitation because it is a military means. According to Sun Tzu, a true victory is one that can change the enemy's long-term strategic intentions. Defeating the enemy in war may not be an absolute victory if there is still a potential for subsequent war. The grand strategic calculation implies that without *tao*, one may be unable to win a war even against an inferior enemy. In other words, there are wars that may not be won by a particular side. In such situations, states capable of conducting strategic paralysis may be unable to exploit such a capability to achieve their objectives. The fact that strategic paralysis is not always applicable despite its potential should be regarded as its greatest practical limitation.

At the military strategic level, there may be some political, economic, legal, and/or other constraints that prevent the full application of the strategic paralysis concept. According to Sun Tzu, all available means should be used to achieve the objectives of war. It is a fact that some wars may not be won solely by military means, or may be won more quickly if the war efforts are enhanced by other means. To apply non-military means successfully, some constraints may have to be imposed on the application of military means. Consequently, military planners may be unable to apply the entire theoretical concept of strategic paralysis in practice. For instance, the assailant may be unable to isolate the enemy by blockade, or may have to exclude some sensitive targets. The partial application of the strategic paralysis concept may reduce the campaign effectiveness or could lead to a failure.

In addition, there is the argument that strategic paralysis may not be feasible without an effective nuclear deterrence.⁷⁵ The argument is based on the assumption that the enemy would be deterred from using WMD to counter strategic paralysis because of the fear of nuclear retaliation. Even small states may have a capability to employ WMD.⁷⁶ Without a nuclear capability, the assailant might be unable to deter such counter-attacks. On the other hand, the



strategic paralysis capability itself may have raised the credibility of conventional deterrence to a degree that it could effectively deter the use of WMD.

At the operational level, there are many complicating factors. First, the availability of forward bases may be a factor. A strategic paralysis campaign may require some suitable forward bases in third countries. The bases may be unavailable to the assailant, or the hosts may impose restrictions due to political reasons. Though long-range operations may be possible, there are many disadvantages such as higher operational costs, fewer available sorties, and aircrew fatigue.⁷⁷

Second, the deployment phase that normally takes quite some time may create difficulties. The enemy could use this opportunity to strengthen his defence and prepare counter-attacks.⁷⁸ The enemy may also seize the opportunity to launch a pre-emptive strike against the assembling forces. The assailant might have to delay or abandon the campaign if the enemy succeeds in destroying his key assets.

Third, there may be no suitable targets for strategic paralysis. If the enemy is a non-industrialized economy, his basic infrastructure and industry may not be as critical to him as compared to an industrialized economy. Striking such targets may have little effect on his war efforts. The enemy may also disperse his assets so that they become inaccessible, or are no longer high-value targets. The use of smart weapons may be unfeasible, or become excessive and less cost-effective against such targets.

Fourth, the campaign may be ineffective if the enemy's vulnerabilities or weaknesses are incorrectly identified.⁷⁹ The COG may be different from state to state. The assets that the assailant regards as vital may not be that important to the enemy. Targeting can be very difficult unless the assailant knows the enemy inside out. Attacking a wrong COG may lead to protracted war and excessive losses for both sides.

Fifth, the environment may not be ideal for strategic paralysis. The assailant may be unable to isolate the enemy physically due to unfavourable geography or other reasons. It is also a fact that airpower, the primary instrument

...there may be no suitable targets for strategic paralysis. If the enemy is a non-industrialized economy, his basic infrastructure and industry may not be as critical to him as compared to an industrialized economy



of strategic paralysis, is not fully effective in bad weather. In addition, certain types of terrain such as forests, mountains, or urban areas may be unsuitable for some types of smart weapons.⁸⁰

Sixth, there may be some operational constraints that reduce operational effectiveness. For example, the conduct of the campaign will have to comply with the Law of Armed Conflict that restricts certain actions.⁸¹ There might also be a problem in a joint or combined campaign. The available assets may not be fully exploited due to the allocation of responsibilities among the services or nations that make up the joint or combined force.

Seventh, the zero casualties and minimum collateral damage concepts may lead to unproductive efforts.⁸² The operational directions may be influenced by the media and public (the so-called 'CNN effect'). The assailant may have to allocate considerable assets to counter relatively insignificant threats instead of attacking more lucrative targets. He may also have to attack insignificant targets while omitting key targets in the vicinity of populated areas.

Eighth, logistics may become a bottleneck for strategic paralysis. Massive airlift may be required in a short timeframe for both the deployment and the campaign itself. The assailant's airlift capacity may be insufficient to support such a requirement, or could be affected by the enemy's initiative. Moreover, the high consumption of smart weapons that have become the weapon of choice may deplete the limited stockpile quickly.⁸³ This could cause serious operational problems if the acquisition process cannot keep up with the demands.

Ninth, some combat and supporting components may become the assailant's vulnerabilities as strategic paralysis makes them critical to operational success.⁸⁴ In a compressed timeframe with several branches of effort, some critical components such as high-demand assets that are limited in number, air operations centres, key communication nodes, or special supporting facilities would become lucrative targets for the enemy. If the enemy successfully attacked these key components, the assailant might have to suspend his war efforts even though his remaining forces were still at full strength.

Last, the assailant may have to allocate substantial assets to guard against asymmetric threats posed by the enemy.⁸⁵ Since the strategic paralysis capability has become dominant in modern warfare, weaker states are effectively forced to develop asymmetric means as a countermeasure. For example, China has developed the concept of 'unrestricted warfare' that utilizes every possible means to offset the technological advantages enjoyed by the West. Even though asymmetric attacks are unlikely to cause high casualties on the battlefield or have a significant direct impact on operational effectiveness, the indirect impacts due to public sensitivities could considerably affect the campaign. Moreover, the enemy may have a capability to conduct asymmetric attacks against the assailant's homeland.⁸⁶ Such attacks may even have greater indirect impact on the campaign.

At the tactical level, the execution of strategic paralysis may be ineffective due to many factors. For example, it may be difficult to locate and destroy moving targets.⁸⁷ Tactical targets are unlikely to be static in highly mechanized warfare. Though the assailant may be able to locate moving targets quickly by advanced sensors, the targets may have moved by the time the

attackers arrive. Employing airborne alerts may not be a cost-effective solution because it withholds valuable assets from other purposes.

In addition, the enemy's deception combined with self-imposed constraints may reduce the effectiveness of attacks. The assailant may have to impose his own constraints such as minimum altitude restrictions for safety or other reasons. The enemy may also use camouflage to conceal his field forces or decoys to attract the attackers' attention. Moreover, the enemy could enhance the effectiveness of his deception by selecting favorable terrains such as urban areas.⁸⁸ Consequently, intelligence, which is a crucial factor to the success of an air operation, could be inaccurate at the time of planning or execution. In such situations, it may be very difficult for aircrews to identify targets, or to make precise assessments of their attacks.⁸⁹ These limitations may also reduce the overall effectiveness of the campaign.

STRATEGIC PARALYSIS FOR SMALL NATIONS WITH LIMITED AIRPOWER

From the strategic perspective, 'small nations' should be defined in terms of state power that is derived from the means states could use to achieve their national objectives, such as political, economic, and military power. According to Sun Tzu, a great military power without comparative economic and political strengths cannot expect to prevail in the long run. 'Small nations' can be any states of which political, economic, and military strengths are between those of superpowers and poor countries. Similarly, 'limited airpower' should be defined in terms of capability that is derived from air assets that small nations possess. In general, small nations have many constraints on employing their airpower.⁹⁰ For example, they cannot do everything that superpowers can because they lack certain air assets. They cannot replace attrition losses quickly. They have limited stockpiles of weapons and other supplies. They cannot sustain protracted war. Nonetheless, they may have a capability to gain control of the air and strike any targets in the theatre of war and the enemy's homeland. Such a capability is a potential for strategic paralysis and will be regarded as 'limited airpower'. Although some concepts in the following discussion are universally applicable, the use of airpower by superpowers will not be discussed because they are unconstrained by these limiting factors. For poor countries, it is obvious that this military option is unviable.

Strategic paralysis is a relative capability. The assailant must be far superior to the enemy in terms of overall military capability and airpower in particular. A superpower may have a strategic paralysis capability in relation to a small nation. Similarly, a small nation with relatively far superior airpower may have a strategic paralysis capability in relation to a weaker nation. For example, the US had a strategic paralysis capability against Iraq but may not have such a capability against a near-peer competitor such as Russia. Israel, with its relatively larger and far more effective airpower, may have a strategic paralysis capability against some of its weaker hostile neighbours.

Limited armed conflicts over territorial disputes are the most likely scenarios for small nations. Since economic development is normally their primary concern, they would only go to war for non-negotiable issues such as sovereignty. Territorial disputes are



the most common source of conflict although there might be political, economic, religious, or cultural factors. Even in civil wars, each party fights for territorial control more than anything else. Nevertheless, contested territories are not always critical to strategic needs, or vital to economies.⁹¹ In many cases, states engage in armed conflict for the purpose of maintaining their status quo and/or the legitimacy of their claims. If the disputes are not a matter of national survival, small nations should be able to force their adversaries to make concessions provided that the conditions of war are favorable. Military means are usually feasible for state-versus-state conflicts although they should be used only as the last resort.

Small nations may not have to paralyze their enemies in the same way superpowers do. Generally, patients have to be completely paralyzed in major surgical operations. However, complete anaesthesia may be unnecessary for minor operations. A patient may only have to be paralyzed locally on the part of his body where the operation is going to take place. Local anaesthesia is less costly and takes shorter time for patients to recover. While superpowers may choose to paralyze their enemies completely to prevent them from responding at all, small nations may have to paralyze their enemies locally and briefly, precisely where and when the paralysis is required. 'Tactical paralysis' could be as effective as strategic paralysis if small nations paralyze the right part of the enemy at the right time. This approach would suit their operational limitations because it minimizes the demand for air assets. Moreover, tactical paralysis would be less costly in terms of operational and postwar reconstruction costs.

Whether decisive air campaigns are feasible depends on the strategic environment. If the theatre of war is isolated, such as a remote island, ground offensives may be unnecessary. If airpower alone can isolate the enemy's field forces in the theatre of war, decisive air campaigns should be feasible. However, it should be noted that airpower only has a potential to destroy physical targets. It cannot seize and hold any contested territories. It does not have the same degree of presence in terms of psychological effects as occupying forces. If more tasks need to be done in order to secure the victory, the assailant may still have to employ his ground forces.

THE APPLICATION OF SUN TZU'S CONCEPT PRIOR TO THE STATE OF WAR

Sun Tzu recommended an active approach to war; namely, one should predetermine the outcome of war and take the initiative prior to the state of war.⁹² The grand strategic calculation should be performed in peacetime for a few reasons. Firstly, the decision whether to go to war should be based on the predicted outcome. If we are caught by surprise and forced to go to war unprepared, it is because we have been passive. Secondly, the calculation would give an opportunity to foil the enemy's strategy prior to the state of war. War could be successfully avoided if the available time were sufficient to implement the prewar strategy. Thirdly, the decision would allow an early preparation

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for war. The accomplishment of the preparation might change the outcome of war in our favour.

Although Sun Tzu might have been too optimistic about ‘not losing’, some of his suggestions are still very useful. First of all, we should not enter a war we are unlikely to win. Such a war should be avoided by all means because it is a waste of effort. A war that may not be won solely by military means should be carefully considered. We should have the necessary means to implement our strategy before committing ourselves in such a war. A war against a superior enemy or a war that may not be won quickly should be avoided or delayed until we have gained sufficient strategic advantages and strength to defeat the enemy decisively.

In addition, we must meet all the essential criteria discussed earlier and should be reasonable in setting our objectives of war. Most importantly, our political rationale for war must be justified and accepted by our people. The political objectives should be based on a feasible end-state in which peace is sustainable. The military objectives should be realistically achievable under the existing conditions. Generally, the overall political objective is always ‘winning’ but the overall military objective may be either ‘winning’ or ‘not losing’ depending on the relative strengths.

Although ‘winning’ depends on whether the enemy exposes his vulnerabilities or weaknesses, we might be able to win a war without engaging in combat if we successfully foil the enemy’s strategy prior to the state of war. From the enemy’s perspective, his strategy is based on ‘the strategic trinity’ of will, means, and opportunities. More accurately, ‘will’ is the enemy’s strategic intentions rather than his will to fight. ‘Means’ includes both non-military and military means that could be exploited to achieve objectives. And ‘opportunities’ arise when the conditions are favourable to achieve his objectives. An elimination of one or more components would be sufficient to foil the enemy’s strategy and cause him to abolish his war option. Sun Tzu regarded the avoidance of war by this method as the best strategy.⁹³

If we have not succeeded and war breaks out, we should continue our effort to foil the enemy’s strategy along with other war efforts. However, it should be noted that while the elimination of means and/or opportunities might terminate an event of war, it will not necessarily change the enemy’s long-term strategic intentions. This is because the means could be rebuilt and opportunities might arise again in future. Hence, one needs an effective postwar strategy to change the enemy’s long-term strategic intentions.

The enemy’s strategic intentions could be changed by destroying his political rationale for war or by providing him with alternatives to war. The first possibility is that the enemy’s strategic intentions are sometimes based on parochial interests or the personal aspirations of the enemy’s leader rather than the people’s will. If the people are convinced by psychological warfare that the reasons to go to war are unjustified, the leader might have to change his intentions because he is unlikely to win without public support.

The second possibility is that the enemy may have no choice but to go to war. The enemy could be persuaded not to go war if provided with alternatives. War can always be avoided if both parties are willing to compromise. Not only the apparent costs but



also the hidden or incalculable costs should be taken into account in the cost-benefit calculation. War is mutually destructive so both parties would benefit from settling the dispute peacefully. To persuade the enemy to choose an alternative, both positive and negative incentives should be used. Namely, one should not only make the enemy realize the negative consequences but also offer him some advantages if he is willing to cooperate. The enemy should also be provided with a comfortable way out otherwise he might have no choice but to pursue his war option.

Some of the enemy's means could be neutralized prior to the state of war. In addition to the armed forces (fighting organs) which is the primary means, traditionally recognized means also include the mechanisms that drive (a nervous system) and feed (blood) the armed forces, such as the administration, basic infrastructure, industry, agriculture, energy supplies, military infrastructure, and field logistics. These normal means can only be neutralized in wartime. Furthermore, Sun Tzu recognized non-military means such as political power, economic influence, cultural ties, diplomacy, alliances, proxies, and the people as means to achieve the objectives of war. These additional means could, and should, be neutralized before war breaks out.

In some cases, the enemy's key means to achieve his objectives are of the latter types. If we successfully neutralize these key means prior to the state of war, the enemy might have to drop his plan. To accomplish the task, we have to identify the enemy's key means correctly. We should develop a strategy and implement its prewar element to neutralize them. It should be noted that the key means are not always the same, and the same enemy may use different means in different wars. This is probably why Sun Tzu never specified the enemy's COG but only recommended foiling the enemy's strategy.⁹⁴ Nevertheless, the enemy's COG in any war is always part of the strategic trinity.

We can deny the enemy's opportunities by creating a credible deterrence and removing the conditions of war. We can effectively deter the enemy by eliminating or minimizing our vulnerabilities, improving our overall military capability, and seeking additional allies. Opportunity is a function of the vulnerabilities. Since it is impossible to deal with all vulnerabilities, we need to identify and eliminate the vulnerabilities that really interest the enemy. We must analyze our vulnerabilities from the enemy's perspective. The way that we improve our overall military capability should not appear too threatening to the enemy otherwise it might encourage a pre-emptive strike, thus accelerating the war. In an anarchic world, there are neither permanent friends nor permanent foes. We should not fixate or rely solely on particular allies. Besides potential adversaries, we should also pre-identify potential allies in each particular context so that we could seek additional allies when necessary.

In addition, we should try to remove the conditions of war because they are the enemy's incentives or motives to go to war. For example, some conditions provide the enemy with strategic advantages. Some conditions serve the enemy as his political rationale for war. And some conditions could be used by a superior enemy to initiate a war in his favour.

In an anarchic world, there are neither permanent friends nor permanent foes. We should not fixate or rely solely on particular allies

THE APPLICATION OF STRATEGIC PARALYSIS IN CONJUNCTION WITH SUN TZU'S CONCEPT

If the attempt to avoid war fails, the assailant should prepare the battlefield before engaging the enemy in combat. Since strategic paralysis is most effective against a closed system, the assailant should try to isolate the enemy not only physically and economically but also politically and culturally as much as possible prior to the campaign. This is consistent with Sun Tzu's recommendation that the second best strategy is to break the enemy's alliances.⁹⁵ By doing so, the assailant effectively eliminates the external factors that may adversely affect the campaign and also prevents the escalation of conflict. For example, Dr David R. Mets points out that Iraq's inaccessibility to Russian space resources was a factor that contributed to the success of Operation Desert Storm.⁹⁶

The assailant should also think defensively and prepare for the worst cases. It is a fact that vulnerabilities at home and in the theatre of war can never be completely eliminated. Sun Tzu noted that a wise military commander considers both favourable and unfavourable conditions to make his plan both feasible and flawless.⁹⁷ The assailant should never bet on a desperate enemy and always be prepared to defend. Although the enemy's counterattacks are unlikely to affect the overall conduct of war, one of the

assailant's real vulnerabilities might be the public sensitiveness on war casualties.⁹⁸ If the political rationale for war is truly justified, the best way to eliminate this vulnerability is to educate the people to understand the risks and accept the consequences of war.

According to Sun Tzu, the success of a military campaign should be measured by the achievement of military objectives with the initial allocation of assets and within the timeframe.⁹⁹ If that is not the case, the achievement may be arguable and could also be regarded as a partial failure. Military objectives must be effective to attain political objectives. Many failures are due to the fact that people may do things right but may not do the right things. Setting the right military objectives seems straightforward but there are many problems in practice.

Firstly, political objectives are sometimes ill-defined because war may not really be a matter of national survival but something else less important to the state and the people. Consequently, political leaders may be reluctant to make a full commitment to the war effort and may fail to define political objectives clearly.¹⁰⁰

Secondly, political objectives are sometimes dictated by military solutions. In many cases, political objectives are set according to the option most preferred by the military that may not necessarily be the best course of action.¹⁰¹ As a result, such political objectives may not accurately represent the national goal and what should be done to attain the national goal may not be done.



The objectives of Operation Desert Storm are an example. The objective to destroy the Iraqi WMD capability was set without an objective to occupy Iraq. By the nature of WMD, it was unlikely that the task could have been accomplished without an occupation. Consequently, the objective was not fully achieved



Thirdly, military objectives may be inadequate or irrelevant to attain the desired political objectives or end-state. Effective military objectives and realistic timeframes cannot be set if the assailant does not know under what conditions the enemy would concede defeat. The shortcoming usually leads to political interference and ineffective conduct of the military campaign.

Fourthly, military objectives and political objectives are often intermixed or are inconsistent with one another. For instance, military objectives such as defeating the enemy's field forces and seizing his territories are often intermixed with political objectives such as changing the enemy's strategic intentions and restoring sustainable peace. As a result, the military may be unable to attain a military objective that is supposed to be a political objective. Moreover, military objectives are sometimes set without their essential prerequisites. The objectives of Operation Desert Storm are an example. The objective to destroy the Iraqi WMD capability was set without an objective to occupy Iraq.¹⁰² By the nature of WMD, it was unlikely that the task could have been accomplished without an occupation. Consequently, the objective was not fully achieved.

Fifthly, it may be a fallacy to establish a direct relationship between military actions and political objectives while the strategic linkage between military objectives and political objectives is bypassed or missing. For instance, a military option may attain the desired political objectives in a particular war while resulting in an unfavourable political outcome in another war. In fact, each war is unique. Without any military objectives, one can easily make a mistake by incorrectly assuming that a particular military option will always result in a certain political outcome. On the other hand, many military options may attain the same military objectives. With the military objectives designed to attain the desired political objectives, we should never make the same mistake no matter which military option we choose.

The assailant must not make these mistakes. Effective military objectives are based on what is most likely to cause the enemy to concede defeat, not necessarily the most desirable military option. When the enemy decides to go to war, he should be prepared to lose part of certain assets such as his infrastructure, industry, and population in return for the stake. It would take small nations with limited airpower a long time and great effort to achieve military objectives that target such assets. In addition, such assets are unlikely to be critical to the enemy's war efforts in the short term. This shortcoming is evident by the fact that the conventional strategic bombing during World War II was not as decisive as previously expected.¹⁰³ Traditionally, military planners aim directly at the contested territory. Achieving such military objectives does not necessarily cause the enemy to concede defeat because he might choose to retreat strategically and wait for future opportunities.

The assailant needs to know the enemy's core interests as well as how he values his assets and the stake. He needs to identify and target exactly what the enemy cannot afford to lose so that the enemy will have to make the desired concessions. Military objectives set accordingly will have the best chance of being decisive and preventing protracted war. The assailant may indirectly target the assets that are most highly valued by the enemy instead of directly targeting the contested territory. The alternative approach is consistent with Sun Tzu's suggestions to seize what the enemy values most, and to attack undefended positions.¹⁰⁴

For example, states contesting a territorial dispute are normally prepared for holding the contested territory.¹⁰⁵ Seizing or retaking the territory would be very difficult, and the territory itself may not be the real source of conflict or highly valued by the enemy. Alternatively, the assailant could seize or target key strategic areas, highly industrialized zones, or major ports that the enemy does not expect to be attacked. If the enemy does not know exactly where to defend, the tasks could be accomplished with comparatively less effort. Such military objectives are more likely to be effective because the bargaining chip is more critical to the enemy.

Clear military objectives allow military planners to utilize all available assets most efficiently. As discussed earlier, some military objectives may require parallel attacks to be conducted in a compressed timeframe while others may just require independent attacks only when necessary. What, where, when, and how to attack should be primarily determined by the desired effects on the enemy system. In other words, the extra effects besides the operational requirements should not be a dominant factor in targeting. The effects-based approach would not only minimize the operational requirement for air assets but also free them for other purposes. Since all bombs are expensive and could potentially create collateral damage, they should not be wasted on irrelevant targets or used unnecessarily. It does not make sense for small nations to increase the tempo of war unless doing so will significantly minimize losses and/or maximize the effects. According to Sun Tzu, it is correct timing that makes attacks most effective.¹⁰⁶

Traditionally, air campaigners prefer to target strategic targets in the enemy's homeland first, and then work outward to the battlefield. After gaining control of the air, the typical priorities are strategic attacks, air interdiction, and close air support. Although strategic paralysis is based on parallel attacks, such targeting priorities still exist in practice.

Tactical paralysis may require a new targeting strategy to suit small nations' operational limitations and requirements, although the core ideas of strategic paralysis remain unchanged. Control of the air will remain the first priority in a campaign dominated by

manned aircraft because substantial casualties inflicted by the enemy's airpower could adversely affect the campaign both operationally and politically. Long-range precision attack capabilities such as attack UAVs and cruise missiles will remain unfeasible and unaffordable for most small nations for quite some time. The air superiority campaign may still require



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parallel attacks to be conducted in a compressed timeframe in order to minimize the effectiveness of the enemy's resistance. However, strategic attacks may be unnecessary for short military campaigns since such attacks are unlikely to have significant impacts on the effectiveness of the enemy's field forces during the campaign.¹⁰⁷ The assailant should focus primarily on the field forces because they are most likely to be the key means for limited conventional war. This is why Pape finds that 'denial', a coercive strategy that targets the enemy's military means, works best in territorial disputes.¹⁰⁸ In addition, a study of the strategic air campaign in the 1991 Gulf War by Olsen reveals that 'decapitation', another coercive strategy that targets the enemy's leadership as well as his command and control, did not work.¹⁰⁹

Nevertheless, the assailant should not attack the combat elements directly in the early stage because they would be highly prepared. First, the assailant should focus on the enemy's vulnerabilities or weaknesses such as his rear areas. He should indirectly target the logistic lines and some less-protected elements to create an immediate physical and moral effect on the enemy, and then work inward to his homeland as deeply as required in order to prevent further supplies and attrition replacements from reaching the battlefield. The depth of attacks should depend on how long it will take to defeat the enemy's combat elements. For example, if a decisive ground offensive is expected to last only a few days, there is no need to strike logistic depots from which supplies will reach the front in a few weeks. Targets should be neutralized or destroyed only if they really contribute to the enemy's war efforts. By this method, the enemy would start suffering from the very first days of the war instead of just before the beginning of the ground offensive. More importantly, the preparation phase for any ground offensive could be significantly shortened. This step is analogous to preventing oxygen and nutrients from reaching the enemy's fighting organs through blood vessels. The shortage of oxygen and nutrients will incrementally affect the organs.

Once the enemy's field forces have been sufficiently weakened, the assailant should start an air offensive against the remaining combat elements. Having lost the key means, the enemy might decide to surrender and make the desired concessions at this stage. If the enemy does not give up, a ground offensive would be necessary and close air support would be required. It is important to note that attacks against the remaining command and control targets should be withheld until the start of a decisive air offensive or ground offensive to maximize shock effects. Tactical paralysis is fully achieved at this stage by further blocking the enemy's nervous system temporarily so that his fighting organs cannot function during the decisive operation. Such attacks should not be conducted too soon otherwise the enemy might have sufficient time to adapt to the situations and overcome the problems. In brief, the effectiveness of tactical paralysis depends largely on targeting strategy and correct timing.

It should be noted that while strategic paralysis aims at paralyzing the whole enemy system during the entire campaign, tactical paralysis only aims at paralyzing the enemy's fighting organs temporarily during the decisive phase. It is a 'just enough' and 'just in time' strategy. Although the execution of tactical paralysis seems very similar to that of a traditional air campaign, the two actions are largely different in concept. The aim of tactical paralysis is not attrition or 'cutting off' the enemy's fighting organs.¹¹⁰ The assailant only needs to paralyze the enemy's field forces on the battlefield briefly to achieve his military objectives with

minimum resistance. The goal is to minimize casualties for both sides. For tactical paralysis, timing is as crucial as targeting, whereas it may be less important in traditional air campaigns. Tactical paralysis is consistent with Sun Tzu's concept because the assailant could not only preserve his assets but also keep the enemy's field forces intact.¹¹¹

According to Sun Tzu, strategy should be flexible and fluid in order to take situational advantages and exploit the enemy's vulnerabilities.¹¹² Hence, the targeting strategy should be responsive to situational development.¹¹³ The versatility and flexibility of airpower makes it an ideal means to implement such an adaptive strategy. The main effort should be directed at the enemy's weaknesses or targets of opportunity to produce maximum effects at minimum costs. In other words, military objectives may have to be revised from time to time to suit the changing situations.¹¹⁴

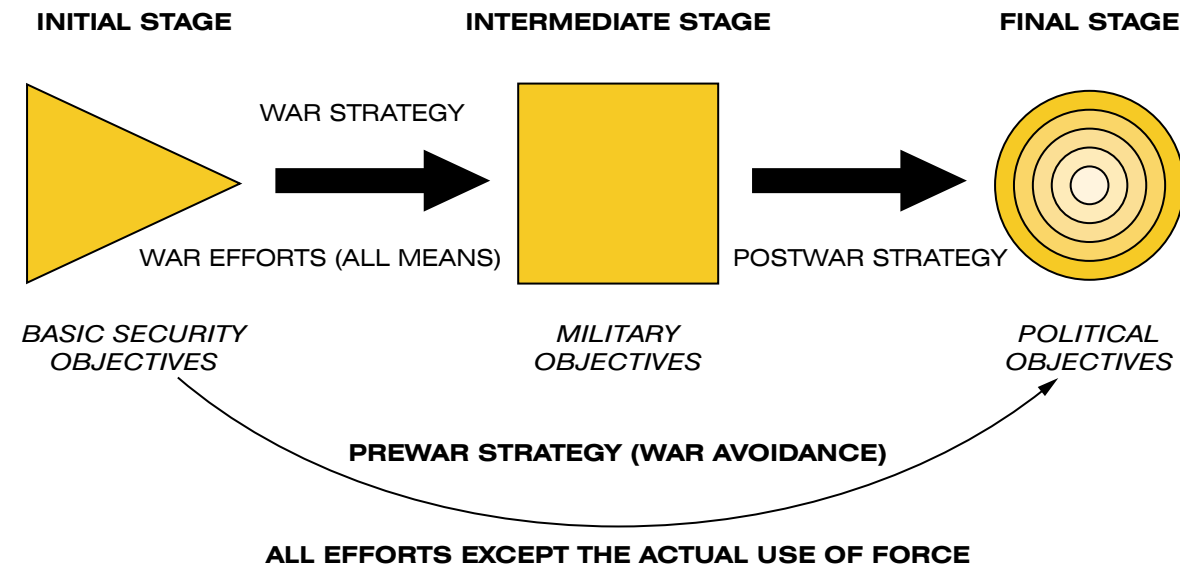
The assailant should always prepare for a ground offensive although it might be unnecessary if there is a shortcut to victory. The shortcut is possible only if the assailant is able to read the enemy's mind correctly, and willing to accommodate him out of deteriorating situations. By human nature, nobody wants to be defeated, lose power, and become a war criminal. In many cases, political leaders do not give up even though their field forces are about to be defeated because they cannot accept the consequences. According to Sun Tzu, one should leave a way out for a desperate enemy otherwise he might decide to fight to the death.¹¹⁵ When there is an indication that the enemy might give up, the assailant should seize the opportunity by providing him with a comfortable way out. If the enemy decides to take the offer, the assailant would benefit from a quick victory.

Once the military objectives have been achieved, the war may have not yet come to an end although armed hostilities may no longer exist. The postwar strategy must be implemented in order to turn the short-term military success into the desired end-state. In terms of mind-time-space, we also have to change the enemy's mind after having prevented him from exploiting time and space. One of the lessons learned from the 1991 Gulf War was that there was no postwar strategy to terminate the conflict.¹¹⁶ While the use of force may bring the enemy to negotiation, the long-term political objectives can only be achieved by conflict resolution. The victorious assailant may have a bargaining power to coerce the loser to accept the terms of peace but it would be meaningless unless the loser is also satisfied with the resolution. Conflict resolution is largely based on compromise. The fundamental conflicts must be correctly identified and the most suitable solution or course of action to remove the

One of the lessons learned from the 1991 Gulf War was that there was no postwar strategy to terminate the conflict. While the use of force may bring the enemy to negotiation, the long-term political objectives can only be achieved by conflict resolution



conflicts must be agreed upon by both sides. The victorious assailant may have to make some concessions himself in return for sustainable peace otherwise he might have to wage subsequent wars.

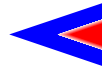


Since the advent of airpower, there have been many unsatisfactory attempts to explain the relationship between a targeting strategy and its strategic consequences. Dr Hammond points out that the connection between the application of military force on a particular target set and its strategic effects is wrongly assumed to be automatic.¹¹⁷ Only 'knowing the enemy', specifically what he values and his cultural mind-time-space, will tell us how a military action may achieve a moral, mental, and emotional strategic effect. Recently, scholars have begun to focus on what the enemy values. For example, 'axiological targeting' is a strategy that targets what the enemy leaders at every level value.¹¹⁸ 'Countervalue military targeting' is another strategy that targets military assets most valued by the enemy.¹¹⁹

Figure 3: The three stages of war according to Sun Tzu's concept

According to Sun Tzu, the connection between a military action and the desired end-state is by design. A right military strategy may bring a military victory but does not guarantee a favorable political outcome unless military objectives are set correctly and postwar political efforts are successful. This can be visualized by breaking down war into progressive stages as illustrated by figure 3. Military actions can only bring us to the intermediate stage. A military success is just a stepping-stone toward the end, not an end in itself, and does not necessarily lead to a strategic success. It is an effective postwar strategy that will allow us to proceed further to the final stage. While it may not be easy to change the enemy's mind, it may even be more difficult to change our own minds. To achieve sustainable peace, we need to have the right attitude toward the coexistence of nations.

In summary, Sun Tzu's concept of war is still relevant to modern warfare. Although the strategic paralysis concept is based on the combined concepts of Boyd's psychological paralysis and Warden's physical paralysis, it is largely dominated by Warden's emphasis on the physical side while Boyd's emphasis on the grand strategic level is missing. There are a number of possible theoretical flaws in the strategic paralysis concept. There are also many practical limitations at all levels of strategy. Although some of these limitations could be overcome by advanced technology and/or new tactics, new limitations would certainly arise as a result of the enemy's adaptations.¹²⁰



Sun Tzu's concept may make it possible for small nations with limited airpower to adopt the strategic paralysis concept with some modifications. Since strategic paralysis is a relative capability, small nations may have such a capability in relation to a weaker state. The most likely scenarios for them are limited armed conflicts due to territorial disputes. Small nations may not have to use their airpower in the same way superpowers do because their enemies may only have to be paralyzed locally by tactical paralysis campaigns.

Sun Tzu's concept of war offers an alternative approach that suits small nations. In regard to strategic thinking, war should be perceived from a broad perspective. The overall strategy to achieve the objectives of war should be comprehensive and exploit all available means. States should avoid war by all means and non-military means should take precedence before the use of force. States should base their strategy on the grand strategic calculation of war. States should always comply with the five essential criteria. Most importantly, *tao* should always be maintained even in peacetime. Knowing the enemy both physically and mentally is very important because it allows states to avoid war by foiling the enemy's strategy. A strategy can be foiled by eliminating one or more components of the strategic trinity: will, means, and opportunities.

Pursuing a right strategy is crucial to small nations. If war breaks out, small nations should aim for a short military campaign because of their limitations. Protracted war, high attrition, and collateral damage should be avoided to minimize losses and the residual effects. They have to aim at both 'not losing' and 'winning'. In order not to lose, they must not make any mistakes themselves. In order to win, they must expose and target their enemy's vulnerabilities and weaknesses. The key to military success is to seek strategic advantages and choose correct timing, not necessarily superior military strength or the rapidity of attacks. Small nations should also continue their efforts to foil the enemy's strategy during the state of war along with other war efforts.

The conduct of war should also comply with Sun Tzu's concept. Small nations should prepare the battlefield by isolating their enemies as much as possible. They should think defensively and prepare for the worst cases. They should aim at achieving their military objectives with the initial allocation of assets and within the timeframe. This could be achieved by setting military objectives correctly. They should target what their enemies cannot afford to lose, which may not necessarily be the contested territories or the stakes. The application of tactical paralysis may require a new targeting strategy that better suits their operational limitations and requirements. Since military objectives may have to be revised from time to time, the targeting strategy should be flexible. Small nations should take a shortcut to quick victory whenever possible by providing their enemies with a comfortable way out. They may also have to compromise with their enemies in return for sustainable peace. That is to say, the postwar strategy must be implemented to turn the short-term military success into the desired end-state.

This paper has demonstrated that strategic paralysis applied in conjunction with Sun Tzu's concept of war could prevent similar failures to those of the 1991 Gulf war and might also be feasible for small nations with limited airpower. One should always bear in mind that war is always fought simultaneously in both the physical and psychological dimensions, and that time is not a limiting



factor for war in the broad sense. While the strategic paralysis concept emphasizes the overwhelming superiority on the physical side, one should never ignore the psychological side because it is potentially as important and may be the factor that determines the outcome of war in the long term.

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NOTES

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- 2 Hammond, Grant T., 'Myths of the Gulf War': Some "Lessons" Not to Learn', *Airpower Journal*, Vol. 12, No. 3, Fall 1998, pp. 8-10
- 3 Arkin, William M., 'Baghdad: The Urban Sanctuary in Desert Storm?', *Airpower Journal*, Vol. 11, No. 1, Spring 1997, pp. 16-17
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- 16 ibid, pp. 201-202 and 250-254 (*The Art of War* Chapters 8 and 11)
- 17 ibid, pp. 84-86 and 284-286 (*The Art of War* Chapters 3 and 13)
- 18 Wing, p. 45 (*The Art of War* Chapter 3)
- 19 Ames, pp. 111-112 (*The Art of War* Chapter 3), interprets that one should keep himself intact while Tao, p. 99 (*The Art of War* Chapter 3), interprets that one should take all under heaven intact (i.e. everything including the enemy state and its army).
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- 21 Ames, p. 161 (*The Art of War* Chapter 11)
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- 28 Ames, pp. 119-121 (*The Art of War* Chapter 5)
- 29 ibid, pp. 135 and 150 (*The Art of War* Chapters 8 and 10)
- 30 Sawyer, pp. 178-179 (*The Art of War* Chapter 3)

- 31 Ames, p. 120 (*The Art of War* Chapter 5)
- 32 *ibid*, p. 103 (*The Art of War* Chapter 1)
- 33 *ibid*, p. 107 (*The Art of War* Chapter 2)
- 34 *ibid*, pp. 104-105 and 169-171 (*The Art of War* Chapters 1 and 13)
- 35 *ibid*, pp. 119-121, 153-162, and 169-171 (*The Art of War* Chapters 5, 11, and 13)
- 36 *ibid*, pp. 119-121 (*The Art of War* Chapter 5)
- 37 *ibid*
- 38 *ibid*, pp. 115-116 and 123-127 (*The Art of War* Chapters 4 and 6)
- 39 Tao, pp. 105-107 (*The Art of War* Chapter 6)
- 40 *ibid*
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- 42 Boyd, John R., 'A Discourse on Winning and Losing', Unpublished Work, 1976-1987, Available from Dr Alan Stephens, University College, ADFA, Note: The work consists of 'Pattern of Conflict', a 193 pages slide presentation dated Dec 1986; 'Organic Design for Command and Control', a 37 pages slide presentation dated May 1987; 'The Strategic Game of ? and ?', a 59 pages slide presentation dated Jun 1987; 'Destruction and Creation', a 16 pages unpublished essay dated 3 Sep 1976; and 'Revelation', a 38 pages slide presentation undated.
- 43 Boyd, 'Pattern of Conflict', pp. 139-143
- 44 Boyd, 'Organic Design for Command and Control', pp. 13 and 26
- 45 Fadok, David S., 'John Boyd and John Warden: Airpower's Quest for Strategic Paralysis', in Meilinger, Phillip (ed.), *The Paths of Heaven: The Evolution of Airpower Theory*, Air University Press, Maxwell AFB, Alabama, 1997, p. 366
- 46 Boyd, 'Pattern of Conflict', pp. 134-137
- 47 Boyd, 'The Strategic Game of ? and ?', pp. 35-36 and 47
- 48 Boyd, 'Pattern of Conflict', pp. 133-134, Note: By the phrase 'getting inside the enemy's mind-time-space', Boyd probably suggested that one should shape the enemy's perception as well as prevent him from using time and space.
- 49 *ibid*, pp. 13-14
- 50 *ibid*
- 51 *ibid*, pp. 41-42
- 52 Hammond, Grant T., 'The Essential Boyd', Unpublished Essay, 1997, Available from Dr Alan Stephens, University College, ADFA, p. 10, Note: According to Dr Hammond, Boyd believed that the real target is always the enemy's perception.
- 53 Boyd, 'Pattern of Conflict', p. 182
- 54 Warden, John A. III, *The Air Campaign: Planning for Combat*, Pergamon-Brassey's International Defense Publishers, Washington, 1989
- 55 Warden, John A. III, 'Employing Air Power in the Twenty-first Century', in Shultz, Richard H., Jr. and Pfaltzgraff, Robert L., Jr. (eds.), *The Future of Air Power in the Aftermath of the Gulf War*, Air University Press, Maxwell AFB, Alabama, 1992, pp. 57-82
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- 58 Warden, 'The Enemy as a System', p. 54
- 59 Belote, Howard D., 'Warden and the Air Corps Tactical School', *Airpower Journal*, Vol. 13, No. 3, Fall 1999, pp. 44-45; and Murphy, Timothy G., 'A Critique of the Air Campaign', *Airpower Journal*, Vol. 8, No. 1, Spring 1994, p. 70
- 60 Warden, *The Air Campaign: Planning for Combat*, pp. 7, 13, 22-23, 33, and 59-60
- 61 *ibid*, pp. 109-126
- 62 Warden, 'Employing Air Power in the Twenty-first Century', pp. 61-62
- 63 Warden, 'The Enemy as a System', p. 47
- 64 Warden, 'Employing Air Power in the Twenty-first Century', pp. 64-82
- 65 Warden, 'The Enemy as a System', pp. 42-43
- 66 *ibid*, pp. 42-48 and 55
- 67 *ibid*, pp. 53-55
- 68 Warden, 'Planning to Win', pp. 78-90
- 69 Perry, James D., 'Operation Allied Force', *Aerospace Power Journal*, Vol. 14, No. 2, Summer 2000, pp. 3 and 8-9 of 13 (through internet), Note: One of the key ideas is to disperse airpower by operating small air units from many concealed locations. Hence, future fighter aircraft should have short takeoff and landing capability to be able to operate from these dispersed

- primitive strips. In addition, future ground forces will have to be small and well-trained to survive in high-tech wars.
- 70 Thomas, Timothy L., 'Kosovo and the Current Myth of Information Superiority', *Parameters*, Vol. 30, No. 1, Spring 2000, pp. 1-14 (through internet), Note: Thomas interviewed Admiral James Ellis, C-in-C of NATO's Allied Forces Southern Europe in 1999. Thomas finds that excessive information has a potential to reduce a military leader's awareness of an unfolding situation and excessive data also leads to sensory overload. He quotes Admiral Ellis that, 'Information saturation is additive to the fog of war ... uncontrolled, it will control you and your staffs and lengthen your decision-cycle times.'
- 71 ibid, Note: Thomas points out that despite NATO having almost total information superiority, its situation awareness during Operation Allied Force was manipulated by the Serbs more often than expected. Although NATO knew almost everything that happened in the battlespace, it did not understand everything. NATO also experienced delays in its integrated information operations as a result of the lack of key personnel.
- 72 Warden, 'Employing Air Power in the Twenty-first Century', pp. 64-68; and Warden, 'The Enemy as a System', pp. 49-53
- 73 Warden, 'The Enemy as a System', pp. 42-43
- 74 Hosmer, Stephen T., *Psychological Effects of U.S. Air Operations in Four Wars 1941-1991: Lessons for U.S. Commanders*, RAND, Santa Monica, CA, 1996, p. 189, Note: Hosmer concludes from the study of psychological effects of air operations in WWII, the Korean War, the Vietnam War, and the Gulf War that the psychological dimension of war should be emphasized in military education, training, planning, and the conduct of military operations.
- 75 Stephens, Alan, Private Discussion, Oct 2000
- 76 Linn, Thomas C., 'Adversarial Use of Weapons of Mass Destruction', *Joint Force Quarterly*, No. 23, Autumn/Winter 1999-2000, pp. 58-64, Note: Linn points out that WMD are cheap, available, potent, and very difficult to detect. Therefore, it is possible that nation states or terrorists could use WMD to attack their adversaries' population centers.
- 77 Correll, John T., 'Visions', *Air Force*, Vol. 83, No. 9, Sep 2000, pp. 36-37, Note: According to the US Joint Vision 2020, the effects of mass could be achieved regardless of where platforms reside, fly, or orbit. Nevertheless, these limitations will still exist to some extent.
- 78 Stillion, John and Orletskey, David T., *Airbase Vulnerability to Conventional Cruise-Missile and Ballistic-Missile Attacks*, RAND, Santa Monica, CA, 1999, pp. 59-60, Note: Stillion and Orletskey conclude that by combining several well-known and widely available technologies such as UAVs, GPS, submunition warheads, and ballistic missiles, an enemy could severely disrupt the USAF's ability to conduct air operations from airbases in the theater.
- 79 Meilinger, Phillip S., 'Air Strategy: Targeting for Effect', *Aerospace Power Journal*, Vol. 13, No. 4, pp. 1-13 (through internet), Note: Meilinger believes that selecting the correct targets is the essence of air strategy. He also points out that COGs of one country are not necessarily those of another and may change over time within the same country.
- 80 Vick, Alan, et al., *Aerospace Operation in Urban Environments: Exploring New Concepts*, RAND, Santa Monica, CA, 2000, pp. 264-265, Note: Vick and his colleagues find that one of the major factors that significantly degrades the effectiveness of airpower is concern about friendly and non-combatant casualties.
- 81 RAAF, *DI(AF) AAP 1003 Operations Law for RAAF Commanders*, Air Power Studies Centre, RAAF Base Fairbairn, Canberra, 1994, the introduction and pp. 7-1 to 7-6
- 82 Arkin, William M., 'Smart Bombs, Dumb Targeting?', *The Bulletin of the Atomic Scientists*, Vol. 56, No. 3, May/Jun 2000, pp. 46-53, Note: Arkin effectively argues that the effectiveness of Operation Allied Force was compromised by the need to minimize civilian casualties.
- 83 Thomas, p. 6 of 14 (through internet), Note: This problem actually occurred in the early stage of Operation Allied Force.
- 84 Haffa, Robert P. and Watts Barry D., 'Brittle Swords: Low-Density, High-Demand Assets', *Strategic Review*, Vol. 28, No. 4, Fall 2000, pp. 43-48, Note: The US admitted that it could not meet the operational demands for some low-density, high-demand assets which were critical to its advanced war fighting capabilities during Operation Allied Force even though those assets were not affected by the enemy's actions.
- 85 O'Brien, Kevin A., 'Intelligence Gathering on Asymmetric Threats – Part One', *Jane's Intelligence Review*, Vol. 12, No. 10, 2000, p. 52; and Perry, pp. 1-13 through internet, Note: Some PLA officers believe that in future, dedicated computer viruses could paralyze the adversary's electric power plants, financial institutions, stock markets, telecommunication infrastructure, and integrated defence networks, thus creating national chaos and reducing the effectiveness of armed forces.
- 86 Larsen, Randall J. and David, Ruth A., 'Homeland Defense: Assumptions

- First, Strategy Second', *Strategic Review*, Vol. 28, No. 4, Fall 2000, pp. 4-10, Note: Larsen and David believe that the threat of asymmetric attacks against the US homeland, either by nation states or terrorist organizations, is real and increasing. They recommend that homeland defence should be seriously addressed.
- 87 Thomas, p. 3 of 14 (through internet), Note: Despite the lesson learned from hunting Scuds in the Gulf War, a similar problem was experienced again in Operation Allied Force.
- 88 Gerwehr, Scott and Glenn, Russell W., *The Art of Darkness: Deception and Urban Operations*, RAND, Santa Monica, CA, 2000, pp. 57-59
- 89 Tilford, Earl H., 'Operation Allied Force and the Role of Air Power', *Parameters*, Vol. 29, No. 4, Winter 1999/2000, p. 5 of 11(through internet), Note: This problem was experienced in Operation Allied Force. The Serbs made use of deception effectively while NATO itself imposed a minimum altitude of 15,000 feet to avoid casualties.
- 90 Clarke, Shaun, *Strategy, Air Strike and Small Nations*, Air Power Studies Centre, RAAF Base Fairbairn, Canberra, 1999, pp. 67-70, Note: Clarke summarizes that small nations' main limitations are largely economic based. These constraints include inability to mass platform and weapons, inability to sustain protracted war, limited access to advanced technology, low tolerance to casualties, and low capacity to replace attrition.
- 91 Group Interview, Note: A senior RTAF officer notes that unlike in the Middle East, many of the contested territories in Southeast Asia are neither economically valuable nor strategically vital to the disputing parties because gaining or losing the territories is unlikely to have significant economic or security impacts on the parties in the short term.
- 92 Ames, pp.103-105 and 119-121 (*The Art of War* Chapters 1 and 5)
- 93 *ibid*, p. 111 (*The Art of War* Chapter 3)
- 94 *ibid*
- 95 Huang, p. 49 (*The Art of War* Chapter 3)
- 96 Mets, David R., 'To Kill a Stalking Bird', *Airpower Journal*, Vol. 12, No. 3, Fall 1998, pp. 91-92
- 97 Tao, p. 111 (*The Art of War* Chapter 8)
- 98 Edwards, Sean J.A., *MARS Unmasked: The Changing Face of Urban Operations*, RAND, Santa Monica, CA, 2000, pp. xiv-xv and 95-98
- 99 Tao, pp. 97-98 (Sun Tzu, *The Art of War* Chapter 2)
- 100 Handel, Michael I., *Masters of War: Classical Strategic Thought* (Third, Revised and Expanded Edition), Frank Cass, London, 2001, pp. 307-326, Note: This problem gave birth to the 1984 Weinberger Doctrine. Whether vital US interests are involved and whether political and military objectives are clearly defined are two of the six major tests to be applied before committing US combat forces overseas.
- 101 Bryan, Ian, 'Military Success Requires Political Direction', *Strategic Review*, Vol. 27, No. 4, Fall 1999, pp. 3-11, Note: Brian argues that the military may fail to recommend the best course of action because of many reasons. For example, it may pursue bureaucratic objectives, misinterpret national political objectives, misjudge the political impact of its actions, or fail to support foreign policy.
- 102 USGAO, *Operation Desert Storm: Evaluation of the Air Campaign*, USGAO, Washington, D.C., 1997, pp. 194-195
- 103 Pape, Robert A. Jr., *Bombing to Win: Air Power and Coercion in War*, Cornell University Press, New York, 1996, pp. 10-11
- 104 Ames, pp. 123 and 162 (*The Art of War* Chapters 6 and 11)
- 105 Group Interview, Note: From his experience in many territorial disputes, a senior RTAF officer observes that the adversaries usually strengthen their positions before engaging in limited armed conflicts. The application of airpower is often ineffective when the adversaries conceal themselves in modified natural shelters especially in mountainous terrain.
- 106 Ames, p. 120 (*The Art of War* Chapter 5)
- 107 Pape, p. 75
- 108 *ibid*, p. 20
- 109 Olsen, John Andreas, 'Operation Desert Storm: An Examination of the Strategic Air Campaign', Dissertation submitted to De Montfort University for PhD, UK, Mar 2000, pp. 317-321
- 110 Barlow Jason B., 'Strategic Paralysis: An Air Power Strategy for the Present', *Air Power*, Vol. 7, No. 4, Winter 1993, p. 6, Note: According to Barlow, the 'attrition' strategy seeks victory by exhausting the enemy in time, space, energy, and supplies.
- 111 Tao, p. 99 (*The Art of War* Chapter 3)
- 112 *ibid*, pp. 102 and 107 (*The Art of War* Chapters 4 and 6)
- 113 Meilinger, p. 12 of 13 (through internet), Note: Meilinger similarly suggests that 'flexibility is the key to airpower.'
- 114 Bryan, p. 11, Note: Bryan argues that the exclusion of political input would degrade military effectiveness. However, this should not be confused with

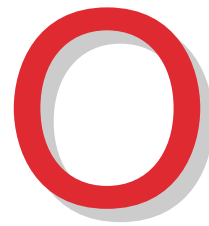
political interference. He suggests that political leaders should monitor military policy and action; nonetheless, they should not micromanage military operations or flippantly disregard military advice.

- 115 Ames, p. 132 (*The Art of War* Chapter 7)
- 116 Horner, Charles A., 'New Era Warfare', in Stephens, Alan (ed.), *The War in the Air*, Air Power Studies Centre, RAAF Base Fairbairn, Canberra, 1994, p. 324, Note: General Horner who was in charge of the coalition's air assets during Operation Desert Storm, admits that he did not know what to negotiate with the Iraqis when he was directed by the US Government to do so.
- 117 Hammond, Grant T., Private Correspondence, Feb 2001
- 118 Wijninga, Peter W.W. and Szafranski, Richard, 'Beyond Utility Targeting: Toward Axiological Air Operations', *Aerospace Power Journal*, Vol. 14, No. 4, Winter 2000, pp. 47-48
- 119 Mueller, Karl, 'Counter military Strategies for Coercion: Threatening What the Enemy Values', Presentation at the International Studies Association 42nd Annual Convention, Chicago, Feb 2001, pp. 4-5
- 120 Scales, Robert H., Jr., 'Adaptive Enemies: Dealing with the Strategic Threat after 2010', *Strategic Review*, Vol. 27, No. 1, Winter, 1999, p. 13, Note: Scales believes that 'Every successful technical or tactical innovation that provides a dominant military advantage eventually yields to a countervailing response that shifts the advantage to the opposing force.'

A photograph of an F-16 fighter jet in flight, viewed from a low angle. The jet is grey and white, with "NY" and "79335" visible on the tail. It is carrying a large white pod under the nose and missiles on the wings. The background is a light blue sky with faint, circular patterns. In the top right corner, there is a small blue and red logo.

Air Power Versus a Fielded Army:

**A Construct for Air
Operations in the 21st
Century**



Operation Desert Storm, the 1991 Gulf War, and Operation Allied Force, the 1999 Air War over Serbia, saw US and coalition Air Forces attacking enemy field forces at unprecedented levels. Given the real change in the nature, strategy, and conduct of air operations in the last decade, this study examines how to most efficiently employ airpower to achieve its objectives in the asymmetric attack against a fielded army.

During Desert Storm, US Air Forces developed medium altitude tactics increasing survivability by over-flying the range of Iraqi AAA and MANPADS. Difficulties in attacking from medium altitude were countered with massed formations of specialised armor-killing A-10s, the development of F-16 "Killer Scouts," and the F-111 and F-15E tactic of "Tank Plinking" with laser guided bombs. During Allied Force, the challenge lay not in attacking the enemy, but in locating and identifying an army interspersed with a large number of civilian refugees.

A systems approach is required to most efficiently attack a fielded army by air. The key is the integration of ISR assets through an intelligence "flex targeting" cell and the use of terminal air controllers such as Forward Air Controllers Airborne (FACAs), along with trained strikers capable of precision attack. This approach requires a change in Joint and Air Force doctrine acknowledging the supported role that US Air Forces have performed against enemy fielded forces over the last decade. It calls for the adaptation of the tactics, techniques, and procedures necessary to ensure the USAF prepares for these kinds of operations in the future.

THE AIRPOWER DEBATE

Though this paper focuses predominantly on operational and tactical concerns, it is firmly rooted in the larger issues of airpower and warfare. Even as the one hundredth anniversary of powered flight approaches, debate over the military effectiveness of airpower continues. Both theorists and practitioners have addressed this most important question and, more often than not, their answers have stressed the strategic dimensions of aerial warfare. The critical component of strategic airpower theory and doctrine has been the need to strike directly at the enemy's heartland in order to destroy the enemy's willingness or capability to wage war. Theorists and practitioners of air warfare from Douhet to Warden have equated airpower effectiveness with attacks on strategic targets: the enemy's population, war-making industries or industrial web, or the enemy's leadership. Whether command of the air, high-altitude daylight precision bombardment, or strategic paralysis, the focus has been on attacking targets characterized as strategic in nature.

However, in the wake of the Gulf War, some theorists and practitioners are suggesting that a more effective (and politically palatable) use of airpower lies not only in attacking strategic targets, but also in directly attacking an opponent's fielded forces. This new emphasis does not suggest targeting fielded forces in *support* of planned or actual ground operations, but rather targeting fielded forces independently with a goal of destroying or degrading them to the point of enemy accession to demands. In his book *Bombing to Win*, Robert Pape suggests such an approach. Pape divides coercive air strategies into four categories. Punishment strategy attempts to increase the pain to enemy civilians to the point where the cost of continued resistance by the state exceeds the benefits of their territorial interests¹. The bombing of cities to create homeless citizens and severe shortages of key supplies is an example of this strategy. Risk strategy slowly raises the costs of continued resistance over time, forcing the enemy to weigh future risks with continued resistance.² Vietnam's Rolling Thunder air campaign, based on the logic of Schelling's gradualism, provides this classic example of this strategy put into practice. A decapitation strategy strikes key leadership and command and control facilities. This was applied in the initial air strikes of the Gulf War.³ Finally, denial strategy targets the enemy's ability to achieve its military objectives.⁴ In his analysis of thirty-three airpower case studies, Pape concludes that only denial strategy has been decisive in aerial warfare.⁵ Though Pape's analysis and conclusions are subject to challenge, his conclusions have ignited a serious debate within America's security community on the effective use of airpower.⁶

Not only theorists, but also Air Force practitioners, have recently debated the effectiveness of direct aerial attack against an advancing enemy army. Major General Charles Link championed the use of airpower asymmetrically against enemy ground forces during the "Halt" phase.⁷ This halt strategy is designed to stop the enemy short of their objective. Once stopped, the enemy must resolve either to survive in friendly territory under aerial bombardment or to withdraw to a position where they are no longer threatened.⁸ A



In his analysis of thirty-three airpower case studies, Pape concludes that only denial strategy has been decisive in aerial warfare

A B-57 drops 750lb bombs over Vietnam, 1967.

halt strategy is not just a defensive posture, but an application of airpower to directly defeat an enemy by defeating/destroying its fielded forces. The debate on how to best coerce an opponent through application of airpower now involves more than just strategic attack.

The purpose of sketching these distinctions between theories is not one of semantics. Rather, it is background to

the real change in the nature, strategy and conduct of air operations in the last decade. If there is any validity in the theories put forward by thinkers like Pape and Link, then practitioners must develop the systems to most efficiently strike fielded forces with the appropriate lethality, flexibility, and controllability. Reinforcing this requirement are the recent policy and strategy shifts towards the use of airpower to attack not only traditional strategic targets, but also fielded forces independent of friendly ground operations. As both the earlier operations in Bosnia and the latest in Kosovo illustrate, political leaders are looking to coerce opponents with attacks directed at fielded forces accomplished primarily, if not solely, through airpower. This paper draws on the experiences of attacking Iraqi and Serbian fielded forces during Desert Storm and Allied Force. It then lays out the operational and tactical framework, emphasizing a systems approach, for efficiently conducting air operations against fielded forces.

DESERT STORM: ATTACKING THE REPUBLICAN GUARD

On 17 January, 1991 United States and coalition forces launched the Gulf War air offensive. Waves of aircraft flooded into Kuwait and Iraq, attacking key integrated air defense system nodes, airfields, command and control systems, nuclear/biological/chemical sites, and electric plants.⁹ Daybreak of day one witnessed the start of attacks against Iraqi ground forces in Kuwait. Among the centers of gravity identified by General Schwarzkopf, the US Joint Forces Commander, were the seven elite Republican Guard divisions held in reserve along the Iraq-Kuwait border.¹⁰ While aerial attack continued against key “strategic” targets in Iraq, 75% of the coalition strike missions focused on the Iraqi forces in Kuwait.¹¹

Operation Desert Storm provided a catalyst for airpower thinkers like Pape and Link. The Gulf War demonstrated the ability of air forces to effectively attack fielded forces, fundamentally changing the perspective of many senior military leaders and policy makers on how warfare should be conducted. Never before had airpower been called upon to produce the level of destruction upon fielded forces that coalition air forces were expected to achieve prior to a ground invasion of Kuwait. Because US casualty estimates were predicted to be as high as fifteen thousand, US concern over these possible losses led the national command authority and General Schwarzkopf to develop a strategy emphasizing the use of airpower to significantly reduce the Iraqi army’s size, maneuver capability, and will to fight.¹² The same capabilities Colonel Warden and his planners capitalized upon to enable their strategic attacks, improvements in target acquisition and precision weapons delivery, provided a quantum leap in airpower’s lethality against an army.

This air-first strategy proved immensely successful, with friendly casualty rates far below even the most optimistic estimates and with friendly ground forces achieving objectives well ahead of schedule, with limited Iraqi resistance. The exact relationship between the destruction of Iraqi ground forces by air attack and the ultimate decision by Iraq to abandon Kuwait and agree to negotiations is still debated. Still, the fact remains that airpower played a deliberate, leading roll in the defeat of the Iraqi Army. However, this aerial achievement was not accomplished without major modification to existing tactics, techniques and procedures.



Iraqi Hardened Air Shelters (HAS)

air defense system. Phase III was the air attack against Iraq's fielded forces. It called for the 50% attrition of Iraq's 5,000 pieces of dug in armor and artillery prior to any ground offensive.¹³ In this phase, Schwarzkopf was most concerned with the three heavy divisions of the seven Republican Guard divisions along the Kuwait-Iraq border.¹⁴ The units were widely dispersed and dug in, with thousands of U-shaped earthen berms protecting their T-72 tanks.¹⁵ Their defenses included anti-aircraft artillery (AAA), infrared SA-13 surface-to-air-missiles (SAMs) and radar-guided SA-6 SAMs.

Phase III required the unprecedented success of airpower against a fielded army.¹⁶ Air planning boss Brigadier General Buster Glosson's briefing to Schwarzkopf in December 1990 indicated the Republican Guard could be attrited to 50% in five days, assuming 600 sorties a day.¹⁷ Air planners divided Kuwait and Iraq into a grid pattern with the smallest division being a 30 nautical mile x 30 nautical mile square known as a "kill box". Aircraft were then assigned kill boxes and ordered to locate and destroy Iraqi forces within that area.¹⁸ The job of attacking the elite Republican Guard fell to F-16s and B-52s, while A-10s were used against the regular Iraqi divisions dug in along the Kuwait-Saudi border.¹⁹

By the fifth day of phase III, coalition air attacks against the Republican Guard had not achieved anywhere near the 50% attrition levels expected by Schwarzkopf.²⁰ Post war analysis indicated that between 24-34% of Republican Guard heavy division armor was actually attrited during the entire 38 days of the air campaign.²¹ Glosson's 5-day estimate proved overly optimistic for two reasons. First, air attacks were not as effective as war-gaming analysis predicted.²² US Air Forces used medium altitude tactics to reduce the threat from Iraqi air defenses. While this greatly improved survivability, US pilots were

The exact relationship between the destruction of Iraqi ground forces by air attack and the ultimate decision by Iraq to abandon Kuwait and agree to negotiations is still debated

Desert Storm educated the USAF on how to organize and train airpower to accurately attack a fielded army and the Gulf War has reshaped how the United States employs its airpower.

The Gulf War air offensive consisted of three phases, conducted nearly simultaneously. Phases I and II were directed against strategic target sets to include leadership, command and control facilities, nuclear, biological and chemical (NBC) facilities, airfields, aircraft, and the integrated

relatively unfamiliar with medium altitude tactics. Unforeseen difficulties with target identification, poor weather, and inaccuracies in delivering medium altitude munitions reduced effectiveness. Second, the number of sorties flown against the Republican Guard fell well short of 600 sorties a day. A combination of initial emphasis on phase I operations, a reluctance to employ A-10s that deep in the battlespace, and unanticipated Scud hunting missions reduced the number of sorties available to attack the Republican Guard. For the first 5 days, total strikes against Republican Guard units were constant at around 100 missions per day. By the end of day 10, a cumulative count of sorties against the Republican guard totaled 728 missions, an average of only 72.8 sorties a day.²³

In addition to the lower than estimated sortie rates, intelligence and targeting support against the Iraqi fielded forces proved extremely difficult. The Joint Air Operations Center (JAOC) intelligence cell at Riyadh was overwhelmed with concurrent requests

The job of attacking the elite Republican Guard fell to F-16s and B-52s, while A-10s were used against the regular Iraqi divisions dug in along the Kuwait-Saudi border

The ubiquitous A-10 ‘Tankbuster’



to support strategic, counterair, counterland, and Scud hunting operations.²⁴ The task of destroying the Iraqi army, with thousands of vehicles spread out over thousands of square miles of desert was enormous. This, coupled with an underlying assumption that imagery of a potentially mobile unit had limited viability, restricted the precision imagery available to help plan and direct attacks on the Iraqi Army.²⁵ The intelligence system was neither designed nor prepared to provide the quantity of imagery required by the flying units.²⁶ Some flying unit intelligence shops provided comprehensive information on the Iraqi's Ground Order of Battle, based on the Joint Forces Air Component Commander's priorities. This included available imagery, GPS-based coordinates, and unit derived target areas of interest products.²⁷ However, no one at the JAOC was responsible for producing these materials and, consequently, many aircrews launched on missions with little more than the approximate location of enemy divisions within an assigned kill box.²⁸

Even when intelligence products were available, the usefulness of the material was suspect. Aircrew had difficulty in locating the exact coordinates of potential targets dispersed throughout the desert. The flat, featureless terrain made detailed maps (such as 1-50,000) unusable for target location criteria. Limited GPS



...many aircrews launched on missions with little more than the approximate location of enemy divisions within an assigned kill box

medium altitude it was difficult to identify what was being attacked. While differentiating tank, artillery, and soft skin vehicles was possible, assessing bombing damage proved difficult.³¹ From medium altitude it was nearly impossible for pilots to know exactly what they had destroyed. Also the HUD (Heads-Up-Display) video footage provided by most fighter aircraft from medium altitude weapon delivery attacks was unusable for BDA purposes.³²

Second, Central Command Air Force (CENTAF) intelligence was overwhelmed and had no overall framework to integrate the reports from the numerous wings into an overall picture of the effectiveness of the air attacks.³³ Compounding this problem was Schwarzkopf's decision to allow the Army and Marines to separately determine the attrition rates of enemy ground forces. The

navigation capability of tactical aircraft left aircrews reliant on inertial navigation systems (INS) that were sufficient for basic navigation, but inadequate for precise coordinate location.²⁹ Aircrews flew to known or suspected target areas and then commenced visual searches for any viable targets.

The intelligence deficit was not insurmountable. More accurate information including photos and graphics was available. The Army Intelligence Agency had studied the Kuwait Theater of Operations (KTO) continuously and produced highly accurate and detailed templates with individual tanks plotted, which were then supplied to US Army units in theater.³⁰ But this information was never made available to the air units and crews responsible for attacking the Iraqi army. This disconnect between the US Army and Air Force was just one indication of a chasm between the two services' intelligence and targeting systems.

As problematic as the intelligence support was the lack of coordination between Army and Air Force over the rules governing Battle Damage Assessment (BDA). The objective of 50% attrition of Iraqi armor and artillery meant that BDA had to accurately track the damage being done by air attack. This proved difficult for a variety of reasons. First, from

lack of pre-coordinated Joint BDA guidelines led to vast disagreements over the state of the Republican Guard. The Army's lack of confidence in medium altitude attack led them to only accept BDA from laser guided bombs (with accompanying targeting pod film) and A-10 attacks.³⁴ The friction between services and the BDA calculating formulas and permutations floating around Riyadh ultimately led Schwarzkopf to abandon the percentages game.³⁵ He instead relied on reports from the coalition ground commanders, to evaluate whether the air attacks had achieved adequate levels of battlefield preparation.

A-10s mounted three days of wing-sized attacks against the division, with powerful results despite Iraqi efforts to dig their forces deeper under the desert sand...

At the tactical level, the problem was one of how best to destroy the dug in Republican Guard. While the JAOC never solved the intelligence challenges of locating and identifying enemy army forces, they incorporated three tactical changes to increase the efficiency of the operational air forces. The first tactic involved directing the unique firepower of A-10s against exposed and vulnerable Republican Guard forces. A-10s employed initially against front line forces near the Kuwaiti-Saudi Arabian border. On 27 February, Glosson instructed A-10 commanders to prepare to attack the Republican Guard Tawakalna armored division.³⁶ In attacking such a heavily defended area, A-10s flew in mass formations, in lieu of their usual two-ship formations. A-10s mounted three days of wing-sized attacks against the division, with powerful results despite Iraqi efforts to dig their forces deeper under the desert sand and stepped up efforts at deception. The combination of massed attack and a unique airframe designed and manned by pilots trained in the art of destroying armor proved a major step forward for coalition air strikes against Iraq's Republican Guard.³⁷

The second tactical innovation used against the Republican Guard was the introduction of the F-16 "Killer Scout."³⁸ Killer Scouts would take off early and reconnoiter the target area. Once identifying targets, they would then bring in additional fighters to attack these locations. The Killer Scouts were allocated air-refueling tankers and could thus remain on station for much longer periods of time, becoming familiar with the area and increasing their situational awareness. Along with identifying viable target areas for attack, Killer Scouts also aided in the collection of BDA. However, they did not completely solve the problem of target discrimination. Although they used binoculars, they still could not accurately tell the number of vehicles destroyed during their attacks. While the Killer Scout role had its limitations, this innovation allowed for the F-16s to more efficiently use their resources against the Iraqi fielded forces.

The third innovation was the introduction of "tank plinking," locating targets from medium altitude with infrared targeting pods and then attacking them with precision laser guided bombs.³⁹ One of the most pervasive arguments for tank plinking was the targeting pod video, which could clearly indicate the infrared contrast of Iraqi armor against the cold desert background.⁴⁰ This added to the ability to verify BDA and boosted Army Central Command (ARCENT) BDA estimates.

These tactical innovations by the USAF against the Republican Guard significantly increased the efficiency of airpower in directly attacking ground forces. The massed formations of A-10s, the introduction of Killer Scouts, and tank plinking combined to produce a quantum improvement in medium altitude tactics. While these tactics were effective at prosecuting attacks, the lag in the integration of intelligence and Imagery, Surveillance, and Reconnaissance (ISR) assets hindered further gains. Even if intelligence products were available, the lack of GPS equipped strikers operating over a featureless desert would have limited the effectiveness of the information.

OPERATION ALLIED FORCE: ATTACKING THE SERBIAN 3RD ARMY

Despite the primacy of strategic attack in Air Force thinking and doctrine, the preponderance of coalition airpower in the Gulf War was directed against Iraqi fielded forces. Some commentators have dismissed the importance of these attacks or viewed them as an anomaly based on the unique contextual elements of the Gulf War.⁴¹ For those who believed attacking fielded forces was reserved for the arena of a flat open desert, Operation Allied Force, the air operations against Serbia, proved otherwise.⁴² Once again, a combination of context, policy, and overall military strategy compelled airmen to apply airpower in direct attack of a fielded army. The situation was further complicated by the much-publicized caveat that the Serbian army would face no threat from NATO ground forces.

Planning for possible air operations against Serbia began in earnest May of 1998. By July, General Wesley Clark, Supreme Allied Commander Europe (SACEUR), was focusing NATO's military actions around a phased air operation, with an incremental approach to hold military escalation firmly under political control.⁴³ Until mid-February 1999, planning focused on punitive strikes against fixed command and control and military facilities in Kosovo, Montenegro and Serbia. However, while negotiations were being conducted at Rambouillet, France, General Clark ordered his Combined Forces Air Component Commander (CFACC), Air Force Lieutenant General Mike Short, to increase the scope of planned strikes to include attacks on the Serbian fielded forces in Kosovo. General Short was not convinced that direct attacks would be the best use of airpower, believing the key to meeting NATO's objectives lay in attacking the political leadership in Belgrade.⁴⁴ However, NATO's stated military objectives included two dealing directly with the Serbian fielded forces: deterring further Serbian action against the Kosovar Albanians, and reducing the ability of the Serbian military to continue offensive operations against them.⁴⁵ Prodded by General Clark, General Short tasked air planners to formulate a plan for attacking the Serbian 3rd Army. However, unlike Desert Storm, where the somewhat quantifiable objective of 50% attrition of Iraqi armor had been set, no such measurable goals were set before or during Allied Force.

Attacking the Serbian Army in Kosovo was a much different venture than going after the Republican Guard. The terrain in Kosovo differed greatly from the desert of Kuwait. The entire region of Kosovo lies within a valley measuring a mere 60 by 60 miles. Small cities and villages are well dispersed throughout the region. The valley sits at approximately 2,000 ft. mean sea



Attacking the Serbian Army in Kosovo was a much different venture than going after the Republican Guard. The terrain in Kosovo differed greatly from the desert of Kuwait

level (MSL), but the surrounding mountains rise as high as 10,000 ft. MSL. The valley is a patchwork of wheat fields and forests, a terrain well suited for concealing an armored army. The weather in Kosovo is some of the worst weather in all of Europe for conducting air operations. Further, Kosovo was overflowing with nearly a million refugees. Kosovar Albanians were being forced from their homes and either fleeing as refugees to Macedonia or Albania, or retreating to the foothills and living in makeshift tents and shelters as internally displaced persons. With the Serbian Army operating in close proximity to these civilians, the potential for collateral damage and casualties was great.

Concealed within this verdant, cloud-covered valley roamed 40,000 soldiers of the Serbian 3rd Army, protected by a wall of mobile radar guided SA-6 SAMS and a squadron of MiG 21 fighter aircraft.⁴⁶ Additional air defenses included large numbers of man portable air defense systems (MANPADS) and medium caliber towed AAA.⁴⁷ Though outdated by western standards, the armor and artillery they deployed numbered in the hundreds and included M-84 and T-54/55 tanks, M-80 Armored Personnel Carriers (APC) and self-propelled and towed artillery.⁴⁸

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Figure 1: Map of Kosovo

In developing the air plan against the Serbian 3rd Army, air planners focused on adapting a combination of known techniques to the situation. Air superiority would be achieved by NATO Airborne Early Warning (NAEW) and a continuous fighter presence.⁴⁹ To counter the SA-6 threat, USAF F-16CJ (Block 50) and German ECR Tornados provided reactive cover with High-speed Anti-Radiation Missiles (HARMs). Also, US Navy and Marine EA-6Bs jammers and “Compass Call” USAF EC-130s would confuse and degrade the Serbian Integrated Air Defense System (IADS).

Once air superiority was achieved over Kosovo, strikes would be directed against the Serbian army. Two tactical problems remained: how to locate and identify the targets and how to successfully attack them while limiting collateral damage. A squadron of A-10s and two squadrons of F-16CG (Block 40) Forward Air Controllers Airborne (FACAs) were available to perform this critical task. These pilots were trained in visual reconnaissance and air strike control.⁵⁰ They would search out targets either identified from ISR assets during pre-mission planning, or real time from the Joint Surveillance Target Attack Radar System (JSTARS). Once targets were identified, the FACAs would control strikes using available NATO aircraft. A-10 pilots, trained with space-stabilized binoculars, would be the primary day FACA, while F-16CGs with targeting pods would be the primary night FACA.⁵¹

General Short approved the plan to attack the Serbian 3rd Army on 15 March, 1999. Meanwhile at Rambouillet, negotiations were at a standstill and NATO began preparations for punitive air strikes on Serbia to begin the night of 24 March. Short had approval for enough fixed targets spread throughout Serbia proper, Kosovo, and the Montenegro province for two or three nights of limited strikes. The Combined Air Operations Center (CAOC) had developed a two-day air tasking order (ATO) for the strikes.⁵² However, as NATO bombs began to rain down, the Serbian 3rd Army responded by accelerating the mass ethnic cleansing operation against the Kosovar Albanians. Responding to this situation, General Clark ordered Short to begin attacks on Serbian fielded forces commencing 30 March.⁵³

Air attacks against targets in Serbia and Kosovo were conducted under rules of engagement (ROE) approved by General Short. Part of the ROE included a 15,000' AGL altitude restriction aimed primarily as a means to protect NATO aircraft against hostile fire. The resulting tradeoff was added difficulty in locating and identifying targets. To compensate for this, the ROE allowed FACAs to fly as low as 10,000 ft. AGL to identify targets.⁵⁴ As Allied Force progressed, the ROE was continually adjusted to

restrict the types of targets to be attacked. Initially, FACAs could attack any Serbian Army vehicles, wherever located. By early June, FACAs were required to receive permission from the CAOC for any targets attacked. Likewise, certain areas within Kosovo were off limits to attack including a ten-mile wide strip along the Kosovo-Macedonia border.⁵⁵

30 March saw the first air missions against the Serbian fielded forces.⁵⁶ SA-6 operators were reluctant to switch on their radars with HARM equipped fighters overhead and, after having previously lost several fighters, the Serbian Air Force refused to meet the NATO attackers in the air. But NATO's Air Force did not have the element of surprise and the 3rd Army units limited their movement when FACAs circled overhead. Now facing a static enemy, two problems quickly surfaced. First, just as in Desert Storm, the intelligence support and imagery provided to aircrews was not adequate to accomplish the mission. Second, with the Serbs sitting on the sides of the roads during strike windows, the usefulness of JSTARs and its moving target indicator was limited.

Monitoring of the Serbian 3rd Army was the responsibility of NATO's in-theater intelligence organizations consisting primarily of intelligence assets based at the Joint Analysis Center (JAC) in Molesworth, England and at the CAOC's C2 intelligence cell in Vicenza, Italy. With NATO's initial plans having focused on attacking fixed target sets, neither facility was fully prepared for the enormous demand for tactical imagery required to efficiently attack fielded forces. The lack of a strong Army intelligence presence at the CAOC further exacerbated the problem.⁵⁷ This resulted in an incomplete picture of the Serbian Order of Battle in Kosovo during March and April. This overall weakness in intelligence capability existed throughout the operation, but the arrival of the US Army's Task Force Hawk to Tirana, Albania and the construction of a flexible targeting cell within the CAOC improved matters.

Compounding the limited tactical intelligence support, tactical imagery of the Serbian 3rd Army was inadequate, both in the quantity produced and timeliness of dissemination. The poor weather over Kosovo during late March and early April prevented US reconnaissance assets from producing imagery and those products that were received were outdated. Similar to Desert Storm, aircrews stepped to jets with inadequate imagery and only a general idea of Serbian locations. Even with good weather, requests for tactical imagery had to compete at the National Command Authority (NCA) level for priority. Often there were timely photographs of the refugees hiding in the hills, but no imagery of the Serbian armor that had driven them there.⁵⁸ In-theater tactical reconnaissance assets were available, albeit to a limited degree. However, dissemination of the information proved ineffective. A process was never developed for timely distribution of the tactical imagery produced by Navy Tactical Air Reconnaissance Pods (TARPs) equipped F-14s, French Mirage or British GR-7 tactical reconnaissance pods.

Viable intelligence and imagery was critical for locating and destroying Serbian fielded forces, but other systems were also available to try and fill in the gap. One such system, JSTARs, had the unique capability of tracking hundreds of vehicles throughout Kosovo with its Moving Target Indicator.⁵⁹ JSTARs data was used on several occasions locating targets. However,



A Tactical Air Control Party (TACP) controller located at the CAOC, monitored Predator video and performed real time target talk-ons via a radio link through the Airborne Command and Control Center (ABCCC) to FACAs overflying the target area

the successes were few and far between. The real limitation of JSTARS was the lack of a viable onboard target identification capability. JSTARS could see all the vehicles moving around Kosovo, but could not distinguish a T-72 tank from a tractor pulling a trailer loaded with refugees. Collateral damage concerns, the necessity for positive target identification, and a rugged terrain were all contextual elements which had not existed in the Kuwaiti desert. JSTARS did develop tactics in an attempt to overcome the challenge of target ID and, on occasion, was able to correlate vehicle identification from unmanned aerial vehicles (UAVs) to provide real time targeting information to airborne FACs. But, for the most part the lack of target identification capability severely limited JSTARS' impact on the battlefield.

While JSTARS' lack of onboard target ID capability limited its usefulness, UAVs such as USAF Predator and USA Hunter could identify targets through their real time video output. Limits on the efficient use of UAVs during Allied Force were due

mostly to the lack of integration with the conventional operational forces. UAVs had never been integrated into the air tasking order (ATO) with strike packages and the lack of training between UAVs and FACAs made tasks such as altitude deconfliction and target talk-ons difficult. Even so, the ability of UAVs to locate and identify Serbian forces was a much sought-after capability and operational techniques were quickly patched together. One example was the effort to connect Predator with the FACA. A Tactical Air Control Party (TACP) controller, located at the CAOC, monitored Predator video and performed real time target talk-ons via a radio link through the Airborne Command and Control Center (ABCCC) to FACAs overflying the

target area. The occasions when these missions were successful provided a glimpse into the potential of fully integrated UAV platforms with conventional strike aircraft. But UAV-FACA employment techniques were in their infancy at the end of Allied Force and did not produce a significant number of target engagements.

With limited intelligence, imagery, JSTAR, and UAV support, the FACA was forced to independently locate and identify the Serbian army. FACAs were required to positively identify all targets prior to attack. Visual target identification was difficult during the day and virtually impossible at night, even with the use of Night Vision Goggles (NVGs) and targeting pods. But, whereas locating and identifying targets proved difficult, once identified the destruction of those targets was relatively easy. Precision guided munitions proved effective against Serbian armor, as did cluster bomb units and general purpose bombs dropped by strikers with computed delivery systems. For the most part, once a target was identified, it would be killed.

Despite this ability, the results against the 3rd Army were mixed and bear some explanation. The first week of attacks in Kosovo from 30 March through 5 April were severely hampered by bad weather. Attacks against the 3rd Army began in earnest on 7 April with A-10 FACAs destroying moving armor. Within a week the Serbian military had responded by severely limiting its movement of vehicles during good weather and had begun to hide its armor. Although late April to mid-May was characterized by better weather, the Serbs increased their efforts at camouflage and deception tactics. Late May ushered in the emergence of improved intelligence with the introduction of the CAOC's flexible targeting cell. This, coupled with a KLA offensive, which forced the 3rd Army out of hiding, increased Serbian vulnerability to attack from the air.

Measuring the effectiveness of air strikes proved as problematic as locating and identifying Serbian armor. Unlike Desert Storm where mission objectives called for a 50% attrition of the Republican Guard's armor, no such quantitative objective was ever set for Allied Force. Furthermore, total numbers of Serbian armor in Kosovo were never well tracked, leaving no way for NATO intelligence to adequately assess attrition rates, even if that had been an objective. While the conflict between Army and Air Force BDA had been a major source of friction during Desert Storm, the BDA count was not an issue until after Allied Force. The measure of effectiveness of the air attacks was then reduced to the question of how much armor was destroyed. In a September, 1999 NATO news conference, General Clark, when asked how much of the 3rd Army was destroyed, replied, "Enough."⁶⁰ This alludes to the fact that NATO's air strikes against the Serbs in Kosovo were designed to coerce, rather than destroy. The objectives of deterring Serbian action against the Kosovar Albanians and of reducing the ability of the Serbian military to continue offensive operations was not measured in number of vehicles destroyed, but by the Serbs' actions. Nonetheless, the fact remains that the primary target of NATO warplanes in Kosovo was the 3rd Army's armor and artillery. It seems reasonable that accurate BDA would shed light upon the effectiveness of attacking fielded forces at the tactical level.

Unfortunately, Allied Force BDA has been clouded by controversy since the final air strikes in Kosovo. Table 1 reflects the BDA reported from several sources. Regardless of which set of numbers are closest to being accurate, having an accurate number/percentage of vehicles destroyed would still be meaningless without a yardstick to measure overall effectiveness.



BDA Source	Tanks	APCs	Artillery
Shelton, 10 June 99	120	220	450
Serbian Army	13	6	27
Newsweek 15 May 00	14	18	20
NATO, 16 Sep 99	93	153	389

Table 1: Allied Force Tactical BDA estimates ⁶¹

Unlike Desert Storm, for which attacking fielded forces was a prelude to land warfare, Allied Force was an air-only campaign. Since airpower’s goal was not the preparation of the battlefield for a US Army attack, conventional attrition ranging from 30-50% made little sense. In Allied Force, the only measure of the effectiveness of attacking fielded forces was in achieving NATO’s stated military objectives of deterring further Serbian action against Kosovar Albanians and reducing the ability of the Serbian military to continue offensive operations. Since no quantifiable numbers or percentages can be readily drawn from these objectives, the goal became to attack fielded forces in the most efficient manner. The operational measurement of success was not determined by destroying a preset quantity of targets, but rather the destruction of as much armor as could be positively identified.

The challenge of attacking the Serbian 3rd Army in Kosovo lay in such contextual factors as conducting an air operation in poor weather, over a rugged, well-vegetated terrain, amidst a million refugees. In addition, other critical areas identified as airpower weaknesses during the Gulf War were amplified over Kosovo. As in Desert Storm, Air Force intelligence and reconnaissance communities were ill prepared to provide a detailed enemy ground order of battle and time sensitive tactical imagery requirements for attacking mobile armor. Medium altitude tactics by conventional strike assets were limited by onboard and off-board sensors for target location and identification. Likewise, accurate BDA assessments and synthesis with the overall intelligence picture proved elusive, with BDA unable to provide an accurate measure for air strike effectiveness. For both Desert Storm and Allied Force, target identification and post strike assessment proved the most challenging aspects of attacking a fielded force. Both conflicts demonstrate that while technology shows great potential, there is no single silver bullet to solve the target identification problem. Improvements in airpower efficiency against a fielded army only begin to accumulate once the Air



The challenge of attacking the Serbian 3rd Army in Kosovo lay in such contextual factors as conducting an air operation in poor weather, over a rugged, well-vegetated terrain, amidst a million refugees

Force recognizes that it will again be required to attack fielded forces in future conflicts. Regardless of how strongly strategic airpower theorists argue, an enemy's fielded force will continue to be a viable target for aerial attack. Only when the Air Force views this mission from a systems perspective, integrating existing capabilities and techniques with developing technologies will real increases in efficiency materialize.

ARCHITECTURE FOR ATTACKING FIELDIED FORCES

"In essence, Air Power is targeting, targeting is intelligence, and intelligence is analyzing the effects of air operations."

Meilinger 4th Proposition Regarding Air Power

...given the realities of the joint/combined command structure, key airpower decisions may not be made by an airman

Allied Force, like Desert Storm, demonstrated that target location and identification are two of the most important and challenging aspects of applying airpower. During Allied Force, NATO quickly achieved air superiority and was able to overfly Serbia and Kosovo at will. Having achieved control of the high ground, NATO's air commanders discovered that the fixed target sets they could easily locate and identify were politically sensitive. Unfortunately, the targets most politically acceptable for attack, namely the Serbian 3rd Army in Kosovo, were much more difficult to locate and identify. To properly understand the lessons of Allied Force one must first recognize this irony: an air force trained, prepared and organized to attack a set of predominantly off-limit, fixed targets was relatively untrained and ill-prepared to attack a mobile army in the field. However, the challenge of attacking fielded forces from the air is not limited to the Air Force, but requires a joint/combined approach. The USAF has no monopoly on the requisite ISR assets and intelligence expertise. Also, given the realities of the joint/combined command structure, key airpower decisions may not be made by an airman.

The argument presented here does not call for the USAF to abandon its capabilities for strategic attack based on the politically sensitive nature of its target set. Rather, it is to acknowledge and accept that enemy fielded forces will not only continue to be viable target arrays, but that the Air Force will continue to be required to engage these forces prior to or in lieu of friendly ground force activity. In addition, both Desert Storm and Allied Force provide insight into the unique intelligence, target identification and BDA requirements of an air campaign versus a fielded army. Attacking an army from the air without the clarifying presence of friendly ground forces is a unique mission with special requirements. Fighting an organized mobile and reactive enemy condenses the time available from target identification to destruction. Without a friendly ground force to locate,

identify, and fix enemy forces as well as organize and prioritize air attacks, these heavy responsibilities fall back to the Joint Forces Air Component Commander (JFACC).

This focused discussion on the targeting of an enemy's army does not imply that an enemy's air-to-air or surface-to-air capabilities are inconsequential. On the contrary, air superiority is prerequisite for any successful air operation. In the case of attacking fielded forces, an air force must be free to occupy the battlespace above the enemy in order to successfully monitor enemy movement, locate and identify specific enemy positions, attack valid targets and verify BDA. This freedom involves removing or diminishing the threat from enemy aircraft and SAMs. Air supremacy will probably remain elusive and the adaptation of medium altitude tactics and integrated SEAD and air-to-air assets will significantly reduce the threat, leaving air operations relatively immune from enemy air defenses.

...when attacking fielded forces, a unique set of capabilities must be integrated into a system designed for the rigorous, fast-paced nature of war against a reactive and mobile enemy

Air superiority and SEAD assets remain high on the JFACC's list of essential capabilities. These air assets are required no matter what targets the JFACC plans to attack. However, when attacking fielded forces, a unique set of capabilities must be integrated into a system designed for the rigorous, fast-paced nature of war against a reactive and mobile enemy. At the operational level, the JFACC must have a JAOC with a J2 intelligence shop capable of maintaining an up-to-date ground order of battle while simultaneously processing applicable ISR products for real or near real time use by combat operations; a monumental task. Once strikes have begun, intelligence must also be able to receive and integrate accurate BDA to continuously update the overall battlespace picture for the JFACC. Likewise, J3 combat operations must be able to control its tactical assets overhead the enemy to translate intelligence products into quickly and efficiently prosecuted attacks within the bounds of ROE.

At the tactical level, the right mixture of ISR assets must be able to locate, identify and track fielded forces in real or near real time. Joint assets such as US Navy tactical reconnaissance (TAC RECCE) pods or US Army counter battery radar may be required to provide capabilities not available with Air Force assets. Terminal attack control assets capable of final target identification and collateral damage assessment will remain critical as will strikers trained to attack mobile targets and able to accurately deliver a variety of munitions.

Intelligence at the JAOC is the logical point of departure to begin this discussion on the tailored requirements for successfully targeting an enemy's fielded forces. The two key areas to be addressed by intelligence are manning and organization.

Intelligence manning requirements increase significantly when the JAOC assumes responsibility for maintaining the ground order of battle. Under joint doctrine the Fire Support Coordination Line (FSCL) is not only the chief mechanism for determining who controls strikes, but also indirectly divides targeting responsibility.⁶² While a bit simplistic, this line drawn on a map and in the sand has long been the method for the division of labor, with Army intelligence assets being primarily responsible for the

detailed targeting associated with the close fight and Air Force intelligence focusing on deeper target sets. Air assets allocated to attack targets short of the FSCL receive their targeting information within the construct of the Theater Air-Ground System (TAGS).⁶³ However, when a FSCL does not exist, the responsibility for all enemy targeting by air reverts defacto to the JAOC. In this case, the JAOC must have additional manning to assume the tactical targeting responsibilities against enemy fielded forces normally conducted by the Army.

USAF intelligence personnel are trained primarily within a targeting process focused on fixed targets. Intelligence expertise against enemy armies resides within the US Army

Besides having additional manning, the JAOC's J2 intelligence requires an injection of Army intelligence expertise. USAF intelligence personnel are trained primarily within a targeting process focused on fixed targets. Intelligence expertise against enemy armies resides within the US Army. Army intel is not only trained at templating enemy ground activity, but is also intimately familiar with the various ISR assets with specialized capabilities against fielded forces.⁶⁴

Once properly manned in numbers and expertise, the J2 must be organized to handle the additional responsibility of targeting fielded forces. A "flex targeting" cell, as developed during Allied Force, should be the theater's clearing house for intelligence information on the enemy's army. The flex targeting cell has four main tasks. First, it takes inputs from all available intelligence sources to build the most complete picture of the enemy force structure and movements. Flex targeting should have the theater's best and most up-to-date assessment of the ground order of battle. Second, it provides current operations (J3) the latest changes to the battlefield. This is an important consideration. Knowledge of the enemy's precise location and intentions are of no use unless they can be translated into successful attacks. In particular, this requires the production of time sensitive targeting material, including processed imagery. Third, flex targeting maintains responsibility for the central filtering and processing of national and TAC RECCE products and distributing them within theater. The goal is to make up-to-the-minute processed imagery available on secure networks with joint and combined access down to the squadron level. The two critical attributes of good tactical imagery are quality and timeliness; can an aircrew actually find the target based on the picture provided and will the target still be there once the aircrew reaches the target area? The fourth task of flex targeting is the processing and validation of BDA. Without the ability to observe what is transpiring on the battlefield, the necessary adjustments cannot be made to counter the moves of the thinking and reacting enemy.

While the flex targeting cell is the brain of air intelligence activity, its eyes and ears are its ISR assets. Although all sources of intelligence are important in providing an overall assessment of an enemy's activities, some sources are more important than others when translating an intelligence assessment into armor destroyed on the battlefield. The importance of tactical imagery was underscored by an A-10 FACA during Allied Force who coined a familiar phrase: "a picture is worth a thousand coordinates." Imagery must not only be able to identify targets, but also provide enough terrain features to make it usable for terminal attack control assets to easily locate the position.⁶⁵ Coordinates must also be accurate and the aspect of the image

clearly defined. This quality of imagery is available from a wide variety of sources including both national assets and TAC RECCE.⁶⁶

While national assets provide excellent tactical imagery, these assets are not under the direct control of the Joint Force Commander (JFC). Other non-DOD agencies such as the State Department and the CIA compete for priority over the use of national level intelligence. Currently the time cycle for collection and distribution of national products is too lengthy for theater-wide real and near real time target engagement. Recent exercises such as Joint Expeditionary Forces exercise (JEFX) 1999 and 2000 have focused on reducing this time from sensor to shooter.⁶⁷ Such exercises have demonstrated the potential integration of existing ISR and data-link technologies to decrease the time required for getting the right information to the right cockpit. While such technologies are important in reducing the time from target ID to target destroyed, they are not a replacement for, but an enhancement to an integrated intelligence-operations system, designed to push imagery to terminal control assets as quickly and efficiently as possible.

While the JFC and JFACC must compete for national assets, TAC RECCE assets are under the JFC's control and can be more flexibly employed. A disadvantage of the majority of current TAC RECCE assets is the difficulty in quickly transmitting the information. Current systems, including the US Navy TARPS and NATO TAC RECCE pods, are wet film systems. Developed prior to the digital age, these systems require processing the imagery and then translating it to a digital medium in order to be transported on the same networks as other imagery products. Although this processing takes time, it is somewhat offset by the fact that these assets reside in theater.⁶⁸

Airborne Command and Control platforms such as Airborne Warning and Control system (AWACS) and ABCCC are responsible for the flow of assets in and out of the AOR and act as the conduit to the JAOC

Boeing E3D AWACS



Along with imagery, intelligence should continue to use other sources such as human intelligence (HUMINT) and signals intelligence (SIGINT) to develop the best all source picture of the battlespace. As ISR assets have matured over the last decade, they have begun to bridge the gap between the ISR and operational worlds. While no single asset provides the silver bullet for attacking fielded forces, these systems do provide additional capability that, when integrated into an overall system, increase efficiency. For example, JSTARS has all weather capability to locate and track mobile vehicles.⁶⁹ Other assets, such as UAVs, provide real time overhead target identification capability. Being unmanned, UAVs can typically accept higher levels of risk, allowing for longer duration and lower altitude operations over enemy positions.⁷⁰ Joint assets may also be available. The Army has a full suite of ISR assets capable of identifying enemy positions, but their limitation lies in the coordination and integration of US Army assets into the JAOC during operations.⁷¹

Once ISR assets have located and identified mobile targets, intelligence through the flex targeting process, distributes this information in a timely fashion. Operations must now prosecute swift attacks on these targets. The Battle Staff Director is the JAOC's agent responsible for the daily operational conduct of the area of responsibility (AOR). Airborne Command and Control platforms such as Airborne Warning and Control system (AWACS) and ABCCC are responsible for the flow of assets in and out of the AOR and act as the conduit to the JAOC.

However, a well functioning command and control system still does not insure that the correct target is attacked. It is at the tactical level that the targets are physically destroyed and the JFACC influences these attacks by his designation of terminal control authority.⁷² This delegation of terminal control authority is dependent on the nature of the conflict and the type of mission being conducted. During CAS missions, when air attacks on fielded forces are in close proximity and in coordination with friendly ground forces, terminal control authority resides with a terminal attack controller.⁷³ Likewise, when attacking fielded forces without friendly ground forces, the JFACC may assign terminal control authority to an airborne terminal attack controller.

The combination of a high potential for collateral damage and the difficulty of locating and identifying the Serbian 3rd Army was the primary reason FACAs were used for terminal control over Kosovo in Allied Force. There are three characteristics required for a terminal attack controller. First, the controller must be able to develop and maintain situational awareness in order to orchestrate successful attacks. Controllers must be survivable within the battlespace in order to observe and maneuver to identify not only targets, but also threats and collateral damage potential. Second, the controller must have on board target identification capability. Third, the controller must be trained in attacking fielded forces. The tactical controller must be familiar with enemy armor recognition and understand how to control strikers onto targets. Controllers must also be familiar with striker's capabilities and limitations as well as tactics used. The controller is the key tactician who determines what and how targets will be attacked.

Terminal air controllers are responsible for final identification and prioritization of targets, but it is the striker that delivers the firepower.⁷⁴ There are three critical characteristics that require consideration when determining the suitability of a striker: the

training of the aircrews, the platform, and the munitions available. During Vietnam, the entire USAF fighter community was well-versed in CAS procedures. With the introduction of the A-10 in the late 1970s, however, the CAS role became the specialty of one airframe, while the remainder of the USAF fighter force gravitated toward interdiction, strategic attack, and air superiority missions. Today the majority of fighter aircrew is no longer trained in CAS. Although attacking fielded forces without the presence of friendly ground troops is, by definition, not CAS, the fundamental skills remain the same.⁷⁵ These skills include an understanding of terminology and coordination procedures, target marking and talk-on procedures, restrictions, and final control procedures. Aircrew performing the striker mission must also be proficient at weapons delivery. Direct hits are required to kill armor, particularly armor that is dug in or on the move. Collateral damage potential may further restrict attack headings or delivery options, increasing the challenge of successful attack.

Along with the proficiency of the aircrew, the platform employed is also critical. The platform must be survivable. The JFACC needs to weigh the survivability of the striker's platform against the risk of shootdown. The platform must also have a comparable communications suite able to conduct secure communications. Otherwise, strikers may degrade communication security, allowing the enemy an opportunity to gain insight into operational procedures and increase the speed at which they can react to attack. Further, the platform should be able to accurately deliver a variety of munitions. This may mean precision-guided munitions or free fall munitions accurately delivered from medium altitude if the ROE or threat so dictate. It does not matter how proficient the aircrew is if the platform cannot deliver the munition with the requisite accuracy.⁷⁶

Finally, strikers must not only be able to accurately deliver munitions, but also have munitions that destroy the target to an acceptable degree without causing undue collateral damage. Large warheads may provide the killing power desired, but at the expense of excessive collateral damage. There is no perfect solution for the type of munition to use since it is situational dependent. A combination of precision and non-precision munitions provides the flexibility for the striker to prosecute the attack.⁷⁷

This architecture for attacking fielded forces is a systems approach. Relying on the existing Joint Air Operations Center (JAOC) structure, modifications at the operational and tactical level allow for the time critical targeting required to successfully attack mobile targets. The flex targeting cell is the central location for processing ISR inputs and for developing and distributing

During Vietnam, the entire USAF fighter community was well-versed in CAS procedures. With the introduction of the A-10 in the late 1970s, however, the CAS role became the specialty of one airframe...



A-10 Thunderbolt



targeting products, as well as maintaining the enemy order of battle. J3 operations is then responsible for the command and control of assets, ensuring the commander's intent is translated into appropriate action. At the tactical level, terminal air controllers are responsible for target identification and prioritization, as well as determining attack restrictions based on such criteria as collateral damage potential or ROE. Finally, with inputs and guidance from the terminal air controller, the striker completes the attack.

Debate over the effective use of airpower will continue. Advocates for attacking leadership and infrastructure draw from Desert Storm and Allied Force to demonstrate how airpower can best be used to produce decisive results. Ironically, those who believe attacking an enemy's fielded military strength as the key to achieving military objectives also use Desert Storm and Allied Force to fortify their case. The purpose of this paper has not been to settle this argument, but rather to focus on the reality of how US airpower has been used over the last decade. In both Desert Storm and Allied Force, airpower was called upon to directly attack an enemy's army without the benefit of friendly ground forces to locate, identify, and fix the enemy's position. Given the propensity for US policy makers to use airpower first in crisis situations, the United States military should prepare to support such an air first strategy, and its services need to organize, train, and equip for such operations.

Airpower can now destroy what it finds, however an enemy under air attack quickly adapts, using dispersal and deception to conceal its location. Based on the experience of Desert Storm and Allied Force, a systems approach is required to efficiently locate and attack such an enemy. At the operational level the JAOC's J2 requires a flex targeting cell, manned by Air Force and Army intelligence personnel to build and maintain situational awareness on enemy ground forces, as well as process ISR products for near real time targeting and BDA. Intelligence must have immediate access to a variety of ISR assets and be able to process the information quickly. This not only includes USAF and national assets, but joint and combined assets such as Army and coalition UAVs, counter-battery radar, and Navy and coalition tactical reconnaissance platforms.

This systems approach will only be effective if the targeting information provided can be prosecuted at the tactical level. Terminal air controllers, such as FACAs, must have the capability to locate and identify targets on the battlefield. Advances in optics and infrared targeting systems continue to increase the capability of medium altitude target identification during day and night operations. Likewise, more fully integrating UAVs into operations by developing tactics, techniques and procedures during peacetime, will improve their ability for target marking or talk-ons. Finally, strikers must train with FACAs to attack mobile targets and become familiar with the unique and flexible nature of attacking fielded forces.

Historically, air strikes against fielded forces have been in support of the land battle. The air attack against the Republican Guard during Desert Storm had the objective of preparing the battlefield for land operations. In contrast, the direct attack of the Serbian 3rd Army in Allied Force was neither in preparation for nor in support of ground forces. Instead, Army assets performed supporting roles, providing UAV, counter-battery radar, and intelligence assets to assist in air strikes.⁷⁸ Currently, the Army does not train and equip for such a supporting role as in providing specific ISR and intelligence assets from its force structure to

support Air Force operations. Though this may seem a simple change, particularly for airmen used to providing specific capabilities to support ongoing operations, it requires a shift in Army doctrine.

Likewise, Joint and Air Force doctrine needs to adapt to the realities of how air forces are being employed. Current doctrine acknowledges only two Counterland missions: Air Interdiction and Close Air Support, both of which are defined by their relationship to friendly forces.⁷⁹ This leaves the mission of attacking fielded forces in the absence of friendly forces undefined.⁸⁰ Joint and Air Force doctrine must acknowledge attacking fielded forces as a separate mission before it can organize, equip, and train for it. Along with this acknowledgement, Air Force Doctrine needs to redefine two key functions: Terminal Attack Controllers (TAC) and Forward Air Controllers Airborne (FACA). Currently, both are defined only within the close air support construct. Their definitions should expand beyond the confines of CAS as they were used during Desert Storm and Allied Force.⁸¹

Along with doctrinal change, the Air Force needs to adjust its training and tactics. The adage of “fight the way you train” is true from two perspectives. First, it makes sense to take those time-tested tactics and techniques honed during peacetime training into combat. A more subtle implication is that military forces have no other option but to fight the way they train. It is training that develops the tactical skills and mindset that defines a combat force’s capabilities. Major exercises such as Red Flag and Air Warrior should incorporate the attack of fielded forces without friendly ground forces as a primary mission. The Conventional Air Forces (CAF) need to be exposed to the mission and be familiar with the challenges of attacking a mobile army. An Air Force that does not train or develop such tactics will not have the requisite skills when confronted with combat. The Air Force should address the shortfall in tactics by adjusting its Air Force Tactics Techniques and Procedures (AFTTP) 3-1 series publications to better address the systems approach to attacking fielded forces, as opposed to how the tactical publications are now divided among platforms. A separate volume on attacking fielded forces should focus on the system approach, addressing ISR, intelligence, command and control, Terminal Air Controller, striker capabilities, and integration requirements.

This adjustment of doctrine, training, and tactics is critical to maintaining a military capable of successfully accomplishing all the objectives that it is given. Desert Storm and Allied Force demonstrated that an air force could be given the mission of attacking a fielded army from the air. The lessons generated from this conflict are the basis for an architecture that should be developed in times of peace, for use in future conflict.

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- 1 Robert A. Pape, *Bombing to Win: Air Power and Coercion in War*, Faber, (Ithaca, New York: Cornell University Press, 1996), 58.
- 2 Ibid., 66.
- 3 Ibid., 79.
- 4 Ibid., 69.
- 5 Ibid., 10.
- 6 Colonel John A. Warden, USAF (ret), "A Response to Robert Pape's Bombing to Win," *Security Studies* 7, no.2 (winter 1997/8): 172-90. And Watts, Barry D., "Ignoring Reality: Problems of Theory and Evidence in Security Studies," *Security Studies* 7, no.2 (winter 1997/8): 115-71.
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- 8 Major General Charles Link, "The New View of Airpower," *Air Force Magazine*, August 1997, Vol. 80, No. 8.
- 9 *Gulf War Air Power Survey Summary Report*, (Washington, D.C.: Government Printing Office [GPO], 1993), 12.
- 10 General Norman Schwarzkopf and Peter Petre, *It Doesn't Take a Hero*, (New York: Bantam, 1992), 371.
- 11 GWAPS Summary Report, 65.
- 12 Colin L. Powell with Joseph E. Persico, *My American Journey*, (New York: Random House, 1995), 498.
- 13 *GWAPS Summary Report*, 48-51.
- 14 Lieutenant Colonel William F. Andrews, *Airpower Against an Army: Challenge and Response in CENTAF's Duel with the Republican Army*, (Maxwell Air Force Base, Alabama: Air University Press, 1998), 14.
- 15 National Training Center Handbook 100-91, *The Iraqi Army: Organization and Tactics*, (Fort Irwin, Calif., 1991), 25-31.
- 16 *GWAPS Summary Report*, 51.
- 17 Ibid., 49.



- 18 *Gulf War Air Power Survey*, Vol. 5, (Washington, D.C.: Government Printing Office [GPO], 1993), pt. 1: 463-539.
- 19 Andrews, 29. Air Force assets were not the only air assets attacking fielded forces. Carrier-based strikers including F-18s also attacked fielded forces, however they did not begin to attack the Republican Guard in earnest until a week after the air war had started.
- 20 Lieutenant Colonel Christopher P. Weggeman, F-16 pilot with 388th TFW flying the Killer Scout mission against the Republican guard, e-mail interview with author, 28 November 2000. The Army was concerned not only with armor but support assets such as artillery, mechanized infantry vehicles, support vehicles, ammunition supplies and POL storage.
- 21 *GWAPS Summary Report*, 106.
- 22 Weggeman.
- 23 *Gulf War Air Power Survey*, Vol. 5, (Washington, D.C.: Government Printing Office [GPO], 1993), pt. 1: 463-539. The majority of these missions, 569, were delivered by F-16's employing non-precision, free falling general purpose bombs as well as older generation cluster bomb units, MK-20 Rockeye, CBU-52, and CBU-58. Battlefield effectiveness was below expectations, which led to concern over the high consumption rates of the more modern, armor piercing CBU-87 during the first two weeks. "CENTAF TACC/NCO Log, January-February 1991" (U), 30 January 1991, 21. (Secret) Information extracted is unclassified.
- 24 Ibid., 30.
- 25 Ibid., 37.
- 26 Major Laura Berry, F-15E squadron intelligence officer, interviewed by author, Maxwell AFB, Ala., 27 November 2000.
- 27 Weggeman.
- 28 Andrews, 30.
- 29 Major Robert Givens, A-10 pilot with Myrtle Beach Wing, interview with author, Maxwell Air Base, Ala., 2 March 2001. And Lt Col Christopher P Weggeman, F-16 pilot with 388th TFW flying the Killer Scout mission against the Republican guard, e-mail interview with author, 6 March 2001. The F-16 (Block 40) aircraft from Hill AFB were the only strikers with GPS navigation.
- 30 Andrews, 31.
- 31 Weggeman.
- 32 Andrews, 37.
- 33 Ibid. 38.
- 34 Andrews, 60. Due to using the precision guided Maverick missiles and the perception by the Army that the A-10s were better at attacking armor due to close air support training.
- 35 General Norman Schwarzkopf and Peter Petre, *It Doesn't Take a Hero*, (New York: Bantam, 1992), 500.
- 36 William L. Smallwood, *Warthog: Flying the A-10 in the Gulf War*, (Washington, D.C.: Brassey's, 1993), 123-24.
- 37 Andrews, 44.
- 38 Air Force Doctrine Document 2-1.3, *Counterland*, (August 27, 1999), 102. Counterland doctrine now incorporates the Killer Scout mission.
- 39 *GWAPS Summary Report*, 21, and Andrews, 54. F-111Fs developed the tactic using their Pave Tack laser designator. Lessons learned during a Desert Shield exercise had shown the potential for identifying and targeting armor from medium altitude. On 5 February, 2 F-111Fs successfully dropped two GBU-12s on revetted positions. Within 3 days 50 sorties a night were devoted to tank plinking. Navy A-6Es began dropping a limited number of LGBs as did F-15E crews. The F-15Es were limited by the number of LANTIRN pods and quickly developed buddy lasing techniques. Fred L. Frostic, *Air Campaign against the Iraqi Army in the Kuwaiti Theater of Operations*, Project Air Force (Santa Monica, Calif.: RAND, 1994).
- 40 Andrews, 56.
- 41 Col John Warden, USAF (retired), lecture, Air Command and Staff College, Maxwell Air Base, Ala. 12 December 2000.
- 42 For purposes of this discussion Serbia and Serbian will be used to refer to those forces from the Federal Republic of Yugoslav. Likewise Macedonia will be used to refer to the Former Yugoslav Republic of Macedonia.
- 43 *Air War Over Serbia Initial Report*, (United States Air Forces In Europe Studies and Analysis Directorate, April 2000), 8.
- 44 Lieutenant General Mike Short, USAF (retired), lecture, School for Advanced Airpower Studies, Maxwell Air Base, Ala., 21 November 2000.
- 45 *AWOS Initial Report*, 9.
- 46 Ibid., 11.
- 47 R. Jeffrey Smith and William Drozdiak, *Anatomy of a Purge*, Washington Post, April 11, 1999, A1.
- 48 The Yugoslavian built M-84 is a version of the Soviet T-72 and the M-80 is a version of the Soviet BRDM.
- 49 NAEW looks similar to a US AWACS, however NAEW does not have the manning, communications suite, or train to control mass strike packages as does AWACS.

- 50 Major Phil M. Haun, A-10 unpublished war diary. FACAs would eventually expand to include US Navy F-14s and Marine F/A-18D Hornets.
- 51 Commercial purchased space-stabilized binoculars were used for visual identification. Made by Canon these 12x and 15x binoculars remove much of the jitter associated with using binoculars in the cockpit and were a monumental improvement over using regular binoculars.
- 52 Short.
- 53 General Wesley Clark as SACEUR was not technically the Combined Forces Commander (CFC), as Admiral Ellis held this position in charge of NATO forces in the southern region. However for practical purposes General Clark performed the functions of the CFC.
- 54 Major Phil M. Haun, A-10 unpublished war diary. Later the ROE was further modified to allow strike aircraft to fly as low as 8,000 ft. AGL during diving weapons deliveries. This altitude restriction was further reduced to 5,000' AGL after the bombing of a Kosovar refugee column by F-16CGs FACAs on 14 April, 1999.
- 55 This safe haven was implemented by Admiral Ellis as a precaution to prevent Serbs thinking NATO ground troops in Macedonia were actually attacking their positions.
- 56 Due to poor weather over Kosovo, the first strikes against mobile targets did not take place until 6 April.
- 57 Unlike Air Force intelligence, Army intelligence spends its effort in assessing enemy army capabilities. Army intelligence is therefore more familiar with the ISR assets best suited for observing enemy ground forces and adds a wealth of expertise to the CAOC in this area.
- 58 Discussions with author and Lt Steven Smith, Intelligence officer 81st Fighter Squadron, April 1999.
- 59 JSTARS is a long range, air to ground surveillance system aboard the E-8C, a modified Boeing 707, consisting of a Synthetic Aperture Radar (SAR) capable of producing an image of a selected area and a Moving Target Indicator (MTI) designed to locate slow-moving ground targets.
- 60 Wesley Clark, General (USA) and John Corley, Brig General (USAF) at NATO press conference, Brussels, 16 Sep 1999.
www.eucom.mil/operations/af/nato/1999/meabriefing.html
- 61 Secretary of Defense William Cohen and Chairman of the Joint Chiefs of Staff General Henry Shelton provided an initial BDA assessment in a 10 June 1999 briefing. Henry H. Shelton, Chairman Joint Chief of Staff briefing, Washington, DC: 10 June, 1999. www.defenselink.mil/news/Jun1999/t06101999_t0610asd.html. These numbers were refuted by a much lower total given on 16 June 1999 by Serb Army Lieutenant General Nebojsa Pavkovic. Rebecca Grant, "True Blue: The Real Story Behind the Kosovo Numbers Game," AFA Issue Brief, 1 June 2000. www.afa.org/library/issues/trueblue.html. . By mid-July General Clark ordered an Air Force Mission Effectiveness Analysis (MEA) team to go see what was on the ground. General Clark then gave NATO's BDA assessment on 16 Sep, which was similar to Cohen and Shelton's assessment with slightly lower numbers based on multiple strikes, which had previously been double counted. Wesley Clark, General (USA) and John Corley, Brig General (USAF) at NATO press conference, Brussels Belgium, 16 Sep 1999.
www.eucom.mil/operations/af/nato/1999/meabriefing.html. Nearly a year after the air operations on May 15, 2000, a Newsweek article entitled "Kosovo Cover-up" claimed that the Air Force had inflated the MEA teams findings. Newsweek numbers included only those vehicles located at the sites searched by the MEA team and did not account for other sources of BDA or that the Serbs removed vehicles from the battlefield.
- 62 Joint Pub 3-0, *Doctrine for Joint Operations*, 1 February 1995, GL-7. The FSCL is a line established by the appropriate land or amphibious force commander to ensure coordination of fire not under the commander's control but which may affect current tactical operations. While the FSCL does not directly discuss targeting, it is the targeting process that determines fires. Historically fielded forces are those forces inside of the FSCL and therefore the responsibility of land or amphibious forces for intelligence and targeting.
- 63 Air Force Doctrine Document 2-1.3, *Counterland*, (August 27, 1999), 49.
- 64 Examples of such systems include RC-12s, Hunter UAVs, and counter-battery radars.
- 65 Unpublished lessons learned from the 81 Expeditionary Fighter Squadron at the 15 June 1999 A-10 Hot Wash at Gioia Del Colle Air Base, Italy. Fielded forces under attack by air will remain static only as long as they are under direct attack. Once the threat has departed, whether due to poor weather, darkness, or simply the departure of strike forces the enemy will reposition their forces. During Allied Force imagery over 12 hours old resulted in very few successful attacks. Inside 6-8 hours resulted in an improved chance of successful attack.
- 66 During Allied Force national systems were available, as were TAC RECCE forces from the US Navy with its Tactical Air Reconnaissance Pod (TARPs), and coalition assets of the French, British, and Germans.
- 67 Lt Col Richard P. Stafford, intelligence officer who helped set up the flex targeting

- cell during Allied Force, and A-2 for Time Critical Targeting (TCT) for JEFX 2000, e-mail interview with author, 5 March 2001.
- 68 Unpublished lessons learned from the 81 Expeditionary Fighter Squadron at the 15 June 1999 A-10 Hot Wash at Gioia Del Colle Air Base, Italy. A successful example of sensor to shooter processing of TAC RECCE imagery during Allied Force occurred when British GR-7 Harriers carrying TAC RECCE pods were collocated with A-10 FACAs. The GR-7s were able to process morning reconnaissance runs for afternoon missions. This imagery was made available to FACAs in some cases less than 3 hours and proved incredibly valuable.
- 69 JSTARS limitations include a lack of on board target identification capability, restrictions to use in mountainous terrain, and the limited number of platforms available.
- 70 Current limitations being worked include limited communication and Identification Friend or Foe (IFF) capability as well as a limited operational training with target marking or talk-on procedures when working with either FACAs or directly with strikers.
- 71 An example of how US Army ISR assets can be successfully integrated was in the final days of Allied Force when US Army counter-battery radars successfully located active Serbian artillery positions and passed those coordinates to FACAs overhead.
- 72 Air Force Doctrine Document 2-1.3, *Counterland*, (August 27, 1999), 98. Terminal control is the authority to direct the maneuver of aircraft, which are delivering ordnance to a specific target. Terminal control is a type of air control. Air Force Doctrine Document 2-1.3, *Counterland*, (August 27, 1999), 98.
- 73 Air Force Doctrine Document 2-1.3, *Counterland*, (August 27, 1999), 98. A qualified officer or enlisted member who, from a forward ground or airborne position, provides terminal control to aircraft performing close air support to ground forces.
- 74 This does not mean that controllers with inherent kill capability may not perform both controller and striker functions.
- 75 Air Force Doctrine Document 2-1.3, *Counterland*, (August 27, 1999), 92. CAS is air action by fixed and rotary wing aircraft against hostile targets which are in close proximity to friendly forces and which require detailed integration of each air mission with the fire and movement of those forces. Air Force Doctrine Document 2-1.3, *Counterland*, (August 27, 1999), 92.
- 76 An excellent example is the British GR-7 during Allied Force. The RAF pilots were some of the most professional and well-trained pilots available. However, at medium altitude the GR-7 was extremely inaccurate delivering the BL-755 cluster bomb unit. This was due to a lack of a computed delivery solution for the BL-755, requiring a modified manual delivery from medium altitude with the aid of an Electro-Optic targeting pod. First canister impacts were recorded as far as 1-2 km from target. Major Phil M. Haun, A-10 unpublished war diary.
- 77 A common misunderstanding is that precision munitions results in lower collateral damage potential. While precision munitions such as laser guided bombs or maverick missiles are more accurate than free-fall munitions, when a precision munition does not guide the resulting miss distance may be measured in miles. Compare this with a free-fall general purpose bomb delivered from a diving delivery. While this bomb may miss by meters, it is physically impossible for it to be miles off target.
- 78 The availability of Army intelligence and ISR assets were for the most part not planned, but due to Task Force Able Sentry and Task Force Hawk operating in Macedonia and Albania respectively.
- 79 Air Interdiction are operations conducted to destroy, neutralize, or delay enemy's military potential before it can be brought to bear against friendly forces. Close Air Support are actions by aircraft against hostile targets in close proximity to friendly forces requiring detailed integration. Joint Publication 3-0, *Doctrine for Joint Operations*, (February 1, 1995), GL 3-4.
- 80 This has not gone unnoticed in the latest issue of Air Force Doctrine Document 2-1.3. This document makes a reference to such attacks. "In those unusual circumstance in which aerospace forces conduct AI in the absence of friendly surface forces, enemy forces are able to disperse and seek cover in a way that complicates the problem for the airman." This statement misses the mark in two ways. First is that attack of field forces in the absence of friendly surface forces is unusual. Desert Storm and Allied Force demonstrate that this form of attack is now the norm and not simply an unusual occurrence. Second is the mistaken assumption that AI can be conducted in the absence of friendly forces. By definition AI cannot occur unless there are friendly forces. Air Force Doctrine Document 2-1.3, *Counterland*, (August 27, 1999), 8.
- 81 A benefit of the expansion of the role of TAC and FACA would be the removal of the Killer Scout from Air Force doctrine. The Killer Scout role has two key weaknesses, which limit its effectiveness. Killer Scouts do not limit the potential of collateral damage, being untrained in positive control strikes. Killer Scouts also become ineffective once friendly forces become involved, since they are untrained in Close Air Support. By expanding the role of the FACA to that of how it was used in Allied Force removes the requirement of the Killer Scout role.



What was the Impact of the *Luftwaffe's*

'Tip & Run' Bombing Attacks

March 1942 – June 1943?



In March 1942, the *Luftwaffe* formed two dedicated units whose task was to carry out a bombing campaign against shipping and coastal military and industrial installations on the southern coast of England. By fitting bombs to Messerschmitt 109 single-seat fighters, these fighter-bombers, or in German *Jagdbomber* nearly always shortened to *Jabo*, began attacking targets as far east as Kent¹ and as far west as the Lizard in Cornwall. Known to the British as ‘tip and run’ attacks, they continued until the 6th of June 1943² prior to which the *Luftwaffe* had increased its strength of fighter-bombers on the western front from in the region of 28 to 118,³ which had prompted the following phlegmatic British comment:

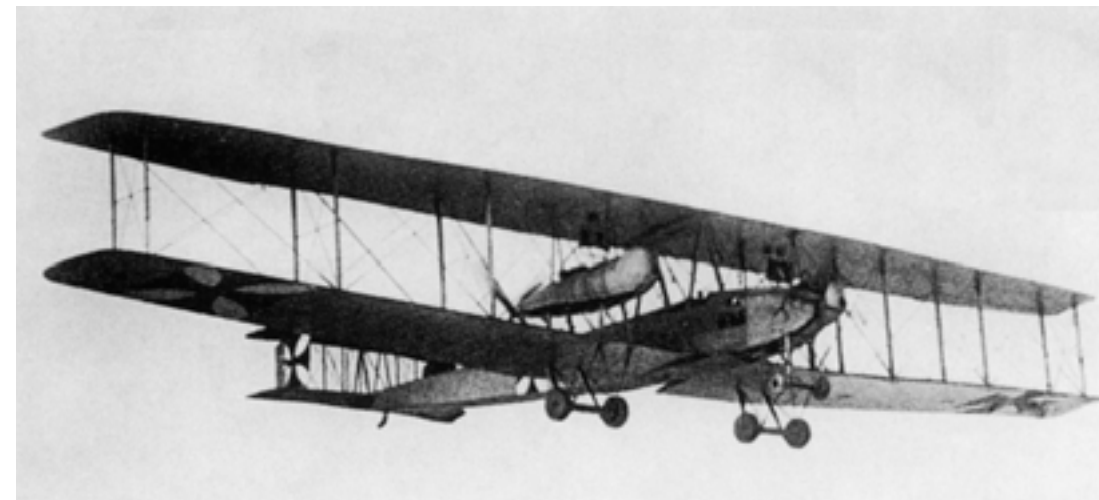
“...for the first three months of the year [1943], the position with regard to enemy fighter-bomber activity was not satisfactory...the problem was to get adequate warning of these low flying raids as, though enemy casualties were high, these casualties mostly took place after the bombs had been dropped...”⁴

Without warning, ‘tip and run’ attacks stopped following the attack on Eastbourne on the 6th of June 1943. The majority of German fighter-bombers were then transferred to the Mediterranean, leaving just 42 fighter-bombers⁵ which were used solely for attacks at night.

This paper will analyse the development of the German tactic of using fighter-bombers prior to March 1942. It will then discuss the impact from the viewpoints of both the *Luftwaffe*, the British military and the civilian population of the ‘tip and run’ campaign between March 1942 and the 6th of June 1943. It will conclude by questioning the German decision to stop such attacks, whether ‘tip and run’ attacks had been effective or not and the lessons that had been learned as a result.

...Germany was keen to prove the superiority of its Zeppelin airships and its specially designed 'battle planes' such as the Gotha...

The origin of the term 'tip and run' is not known but it was first applied to the infrequent small-scale bombing attacks carried out on south-east England by aircraft of the German Imperial Navy in the First World War.⁶ Kaiser Wilhelm II had been begged to authorise limited air attacks against British coastal targets of a military nature and when in January 1915 he acquiesced, military facilities on the shores of the Thames Estuary became legitimate 'tip and run' targets. However, a lack of suitable aircraft, the distance from bases in Belgium and the greater importance of air operations on the Western Front limited the scale of such attacks and by the end of 1916, approximately 25 people had been killed but the military and civilian impact of such attacks is believed to have been minimal.⁷ By then, Germany was keen to prove the superiority of its Zeppelin airships and its specially designed 'battle planes' such as the Gotha and targets switched from 'nuisance raids' to aerial assaults on London and other major cities, something that was to be repeated in 1940. It appeared as if the memory of 'tip and run' attacks would fade into obscurity.



The single-seat Heinkel 51 biplane fighter was, until the arrival of the Messerschmitt 109 monoplane, the Legion Condor's principal fighter

It was in Spain in 1937 that the idea of 'fighter-bombers' was resurrected, a few German fighters in the First World War having been fitted with bombs as a crude way of stemming the Allied advance in the Summer of 1918, these aircraft being termed 'fighter-bombers'. In August 1936, Nazi Germany, concerned that Communists would get a foothold in Western Europe when civil war erupted in Spain, began supporting General Franco's Nationalist army. The *Legion Condor*, a semi-autonomous German air component, would play an important part during the civil war, allowing its aircrew to gain combat experience for the coming Second World War and for



...Henschel 123 dive bombers were quickly brought to Spain and used with great success

Luftwaffe senior officers to devise and prove a concept of air operations. However, it was in Spain in March 1937 that ‘fighter-bombers’ proved to be an effective weapon.

The single-seat Heinkel 51 biplane fighter was, until the arrival of the Messerschmitt 109 monoplane, the *Legion Condor*’s principal fighter. However, it was becoming increasingly obvious that by February 1937, the Heinkel 51 was inferior to the Soviet fighters being used by the Republican forces. Faced with the inferiority of its principal fighter, the *Legion Condor* decided to enhance its offensive capability, particularly for the battle for Bilbao, by fitting its Heinkel 51s with fragmentation bombs and on the 31st of March 1937, these aircraft were used to bomb and strafe Republican front positions with considerable success. In the days that followed, the fighter-bombers proved ideal at neutralising those targets that medium to high-level bombers found harder to destroy.

Paradoxically, it was the success of the fighter-bomber that ultimately spelt its demise. Impressed by the concept of close air support and pinpoint bombing accuracy, the Junkers 87 *Stuka* and Henschel 123 dive bombers were quickly brought to Spain and used with great success. It was this concept of operations that, following refinement in Spain, was used with great effect from the 1st of September 1939 when Germany invaded Poland and again on the 10th of May 1940 when Germany invaded France and the Low Countries. The *Stuka* suited the *Blitzkrieg* concept and with the air superiority achieved by the *Luftwaffe* in the first nine months of the Second World War, there was no need for a fighter-bomber. This was to change dramatically during the Battle of Britain.

On the 10th of July 1940, the *Luftwaffe* began attacking shipping in the English Channel and coastal targets, hoping to entice the RAF into battle and, by means of attrition, to weaken the RAF’s ability to interfere with the planned German invasion of Great Britain. With the Germans anticipating the same air superiority they enjoyed in previous campaigns, it was thought that the *Stuka* would enjoy the same success. However, when the *Stuka* was at last committed *en masse* on the 8th of August

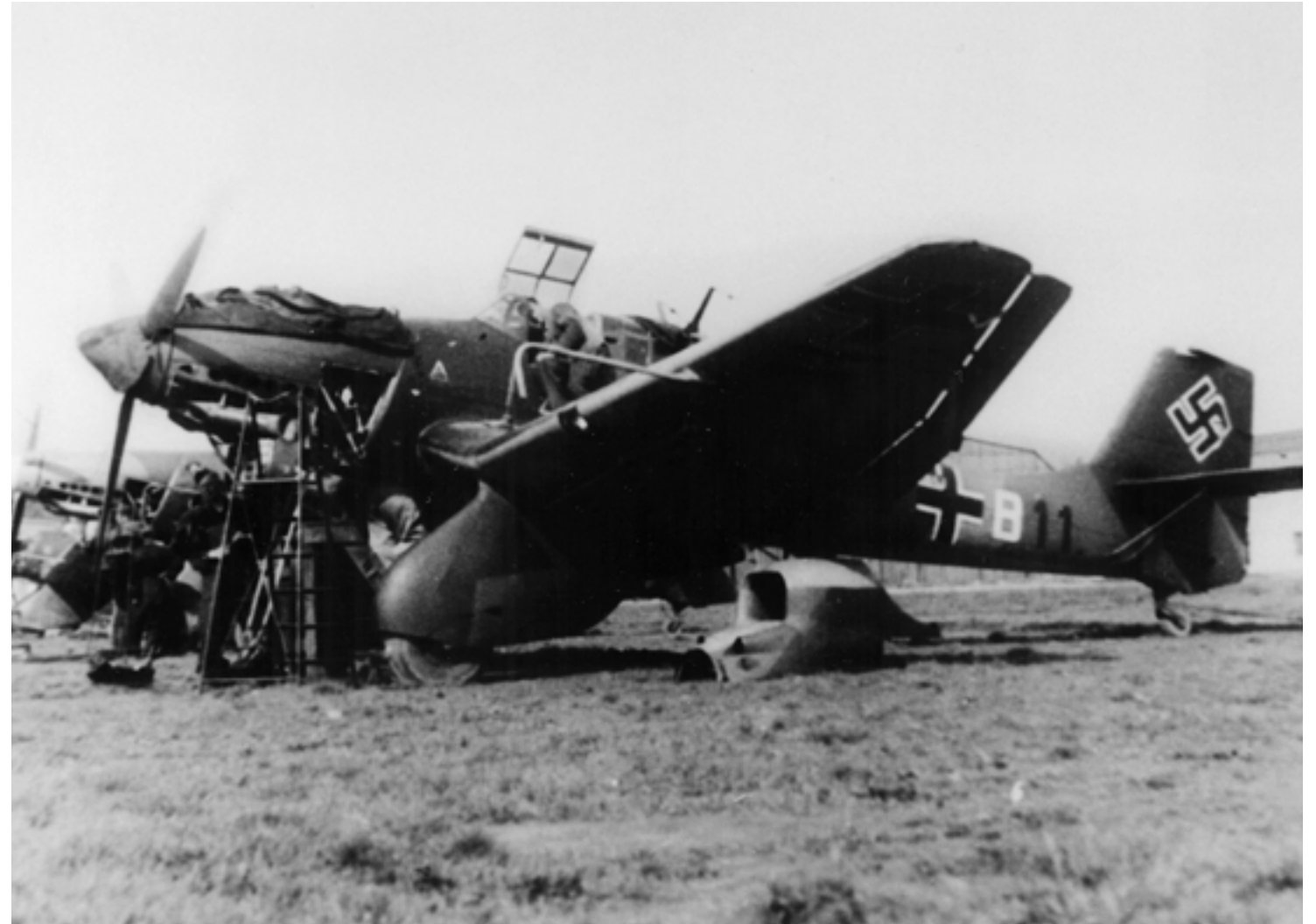
...when the Stuka was at last committed en masse on the 8th of August 1940, it was clear that against far more superior fighters such as the Spitfire and Hurricane, the Stuka was vulnerable...

1940, it was clear that against far more superior fighters such as the Spitfire and Hurricane, the *Stuka* was vulnerable unless it had a substantial fighter escort.⁸ Nevertheless, limited *Stuka* successes on the days that followed appeared to lull the German commanders into using them against inland targets. The results were catastrophic with 25 aircraft shot down and five seriously damaged in the space of two days. The *Stuka* was immediately withdrawn from front line operations and the *Luftwaffe* now had no aircraft that could fulfil the close-support role.

Nevertheless, the *Luftwaffe* had been looking ahead. It was believed that the proposed twin-engined Messerschmitt 210 would be an ideal aircraft to be the *Stuka*'s successor as it was anticipated that it could be utilised in the close-support role and then be able to defend itself, a true fighter-bomber like the Heinkel 51. However, the Messerschmitt 210 was plagued by technical problems and as its entry into service slipped, the experimental unit formed to develop its use as a fighter-bomber pressed ahead with developing the fighter-bomber concept by using the Messerschmitt 110 twin-engined fighter and to a lesser degree the Messerschmitt 109.

It quickly became obvious that the Messerschmitt 110 was slow and vulnerable after dropping its bombs, any successes being achieved purely through the skill of the unit's experienced pilots. However, the Messerschmitt 109 was found to be a much better fighter-bomber and was able to defend itself so it was decided to develop this aircraft as a *jabo*.

A British intelligence report dated 21 Oct 1940⁹ condensed all that had been gleaned on bombing with the Messerschmitt 109 and appears to be the date that the RAF first acknowledged the existence of fighter-bombers, even though a Messerschmitt 109 captured on the 7th of September 1940 was found to be fitted with a bomb rack and bomb release mechanism.¹⁰



Furthermore, an attack against railway lines by a formation of Messerschmitt 109 *jabos* on the 15th of September 1940 had provoked an outcry by the British Press as to fighter-bombers being 'unfair'.¹¹ The report acknowledged that one German unit had had been practising by bombing with 250 and 500 kg bombs from as early July 1940 and that a third of all German fighter groups were now being retrained as 'Me 109 bombers'. However, by the time that this report had been written, the fighter-bomber phase of the Battle of Britain was almost over.

Following the major attack on London on the 15th of September 1940 and the failure of the conventional bombers in daylight, the *Luftwaffe* switched nearly all of its bombers to nocturnal operations. From the 5th of September 1940 onwards, German fighter pilots had started receiving rudimentary training in using their fighters as bombers, using the gunsight as a bombsight. From the start of October 1940, these *jabos* were then used to bomb at medium and high altitudes. At high level, they were particularly hard to intercept but with a normal bomb load of one 250 kg bomb being dropped by pilots unused to bombing and using a rudimentary aiming system, the accuracy achieved was generally poor and attacks soon began to decrease.

Adolf Galland who commanded a fighter group during the Battle of Britain had previously been a ground attack pilot



Additionally, Winter brought with it poor weather which restricted fighter-bomber missions and with the majority of German fighter units being withdrawn to Germany for rest and refit, *jabo* attacks decreased further. Finally, the RAF started offensive fighter sweeps over the Continent on the 9th of January 1941 and this forced the *Luftwaffe* to commit more of its fighters to combat the increasing RAF incursions.

It is interesting to read what the German fighter pilots of 1940 thought about fighter-bomber missions. General Adolf Galland, who had been a ground attack pilot flying Henschel 123s prior to the Battle of France, commanded a fighter group during the Battle of Britain. Of fighter-bombers, he said:

"...we fighter pilots looked upon this violation of our aircraft with great bitterness. We had done everything possible to increase our performance in order to keep up with a progressive enemy. We had discarded everything dispensable in an attempt to squeeze another ounce of speed out of them. We had always demanded ejectable spare tanks in order to increase our range. Instead of that they now gave us bomb-release gadgets and we were forced to see a third of our aircraft drop out of air combat..."¹²

Galland was clearly not an exponent of the *jabo* and I believe that his view was shared by the majority of German fighter pilots. Galland further acknowledges that fighter bomber attacks "apart

Galland was clearly not an exponent of the jabo and I believe that his view was shared by the majority of German fighter pilots

from their nuisance value, [they] achieved very little of any military value"¹³ and that such missions had an adverse affect on the fighter pilot's morale:

"...it is disconcerting for a fighter pilot to have to fight without being able to take the initiative. The morale of fighter pilots was affected; they had to carry bombs, release them at great altitude on an enormous target without being able to observe the effect and then had to adopt a passive attitude towards enemy fighters..."¹⁴

With *Generalfeldmarschall* Göring highly critical of the failure of his fighter pilots and the ineffectiveness of fighter-bomber missions, it is surprising that just over a year later, the decision was made to recommence *jabo* attacks against British targets. This was the start of the *Luftwaffe's* 'tip and run' bombing campaign.

The origins of the Second World War 'tip and run' attacks came in March 1941. One fighter group, *Jagdgeschwader* 2 (JG 2), had continued to carry out fighter-bomber attacks but just against shipping. One squadron from JG 2 was given specific low-level bombing training by the Messerschmitt 210 operation evaluation unit whilst a further two squadrons carried out sporadic fighter-bomber attacks when pure fighter duties permitted. By June 1941, these latter two units had accounted for two freighters between 5,000 and 3,000 BRT and a tanker of 2,500 BRT as well as damaging a submarine, a cruiser of 10,000 BRT and a freighter of 3,000 BRT.¹⁵

Nevertheless, *jabo* missions were still secondary until one officer, wounded in July 1941, returned to operational flying duties. Frank Liesendahl commanded one of JG 2's squadrons which still carried out *jabo* missions. However, he had been replaced after being wounded and it is believed

...jabo missions were still secondary until one officer, wounded in July 1941, returned to operational flying duties. Frank Liesendahl commanded one of JG 2's squadrons which still carried out jabo missions



that as well as recuperating from his wounds, he worked on formulating tactics for low-level fighter-bomber missions. He convinced his senior officers of the value of what a low-level fighter-bomber could achieve against shipping and in November 1941 was given permission to form a dedicated *jabo* squadron.

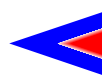
From the 10th of November 1941 to the 18th of February 1942, Liesendahl's squadron trained and perfected the tactics they would employ against British shipping. Liesendahl devised what was called the 'Liesendahl Process' which was quickly adopted as the preferred method of attack. Approaching the target at 450 kph and at an altitude of five metres, 1,800 metres from the target the fighter-bomber would climb to a maximum height of 500 metres before levelling off, diving at 550 kph and a dive angle of 3° before pulling up and lobbing the bomb at the target.¹⁶

The first recorded 'tip and run' attack was made against an unspecified target at Fairlight in Sussex on Christmas Day 1941 and in January 1941, the first 'tip and run incidents' were reported in Kent...

The first recorded 'tip and run' attack was made against an unspecified target at Fairlight in Sussex on Christmas Day 1941¹⁷ and in January 1941, the first 'tip and run incidents' were reported in Kent (three), Sussex (nine), Dorset (two), Hampshire (one), Cornwall (28) and the Isle of Wight (one). However, it would appear that Liesendahl was still trying to convince senior

officers of the value of *jabo* attacks and this proof came on the 10th of February 1942 when the 3,000 BRT steamship *Lieutenant Robert Mory* was badly damaged in an attack off the Cornish Coast. On the 4th of March 1942, *Luftflotte 3's*¹⁸ Fighter Headquarters authorised *jabo* missions as well as ordering another fighter group, JG 26, to form its own *jabo* squadron with effect from the 10th of March 1942.

JG 26 was at a distinct disadvantage, having not been involved in JG 2's three month work up. Pilots who had limited *jabo* experience from 1940 and early 1941 were transferred from other squadrons in JG 26 and a number who came to the *jabo* squadron were either unsuitable as fighter pilots, undisciplined or had incurred the wrath of their squadron commander.¹⁹ With the unsuitability or unwillingness of some of its pilots for 'tip and run' missions and with a lack of training, the effectiveness of 10/JG 26 (as the *jabo* squadron was designated) was questionable. British analysis of 'tip and run' attacks supported the imbalance of missions between JG 2 and JG 26 in March 1942, the first month of authorised operations. 17 'tip and run' attacks were carried out in JG 26's area of operations (Sussex and Kent) whilst JG 2's area of operations (Hampshire westwards) reported 49 such attacks. Admittedly JG 26 was operating in an area heavily defended by anti-aircraft guns and the fighter aircraft of the RAF's Number 11 Group but the successes of 10/JG 2 were impressive and a concern to the British. For example, on the 7th of March 1942, four Messerschmitt 109s roamed unmolested in the Exmouth-Teignmouth area, attacking numerous targets and even shooting down one of the RAF fighters trying to take off to intercept them whilst during the month, 10/JG 2 had attacked at least two convoys, claiming to have sunk three ships of varying tonnages and at damaging at least two more.



In April 1942, ‘tip and run’ attacks increased dramatically, with British intelligence reporting 156 such attacks. April also saw a shift to land targets, particularly gas holders as these were such prominent targets. The *Luftwaffe*’s intelligence during the last war has been criticised as being inaccurate or misguided. However, ‘tip and run’ targets attacked in April and May 1942 did show a high degree of good planning (or possibly luck). For example, the Germans were aware of an underground explosives store inland from Poole and unsuccessfully tried to attack it five times in April and May 1942 whilst two fighter-bombers attacked the Betteshanger Colliery in Kent precisely at shift-change causing damage and civilian casualties. Of greater concern were two attacks carried out by 10/JG 2 against the Telecommunications and Research Establishment (TRE) at Worth Matravers in Dorset. Described as ‘...one of the country’s single most important defence research related establishments during the whole of the Second World War...’,²⁰ much of Britain’s radar and radar-related research and development was being carried out at Worth Matravers. In April 1942, the TRE was studying the effect of the ionosphere on ‘Gee’ transmissions, ‘Gee’ enabling RAF bomber crews to fix their position by using pulse signals from three widely separated transmitters. ‘Gee’ could also be used to find targets when they were obscured by cloud. In the early evening of the 6th of April 1942, three aircraft from 10/JG 2 attacked the site causing unrecorded damage; at lunchtime two days later, another attack killed two and injured six, whilst a bomb passed through the 350 foot tall ‘Gee’ tower, causing slight damage. The site was unoperational for four days and because of the risk of a further more devastating attack and German reprisals for the Bruneval Raid,²¹ the TRE was moved to Malvern in Worcestershire in May 1942.

It should be emphasised that during 1942, the combined strength of 10/JG 2 and 10/JG 26 was rarely more than a maximum of 28 aircraft²² but their effectiveness was keenly felt by the British who quickly voiced concern as to means of combating ‘tip and run’ attacks. The official narrative produced after the war by the Observer Corps was quite specific as to the threat and the difficulties posed, saying:

“...In view of the persistent attacks made by the enemy using very low flying aircraft on coastal targets along the south coast of England, various methods were tried to facilitate interception. The difficulties were great as, in view of the low altitude, RDF [Radio Direction Finding or radar] information was seriously limited with the result that anti-aircraft defences were frequently unable to come into action until the attack had been delivered...”²³

Furthermore, the only anti-aircraft weapons that could counter these low and fast attacks were predominantly the 40mm light anti-aircraft guns. When the ‘tip and run’ attacks commenced, Anti-Aircraft Command only had 43 40mm calibre guns in position on the south coast and these were assigned to protect military installations, the sort of targets that the fighter-bombers were not attacking.²⁴ Even then, these guns had their failings as an attack on the airfield at Bolt Head in Devon on the 1st of May 1942 showed. Five Spitfires were damaged, a pilot badly wounded and many buildings damaged and the following report was submitted in respect of the anti-aircraft guns failing to engage the attackers:

“...the RAF 4 AA Flight twin Lewis gun posts and one Bren gun²⁵ were in action firing 304 rounds. Hits were claimed on all aircraft but no damage was observed. The Bofors guns²⁶ made a rather poor showing. Number Four gun fired only two rounds before the traverse gear jammed and Number Two gun fired one round, the case of which could not be ejected....”²⁷

By the end of April 1942, it must have been increasingly clear to the *Luftwaffe* of the value of such ‘tip and run’ attacks, specifically against shipping. Post-war analysis shows that between July 1941 and February 1942, German aircraft had sunk or damaged just 32.35% of the ships they attacked in daylight but in the period March-October 1942, this increased to 64.4%.²⁸ Still, the *Luftwaffe* did not expand the two units but at the end of May 1942, co-located both units and subordinated them to the *Luftflotte 3*’s Fighter Headquarters for operational, and later administrative, command and control. This was a clear indication that greater direction in fighter-bomber operations was at last being realised. Then, in mid-June 1942, both units were withdrawn piecemeal to near Paris where they began re-equipping with the Focke Wulf 190. Accordingly, ‘tip and run’ attacks decreased, dropping from 105 in May, to 77 in June and 37 in July 1942.²⁹

This was a worrying development for the British. The Focke Wulf 190 was superior in all flight parameters, except turning radius, to the best Allied fighter at that time, the Spitfire Mark Vb. It was 25 to 30 mph faster at all altitudes up to 25,000 feet and had the highest rate of roll of any fighter of the last war. As a fighter-bomber, it could carry a single 500 kg bomb under the fuselage and four 50 kg bombs under the wings, more than doubling the bomb load of the Messerschmitt 109. Furthermore, if the Messerschmitt 109 had been hard to shoot down (10/JG 2 had so far lost four to anti-aircraft fire and two to RAF fighters whilst 10/JG 26 had lost three to anti-aircraft fire and one to a fighter), the Focke Wulf 190 was faster, more suited, because of its air cooled engine and robust construction, to fighter-bomber operations and far more capable of taking care of itself when confronted by RAF fighters.

10/JG 2 flew its first attack with the Focke Wulf 190 on the 7th of July 1942, claiming to have sunk and damaged three ships, two

The Focke Wulf 190 was superior in all flight parameters, except turning radius, to the best Allied fighter...





days later doing the same again, claiming to have sunk two and damaged one. From now on, at least one ‘tip and run’ attack a day was planned or flown and as yet, the British had no means of countering them.

Because radar was rarely unable to detect such attacks, the first line of defence had to be the Observer Corps. Selected posts were ordered to fire a rocket (known as ‘Totter’) as soon as low-flying aircraft were seen and to continue to fire them whilst they remained in their vicinity. Furthermore, in order to speed up the reporting of low-flying fighter-bombers, the Observer Corps post would immediately pass the code word ‘Rats’ to the Observer Centre before passing any plot. This was then passed immediately to the Sector Controller, such messages having full priority to then scramble, or if airborne direct, RAF fighters to intercept.³⁰

...an attack on Salisbury in Wiltshire at the start of August 1942 was so sudden and fast that no RAF fighters were scrambled to intercept ...

The ‘Totter’ and ‘Rats’ systems were still inadequate. It took until November 1942 before standing patrols of two fighters (with another two on standby on the ground) were introduced at anticipated vulnerable points and even then, successful interceptions were infrequent. Furthermore, the existing spacing of the Observer Corps posts still made it possible for enemy aircraft to fly for appreciable distances overland at very low altitude without their tracks being maintained sufficiently to enable fighters to intercept and air raid warnings given. For example, an attack on Salisbury in Wiltshire at

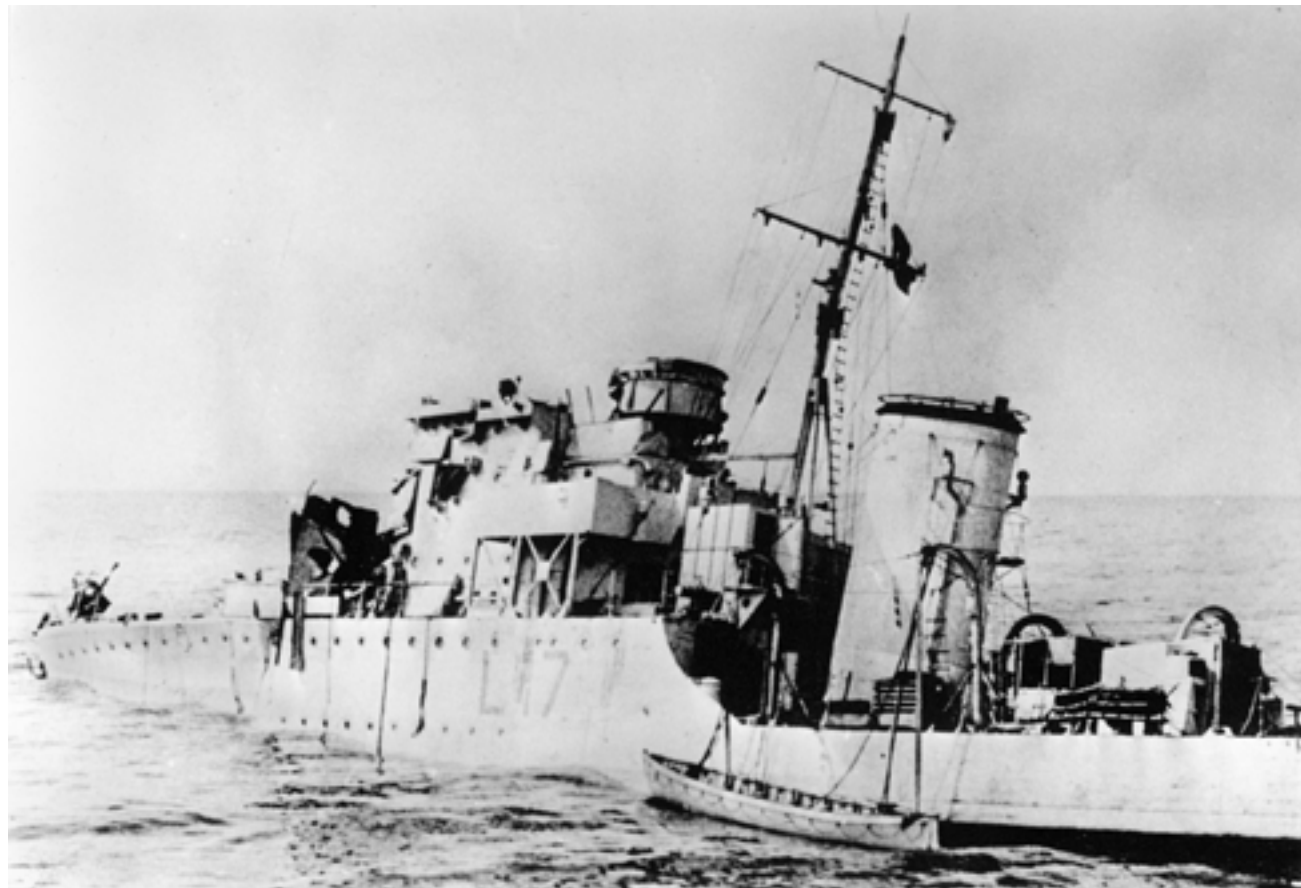
the start of August 1942 was so sudden and fast that no RAF fighters were scrambled to intercept and the air raid sirens not sounded until the two Focke Wulf 190s were well south of the Isle of Wight on their way home. It was therefore decided to form approximately 150 satellite reporting posts, connected to the nearest Observer Corps ‘parent’ post which would increase low coverage in a belt 30 miles width from the coast. These satellite posts were simply to report during the hours of daylight low flying ‘doubtful’ aircraft.³¹ Nevertheless, with both German unit’s fully operational with the Focke Wulf 190 by mid-July 1942, ‘tip and run’ attacks still continued with virtual impunity even though by the end of the month, each unit had lost one Focke Wulf 190 to anti-aircraft fire from the ships they were attacking. These losses had resulted in the deaths of each unit’s experienced commanding officers, one of which was the ‘tip and run’ exponent Frank Liesendahl. However, their replacements were equally experienced and even though the deaths of the two were keenly felt, there was still no respite in the attacks.

It was at the start of August 1942 that changes to the pattern of attacks occurred. 10/JG 26 moved back under the control of *Luftflotte 2*’s Fighter Leader and again started carrying out more attacks on Britain’s south-eastern coast, stretching British defences to their limit. In addition to shipping and coastal targets, the pattern of targets attacked by 10/JG 2 now showed a shift towards specific inland targets such as Helston and Bodmin in Cornwall, Salisbury and on the 5th of August, Yeovil in Somerset. The reason for this change in targets was hinted by a German war reporter who wrote about the Yeovil attack:

“...until now, every mission flown by the *Red Foxes*³² has only been aimed at the south coast of England. They have not yet made an attempt to attack the English hinterland. So they prepare Operation *Ypsilon* all the better because this attack

shall hit industrial works on the other side of the range of hills which stretch behind the south coast. Only two planes are going to carry out this difficult mission. First of all they have to wait for appropriate weather. Up to now, those designated for this attack had to turn back twice because they had not been able to break through the line of English fighter patrols..."³³

The full report, much of which should be regarded as German propaganda, is interesting for three reasons. Firstly, it gives the rationale for attacking targets other than coastal ones. Secondly, it acknowledges that 'tip and run' attacks relied on good weather and thirdly, the British defences, even though they might not be aware of it, did manage to cause some 'tip and run' attacks to be aborted. Nevertheless, this attack was a success. Just two 500 kg bombs destroyed 15 buildings with a further 972 suffering varying damage whilst three civilians were killed and 26 injured. It was thought at the time the target was the Westland



...the Royal Navy did lose the destroyer HMS Berkeley which was a considerable embarrassment, especially as the destroyer was also being used as a forward air controller for the Allied fighters...

aircraft factory but in fact the railway line and station and the centre of the town were the intended targets. The effect it had on the civilian population was not recorded but the audacity and the success of the attack did result in much analysis afterwards, particularly by the Ministry of Home Security.³⁴

For the following weeks, the occasional coastal target was attacked but an increase in Allied air and sea activity was noted and the reason for this became obvious on the 19th of August 1942 when a predominantly Canadian force carried out a raid on the French port of Dieppe. German twin-engined bombers were quickly committed but did not arrive over the beachhead until just before midday and then had to contend with smoke, anti-aircraft fire and a massive Allied fighter umbrella and so Dieppe became an ideal battlefield for fighter-bombers to utilise their speed and skill to attack Allied shipping. 10/JG 26 was based close to Dieppe and was committed throughout the day against purely naval targets, but both 10/JG 2 and 10/JG 26 attacked warships, transports, torpedo boats and landing craft throughout the day, 10/JG 26 losing just one aircraft and its pilot. The more experienced 10/JG 2 proved the value of 'tip and run' tactics being employed against ships off Dieppe, claiming to have sunk two

destroyers, two large landing craft and two other ships, damaging a further destroyer, transport ship, landing ship, two other ships and shooting down a Spitfire for no loss. The validity of these claims are hard to ascertain but the Royal Navy did lose the destroyer HMS Berkeley which was a considerable embarrassment, especially as the destroyer was also being used as a forward air controller for the Allied fighters and those fighters had been helpless to prevent bombs from just two 10/JG 2 fighter-bombers from breaking the destroyer's back.

It would appear that the German successes on the 19th of August 1942 in respect of employing 'tip and run' tactics against shipping were not developed further as from now on, land targets were concentrated on and by that Autumn, no further Allied ships would be attacked by German fighter-bombers, prompting the German Navy to state that it "...regrets every bomb that is not dropped on shipyards, ships etc".³⁵ 'Tip and run' attacks would continue to be a constant source of irritation and threat but now the Allied defences were forced to try and counter them more effectively.

September and October 1942 saw a reduction in the number of 'tip and run' attacks with Kent and Sussex receiving the brunt of the attacks. In order to ensure the success of attacks in this region, the fighter-bombers now had their own escorts but the majority of fighter-bombers lost during these months were still due to anti-aircraft fire.³⁶ The *Luftwaffe* also employed fighters on what was termed by both sides as nuisance or disturbance attacks in Kent and Sussex, the effects of which were minimal.

It was about now that the RAF assigned a new weapon to counter the 'tip and run' raiders. The Hawker Typhoon had been introduced into service in early Summer 1942 and so far had proved to be a disappointment. In August 1942, the commanders



of the three Typhoon squadrons complained that the Spitfire, not the Typhoon, was better used on offensive sweeps whilst the Typhoon's superior speed and fire power would be better used countering 'tip and run' Focke Wulf 190s and by basing the three squadrons near the eastern, south-eastern and south-western coasts.³⁷ This was accepted and by the end of September 1942, a total of five Typhoon squadrons were employed in this manner.

...commanders of the three Typhoon squadrons complained that the Spitfire, not the Typhoon, was better used on offensive sweeps whilst the Typhoon's superior speed and fire power would be better used countering 'tip and run' Focke Wulf

The tactics adopted by the Typhoon squadrons was another matter. It would appear that those developed by one squadron of 15 patrols a day by two aircraft flying at low or even lower altitudes with a further two on 'cockpit readiness', were soon adopted by other squadrons. Standing patrols then positioned themselves two to six miles from the coast and waited.³⁸ There was an additional hazard in that the Typhoon at some angles could look like its German opponent but this was partially solved by painting both the Typhoon noses white and black and white stripes under the wings. Still, success was hard to come by as a squadron records:

"...what with having to keep one eye on engine temperature, scan the air for enemy raiders, watch each gun position and Spitfire with suspicion and guard against crashing into cliffs or balloons, the whole enterprise seemed unprofitable. By the end of November [1942], with nothing to show for it, anti-aircraft fire had claimed one Typhoon, the weather two Typhoons and their pilots..."³⁹

There was another reason for this lack of success. On the 8th of November 1942, American forces landed in north-western Africa and the Germans immediately moved fighter units, including both fighter-bomber squadrons, to southern France as a precaution against any Allied invasion. Both fighter-bomber squadrons remained there for just over a month and between the 1st of November and 16th of December 1942, only one 'tip and run' attack was made. The unit responsible for this sole attack had been withdrawn temporarily from North Africa to exchange its Messerschmitt 110 fighters for Focke Wulf 190 fighter-bombers and cost the German squadron two fighter-bombers, intercepted by a standing patrol of two Typhoons thus validating the RAF's new aircraft and tactic.

However, prior to the southern France detachment and the inactivity of the last two months of the year, it should be stressed that the new British aircraft and tactics were unable to prevent what was the *Luftwaffe's* largest daylight attack on Britain since 1940. Hitler, increasingly annoyed by Bomber Command's offensive, ordered a full strength vengeance attack against Canterbury on the evening on the 31st of October 1942. The attack was carried out purely by fighter-bombers, 19 coming from the two recognised fighter-bomber squadrons and which were reinforced by an unknown number of temporary fighter-bombers drawn from fighter units and the unit which had been temporarily withdrawn from North Africa. The total force, including escorts, numbered 62 Focke Wulf 190s.⁴⁰

The attack was an embarrassment to the British defences. The German formation approached the Kent coast at wave-top height in three waves, hedgehopped approaching the outskirts of Canterbury, then climbed, dropped 31 bombs which killed 32 people and damaged countless buildings, and streaked back for France. British defences claimed to have shot down 10 fighter-bombers and suspected a further aircraft had been destroyed hitting a balloon cable. The true cost was one fighter-bomber lost to anti-aircraft fire after it had dropped its bomb, one fighter-bomber lost part of its wing to a balloon cable but returned safely and one of the escorts was shot down by an RAF fighter. To add further embarrassment, German fighters shot down two RAF fighters. As a vengeance attack, the attack on Canterbury was an unmitigated success with the British

acknowledging that 70% of the total weight of bombs fell in the target area but failing to acknowledge their failure to intercept the raid.⁴¹

The attack of 31st of October 1942 was effectively the last 'tip and run' attack of any substance for 1942. The Home Office, amongst other political and military organisations, was quick to analyse the successes and failures of the 'tip and run' attacks over the preceding nine months. In an end of year report produced by the Key Points Intelligence Directorate, it said of 'tip and run' attacks:

"It is clear that attacks were directed against gas and electricity undertakings, railways, trains and in some cases a terror raid was made on residential and shopping areas. Gas works and electricity undertakings in exposed coastal sites provide in themselves a good target and it may well be that the enemy were encouraged to develop these attacks in view of the repeated warnings of the Government for the necessity of limiting both industrial and domestic fuel. The undertakings at Brighton suffered severely in the several attacks made on them and as a result of the attack on the St Ives undertaking in August, domestic supplies were held up for about two months...."⁴²

An analysis carried out by the War Office on 'tip and run' attacks up to the end of 1942 was even more blunt.⁴³ Bearing in mind that the maximum number of fighter-bombers available to the *Luftwaffe* at this time was 28, 40% of all daylight attacks in 1942 were carried out by *jabos*, with low-level attacks being preponderant in the latter half of the year. Four out of every five fighter-bombers attacked recognisable military targets, average efficiency on each attack was 71% and German losses had been light.

From a British viewpoint, the small number of German fighter-bombers was creating far more work for the Observer Corps, RAF and anti-aircraft defences than they should have. In addition to an expansion of the Observer Corps satellite posts and increased fighter defences using new (and untried) tactics, the increase in anti-aircraft defences was dramatic. The numbers of light anti-aircraft guns assigned to combat 'tip and run' attacks rose from 43 in March 1942 to 543 in November 1942. Searchlight battery personnel were withdrawn from their primary duties and trained to man twin machine guns whilst the RAF Regiment anti-aircraft guns and personnel and 400 Royal Navy rocket projectors which fired wire obstacles into the paths of enemy aircraft were also assigned to the battle.⁴⁴ Despite all of this:

"...the increase in gun strength was not accompanied by any corresponding rise in the success rate...The first big weakness lay in the early warning arrangements which failed to record raid approach or did so too late. Out of 44 attacks



From a British viewpoint, the small number of German fighter-bombers was creating far more work for the Observer Corps, RAF and anti-aircraft defences than they should have



A reminder of the ineffectiveness of British defences was cruelly reinforced early in the New Year by another German 'vengeance' attack

in August 1942, only eight were preceded by radar warning..."⁴⁵

British defences was cruelly reinforced early in the New Year by another German 'vengeance' attack. As a reprisal for Bomber Command's attacks on Berlin on the 16th and 17th of January 1943, 28 fighter-bombers attacked the London Docks area at lunchtime on the 20th of January 1943 whilst a further 12 fighter-bombers carried out a diversionary attack on the Isle of Wight and Tunbridge Wells. Another 16 Focke Wulf 190s were used as escort whilst 39 German fighters carried out a diversionary fighter sweep off the Kent coast.

The attack achieved total surprise. The balloon barrage in that area of London had been brought down for maintenance during that lunch hour and the fighter-bombers attacked as that part of London's inhabitants were going to or at lunch; they were unaware of an attack until the first bombs exploded and only then the sirens sounded, by which time they were too late. With impunity, the fighter-bombers dropped their bombs and strafed buildings before heading south, their only loss being suffered on the return flight. A gasholder was set alight, the Royal Naval College at Greenwich was hit as was the Deptford West Power Station and Surrey Commercial Docks. To add insult to injury, the Germans also shot down ten barrage balloons, the barrage being hurriedly winched back up during the attack.

The loss of life was high and the effect on morale considerable. A school was hit, killing 38 children and six teachers, countless others were injured and many buildings and vehicles destroyed and damaged. So serious were the after effects of the attack that, for the first time, the problem of 'tip and run' attacks was debated in the House of Commons. A petition was signed by local residents complaining about the inability to prevent this attack and questions were asked why the defences were down and what was being done to combat 'tip and run' attacks. In a particularly evasive reply, the Secretary of State for Air, Sir Archibald Sinclair, said that the balloons were down for maintenance and that "...the best deterrence to such attacks as that on the 20th of January is the infliction of heavy casualties on the attackers..."⁴⁶ which was precisely what did not happen – all but one of losses suffered by the Germans were from the diversionary sweeps whilst the only fighter-bomber was lost after it had dropped its bomb. A further question, asking whether the Secretary of State for Air was satisfied that everything was being done to combat 'tip and run' raids, resulted in a similar response: "...the tactical measures best suited for defending this and other areas which are subject to varying forms of attack are under constant review..."⁴⁷

The attack received unprecedented publicity in the days that followed which was not helped by the captured German fighter-bomber pilot who, whilst being interrogated, stated that *jabo* pilots:

"...have been told to attack anything and everything liable to terrorise the British public. Trains, motor buses, gatherings of people, herds of cattle and sheep etc have been mentioned specifically at the briefing as likely targets..."⁴⁸

All of this still did not alter the fact that Britain's capital city had been bombed in broad daylight by a force which penetrated nearly 100 miles at high speed and low-level into enemy territory and still managed to drop its bombs onto recognised targets with good effect and then returned virtually unscathed.

When the weather permitted, for much of January and February 1943 more traditional 'tip and run' attacks were carried out from as far west as Torquay to as far east as Margate with the usual results – destroyed gasholders, hotels where trainee aircrew were being billeted, railway junctions and lines and, more often, town centres. It also appeared that the British defences were at last exacting a toll against the attackers –

Typhoons accounted for five fighter-bombers in these two months, light anti-aircraft fire a further three. However, again all eight aircraft were shot down after dropping their bombs on the designated target and these losses did not deter the *Luftwaffe* or affect the potency of the attacks. In fact, a greater number of attacks were now flown when the weather improved in March and a number of these were by much larger formations of 20 or so fighter – bombers. As the Observer Corps narrative noted:

...Britain's capital city had been bombed in broad daylight by a force which penetrated nearly 100 miles at high speed and low-level into enemy territory and still managed to drop its bombs onto recognised targets...

"...many minor attacks were made by aircraft in small formations with occasional more ambitious attacks by formations of between 12 and 30 fighter-bombers with or without an escort or rear cover. In January [20th], 12 [sic] fighter-bombers bombed the crowded areas round Poplar and Bermondsey from low altitude with considerable moral effect. This was followed by several other similar attacks on Eastbourne, Hastings, London and Ashford..."⁴⁹

If the attack on London on the 20th of January had "considerable moral effect", similar attacks in March 1943 had an even greater adverse moral effect for British civilians

If the attack on London on the 20th of January had "considerable moral effect", similar attacks in March 1943 had an even greater adverse moral effect for British civilians. The attack against Eastbourne on the 7th of March by 18 fighter-bombers was undetected until the first bombs exploded; no RAF fighters were able to intercept and 14 civilians and seven servicemen were killed and countless buildings destroyed or damaged. Then again on the 11th of March, 27 fighter-bombers attacked Hastings, killing six civilians, destroying 40 houses and blocking the railway line. No German aircraft were lost even though anti-aircraft defences claimed to have shot down three but as Headquarters Number 11 Group noted:

"...standing patrols were immediately detailed to the raid but the attack was so sharp that the enemy were passing out to sea six minutes after they were sighted..."⁵⁰

The following day saw another reprisal for Bomber Command's continued attacks against Berlin with 24 fighter-bombers, this time with a massive escort, dropping bombs on Ilford and Barking in Essex and the eastern outskirts of London. Only minor

damage was inflicted but the residents of Ilford were vociferous in the failure of the defences preventing the attack and sirens again being sounded only after the attack had started. The RAF did manage to intercept the formation but not until it approached the Belgian coast on the return flight where two fighter-bombers were eventually shot down.

The final massed attack took place against Ashford in Kent on the 24th of March and was the most successful by far. The official report is graphic as to the attack's effectiveness:

"...this attack was heavier and more successful than the enemy's previous efforts. The enemy aircraft flew across Ashford at low level from south-east to north-west. Two of the five bombs aimed at the railway works did considerable damage whilst three bombs which fell to the north of the works damaged rolling stock. The remaining enemy aircraft appear to have made an indiscriminate attack on the town. One enemy aircraft made a cannon attack from roof top height on a petrol lorry standing in the yard of an agricultural works and the lorry exploded. The bomb carried by this aircraft was hit by light anti-aircraft fire and the enemy aircraft blew up. Extensive damage was caused to the works as a result of the double explosion..."⁵¹

All this increased activity, with 'tip and run' attacks now spreading further north-east as far as Walton-on-the-Naze in Essex, coincided with a massive expansion and reorganisation of the German fighter-bomber force in France. In addition to the two established fighter-bomber squadrons, a dedicated *jabo* group had begun to form in December 1942.

Schnellkampfgeschwader 10 (SKG 10)⁵² flew its first operational sortie on the 7th of March 1943 and by the 31st of the month, had 90 aircraft available to attack Britain, an additional 28 being assigned to it when the two original fighter-bomber units came under its aegis early in April 1943.⁵³

...the Luftwaffe High Command, probably due to incomplete intelligence, believed that daylight jabo missions had not achieved the desired effect...

The British were unaware of this massive force of fighter-bombers and if the *Luftwaffe* had utilised it in a similar tactical manner to the 'tip and run' attacks of the previous 13 months, would have been a formidable weapon which the British

defences would have had considerable difficulty in countering. Crucially, the *Luftwaffe* High Command, probably due to incomplete intelligence, believed that daylight *jabo* missions had not achieved the desired effect and therefore the vast majority of SKG 10 was to be trained for nocturnal attacks, to the incredulity of many of its pilots:

"...they got the idea that attacks would be practicable at night...such an absurd idea. The...pilots of SKG 10 had no qualifications for night missions. There was no experience in night and instrument flying and no [night] navigation system was available..."⁵⁴

April 1943 saw daylight 'tip and run' attacks continue but on a much reduced scale, as much of SKG 10 trained for nocturnal

operations, and only five separate attacks were carried out. Only one of these was a mass attack and took place on the 3rd of April when 16 fighter-bombers, yet again, completely surprised the defences, caused considerable damage and all aircraft returned safely. A minor attack on the 8th of April by a smaller formation caused considerable damage to military and industrial targets on the Isle of Wight but two fighter-bombers were lost, one to a Typhoon on a standing patrol, the other to light anti-aircraft fire.

This reduction in 'tip and run' activity did not go unnoticed and although no obvious reason could be given for it, the British still saw 'tip and run' attacks such as the one on the 3rd of April as wholly successful and that "...it is clear from the results achieved in the 'tip and run' raids on coastal targets that our defences can be improved...".⁵⁵ Furthermore, a similar report analysing nocturnal bombing did not connect the reduction in daylight attacks with a commencement of fighter-bombers attacking by night, stating:

"The fighter-bomber appeared for the first time as a night bomber on the 16th/17th of April and it is presumably the new fast bomber ⁵⁶ which has been mentioned recently in German broadcast claims...They have operated mostly in the London and Home counties..."⁵⁷

May 1943 saw a sharp increase in massed 'tip and run' attacks with 12 specific attacks on seven days. On two days, two attacks were made simultaneously in an attempt to split the fighter defences, all the attacks occurring either early in the morning, lunchtime or late in the evening, maximising their irritation to the civilian population. The fact that Great Yarmouth and a nearby radar station was under attack by 20 fighter-bombers on the 7th of May was not evident until the first bomb exploded whilst a similar attack four days later was equally successful. Only two aircraft were lost in these attacks, one of them to British defences again after the bombs had been dropped. The following day, Lowestoft was attacked by 25 fighter-bombers just before sunset; the results were predictable:

"...the first warning received by anti-aircraft sites was the noise of falling bombs; the official warning was given two minutes after the first bomb had dropped. In addition to 21 bombs on



... 'tip and run' losses for the first 20 days of May 1943 numbered two whilst nocturnal losses for the same period were higher despite such attacks only being flown on four nights

land, several bombs were dropped in the sea near the harbour. Nine anti-aircraft sites were attacked with cannon and machine gun fire and the gas works, electricity mains and a hospital were damaged..."⁵⁸

Yet again, no German aircraft were lost.

It would appear incredible that the *Luftwaffe* was not aware of the successes it was achieving in May 1943 and even German radio broadcasts, usually boastful of such attacks, preferred to play down the successes of the 'fast bombers'⁵⁹. The frequency of nocturnal missions now began to increase as daylight attacks decreased but even then, 'tip and run' losses for the first 20 days of May 1943 numbered two whilst nocturnal losses for the same period were higher despite such attacks only being flown on four nights.

'Tip and run' attacks would occur only on three more days in May 1943 and all attacks but one were devastating. On the 23rd of May, simultaneous lunchtime attacks were launched against Hastings and Bournemouth. At Hastings, anti-aircraft sites appeared to be the chosen targets but, for a change, these sites and the fighter standing patrol had received ample warning. The town was still bombed and the two German losses, one to a Typhoon, the other to anti-aircraft fire, occurred after the bombs had been dropped. Despite a six-minute warning, the attack on Bournemouth was a total success. Considerable damage was caused to the town centre with five buildings destroyed and a further 3,000 damaged whilst civilian casualties were 77 killed, 45 seriously wounded and 150 slightly wounded. Far more serious was a direct hit on a hotel being used by trainee RAF aircrew; 31 service personnel were killed, three missing and 38 wounded. Two days later, Brighton suffered another mass attack. Again, there was five minutes warning of the attack but the fighter-bombers still succeeded in damaging the railway and locomotive works and appeared to be targeting, with considerable success, Brighton's larger buildings.

The only failure that month was on the evening of the 25th of May when adequate warning enabled Spitfires to break up an intended attack on Folkestone. Slowed down by their bombs, the fighter-bombers jettisoned them into the sea and turned for home. Spitfires claimed to have shot down six fighter-bombers but only one was lost.

The final attacks of the month took place on the 30th of May. Torquay, another location where RAF trainee aircrew were billeted, had always been a popular target for 'tip and run' attackers; this time five servicemen were killed and 11 wounded. However, one of the five fighter-bombers lost in the attack did so because it collided with a church steeple; its bomb was thrown clear to explode on a Sunday school, killing 21 children and three of their teachers; the morale of the town's inhabitants was, obviously, badly shaken and the fact that five enemy aircraft had been lost during the attack was of little recompense. An attack on Walton-on-the-Naze that same evening also caused much damage but no casualties.

It could have been safe to assume that 'tip and run' raids in June 1943 would continue in the same vein. Indeed, this was the case for the five mass attacks that took place on the first six days of the month. Each attack was analysed by the British as being a total success, particularly the attack against Eastbourne in the early afternoon of the 6th of June 1943. However, 'tip

and run' attacks expected on the days that followed did not materialise; no further such attacks would occur against the British mainland for the remainder of the war.

The reason for the sudden cessation of 'tip and run' attacks has never been satisfactorily explained

The reason for the sudden cessation of 'tip and run' attacks has never been satisfactorily explained. The Observer Corps Narrative tries to explain it by saying: "...at the end of the first week in June [1943], these 'tip and run' raids ceased. Undoubtedly, the enemy had found it increasingly dangerous to make daylight sorties over this country..."⁶⁰

Another source supports this explanation by saying "...Göring decided that the losses were too great and in June [1943] the...attacks petered out..."⁶¹

However, I have tried to show that contrary to the above, 'tip and run' attacks had met with considerable success, especially for much of 1943, by normally hitting the designated target whilst keeping fighter-bomber losses to a minimum. There were a very few exceptions to this and in particular, the attacks carried out in June 1943 were seen by the British as being 100% successful.

I believe that there are three simple reasons why 'tip and run' attacks stopped. Firstly, German post-attack intelligence, normally quite poor throughout the war, underestimated what the attacks had achieved; even the German radio broadcasts were unusually non-committal about the achievements.⁶² Secondly, the *Luftwaffe* mistakenly believed that by using the fighter-bomber at night, similar results could be achieved whilst the darkness would help protect the aircraft. However, advances in British air-to-air radar technology and the superiority of British night fighters proved that darkness was no protection, German losses were high and effectiveness very poor. As one German commander, who had flown such missions in 1943 and 1944, made clear after the war:

"...the night action of the Focke Wulf 190 against London was not very successful. It was a real makeshift. This type of aircraft was neither designated for this kind of mission nor was it suitable for this task..."⁶³

However, the final reason why tip and run attacks stopped was far simpler in that there were no fighter-bombers available for 'tip and run' missions left in north-west Europe by the middle of June 1943. On the 12th of May 1943, German forces had surrendered in North Africa and it was clear that the Allies would soon invade southern Europe. The Germans thought that the greater threat was now in the Mediterranean, the 'soft underbelly of Europe', so in order to reinforce one wing of SKG 10, a second was rushed from France to southern Italy in the second week of June 1943 whilst a third wing was withdrawn from France and operational from Italy by the end of June 1943. By then, the only fighter-bomber unit still in northern France was the nocturnal wing of SKG 10.

So to conclude, what was the impact of the German ‘tip and run’ campaign? The Germans had discovered a unique use for its fighter aircraft and after much trial and error and even opposition, the fighter-bomber proved to be a very effective weapon against shipping. Extending its usage to coastal targets was also a success and the British defences had great difficulty in preventing many devastating attacks on numerous coastal towns and latterly inland targets.

For much of the 15 months that ‘tip and run’ attacks occurred, the Germans could only muster a maximum of 28⁶⁴ aircraft to attack targets on a coastline which stretched from Great Yarmouth to the Lizard, a distance in excess of 1300 kilometres. However, this length of coastline and uncertainty of what would be attacked also played into the German’s hands. There were insufficient anti-aircraft guns of the correct calibre to counter a low-flying high-speed threat, whilst:

“...the RAF could offer no positive defence against these fast, low-flying fighter-bombers which achieved an effect out of all proportion to the effort they represented. The Chain-Home and Chain-Home Low radar stations...were unable to plot the movements of the *jabos* on account of their low altitude and Fighter Command was forced to mount standing patrols in order to counter the threat...”⁶⁵

It is interesting to note that wartime analysis stated anti-aircraft guns accounted for 55 ‘tip and run’ attackers during the period March 1942 to the 6th of June 1943; fighters were said to have accounted for a further 51.⁶⁶ Analysis carried out by myself tells a different story – anti-aircraft fire actually accounted for 28 fighter-bombers, fighters a further 28, one aircraft was shared whilst a further five either collided with buildings, high-tension wires or other aircraft.⁶⁷ It is clear that to lose 62 aircraft and 62 pilots over a 15 month period was high but at this stage of the war, this was sustainable. Furthermore, these losses should be compared against a comparable German twin-engined bomber group which, for the same period, lost 122 aircraft in attacks on Britain, costing in the region of 480 aircrew killed, missing or prisoners of war.⁶⁸

From a military viewpoint, ‘tip and run’ attacks did result in many more anti-aircraft guns and associated personnel being dedicated to defend potential targets. Furthermore, Fighter Command was forced to dedicate many aircraft to try and prevent the fighter-bombers from dropping their bombs, something normally met with little success. These assets could have been better used.

What of the impact on the civilian population and the Government? The inability to prevent such attacks was a great worry to those living on the south coast. For example, Torquay was attack eight times over the 15 months, two of the attacks being severe and resulting in considerable loss of life. Two other attacks in 1943 so incensed civilians living in the towns affected that petitions were written and questions asked in the House of Commons. However, it would appear from the non-committal responses that ‘tip and run’ problems were left purely to the military and ‘tip and run’ attacks remained a constant irritation to civilians living on or near the south coast.



What then of the value of the 'fighter-bomber' as a weapon? The Germans did indeed develop the idea but the Allies copied and perfected it. Every Allied fighter introduced during the war had to have, with minimum modification, the capability of carrying a bomb and the best example of this was the Hawker Typhoon. In the second half of 1943, the Typhoon found a new role as an all-weather intruder and then close-support aircraft, armed with bombs and rockets. In the battle for Normandy in the Summer of 1944, the Typhoon made a name for itself as a first-class anti-tank, anti-vehicle, anti-building and anti-strongpoint weapons platform, something the Germans never managed to achieve after the early success of the war.

It is therefore my conclusion that 'tip and run' attacks did have an impact on both the British military and, to a lesser extent, the civilian population living on Britain's southern coast but there is scant evidence that the Government was overly concerned, unless a Member of Parliament's constituency was a regular target. From the German viewpoint, they underestimated what they were achieving with what was a very small force of fighter-bombers, a force which was too small to cause massive damage. The decision made in 1943 to use the fighter-bomber at night was misguided and even when the *Luftwaffe* had a massive fighter-bomber force at its disposal, it failed to utilise it in a way that would have swamped British defences and allowed the fighter-bombers to attack more targets, further inland, with virtual impunity.

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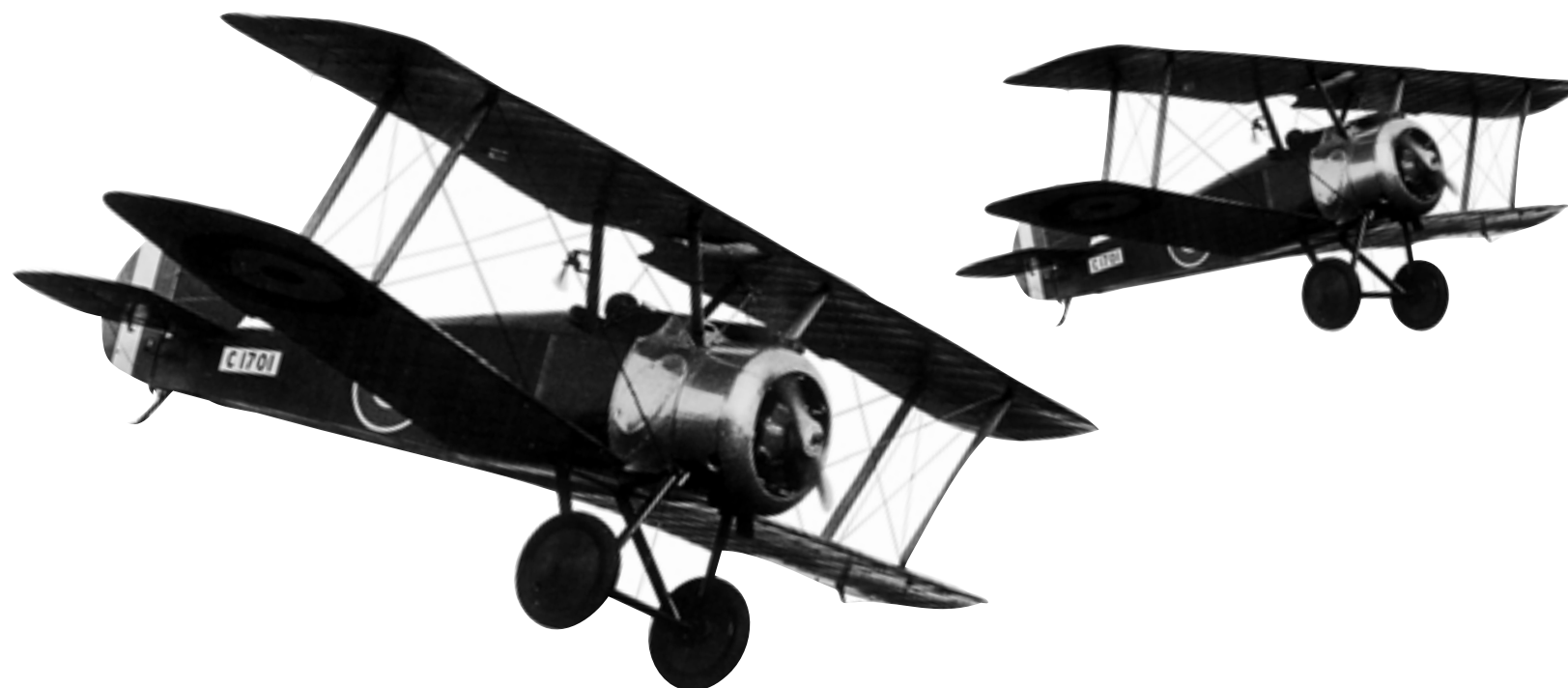
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- 2 Reaching a peak in the Summer of 1942.
- 3 Balke, U (1997) p.389.
- 4 *Royal Observer Corps Narrative* 1943 p.101.
- 5 Balke, U (1997), p.391.
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- 7 Ibid.
- 8 Even though the convoy was nearly annihilated, eight *Stukas* were shot down and a further seven damaged.
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- 43 BC/G/11 p.3.
- 44 Routledge, N W (1994) p.403.
- 45 Ibid.
- 46 Parliamentary Debates Commons 1942-43 Vol. 386 p.477.
- 47 Ibid.
- 48 AI (K) Report Feb 43 p.5; there is no evidence that this was the norm but that it was a tactic reserved for 'vengeance' attacks.
- 49 *Royal Observer Corps Narrative* 1943 p.101.
- 50 HQ No 11 Group Operations Record Book, March 1943, p.7.
- 51 AWA Report No BC/18 May 1943 p.7.

- 52 Fast Bomber Group 10.
- 53 Balke, U (1997) p.389.
- 54 Setzer, F (1989).
- 55 AWA Report No BC/20 p.2.
- 56 Reference to the new unit, SKG 10, which was thought to be using a newer and faster FW 190 which was in fact not the case.
- 57 AWA Report No BC/19 p.1.
- 58 AWA Report BC/20 p.4.
- 59 *Diary of Day Raiding - April and May 1943* p.2.
- 60 *Royal Observer Corps Narrative 1943* pp.101-102.
- 61 Routledge, N W (1994) p.404.
- 62 *Diary of Day Raiding – April and May 1943*.
- 63 Dahlmann, K p.81.
- 64 Assuming 100% serviceability which was never achieved.
- 65 Wood, T & Gunston, B (1977) p.62.
- 66 Routledge, N W (1994) p.404.
- 67 Sources for the German losses are the *Luftwaffe* Quartermaster General's Returns and *Deutsche Dienststelle*. Sources for how these aircraft were shot down came from the Command, Group and Squadron Records books held either at the Air Historical Branch or Public Records Office.
- 68 Balke, U (1997) pp.428-457.



Air Power Taken to its Limits, and Beyond

The Battle of Amiens (8-11 Aug 1918)



In July 1918 the British Fourth Army and the neighbouring French First Army prepared an offensive along the 28-mile section of the line in front of Amiens. In the previous April the German offensive in that area had come to a halt just in front of the city. An important communications centre, Amiens was now within range of German long-range artillery and suffered from frequent shelling. One aim of the new offensive was to push the front line back far enough to remove that threat.

The German Army regarded this part of the front as a jumping off point for a future advance, rather than as a barrier to repel an Allied offensive. Consequently the defences there were relatively weak, with no bunkers or concrete fortifications to protect troops against an artillery bombardment.¹

The Allies took pains with camouflage to conceal the preparations for the new offensive. There was plenty to hide. The British Fourth Army was reinforced by five infantry divisions, two cavalry divisions, nine armoured battalions with 462 heavy and 72 light tanks, and one thousand additional artillery pieces. Nearly 300 extra trains ran into the Fourth Army area, in addition to its normal traffic.² Generally poor weather during the first week in August assisted in keeping these moves secret. On 7 August the skies cleared, and RAF fighters flew a vigorous programme of barrier patrols to prevent enemy planes photographing or otherwise observing the rear areas.



AIR ORDERS OF BATTLE

The RAF’s 5th Brigade was the formation normally attached to the British Fourth Army. During the two days preceding the offensive its strength was much increased with the arrival of units from 9th Brigade, the General Headquarters reserve held for that purpose. Also 3rd Brigade, assigned to the neighbouring sector, sent its units into action over the battle area.

When the offensive opened the RAF units supporting it possessed about eight hundred aircraft, divided as follows:³

Single-seat fighters (Sopwith Camel, Sopwith Dolphin, SE 5A)	376
Fighter-reconnaissance (Bristol Fighter F2B)	75
Day bombers (DH 4, DH 9)	147
Night bombers (Handley Page O/400, Fe 2D)	92
Corps (army co-operation) aircraft (RE 8, Armstrong Whitworth FK 8)	110

In addition there were eight Sections of tethered observation balloons in the battle area, each operating one balloon.

The French air units supporting the French First Army possessed 1,104 aircraft, divided as follows:⁴

Single-seat fighters (Nieuport 28, SPAD XIII)	612
Day bombers (Breguet 14, Salmson A.2)	195
Night bombers (Farman F. 50)	52
Corps (army co-operation) aircraft (Breguet 14, Salmson A.2, SPAD XVI)	245



The number of observation balloons in position in that sector is not known, but was probably about ten.

Thus the total Allied air strength positioned along the 25-mile wide front to support the offensive amounted to about 1,900 combat aircraft and about eighteen observation balloons. There was no shortage of landing grounds within easy reach of the battle area.

...the total Allied air strength positioned along the 25-mile wide front to support the offensive amounted to about 1,900 combat aircraft...



The German Air Service units supporting the Second Army facing the offensive possessed 365 aircraft of all types, divided as follows:⁵

Single-seat fighters (Fokker D VII, Pfalz XIII, Albatross D III)	140
Bombers (AEG G4)	36
Ground attack aircraft (Halberstadt CV, Junkers J.1, AEG J1)	18
Corps (army co-operation) aircraft (Halberstadt CV, Junkers J.1, AEG J1, LVG C.VI, DFW CV)	171

The number of observation balloons in position in that sector when the offensive opened is not known, but it was probably about four. It is likely that more arrived in the battle area after the offensive opened.

RELATIVE EQUIPMENT OF THE OPPOSING AIR FORCES

The latest BMW-engined version of the German Fokker D. VII fighter was now in service with several front-line units. As fast as the fastest Allied fighter types at altitude, its rate of climb was superior to any of them making it a formidable opponent in close combat.⁶ The availability of the D. VII would be a major factor in enabling the outnumbered German flying units to continue effective resistance during the final months of the war. The Allied fighter type that came closest to matching the performance of the D.VII was the newly-introduced Sopwith Dolphin,⁷ but only two squadrons of these fighters were in place to support the offensive.

The German Air Service also had the advantage of possessing armoured aircraft for low altitude operations over the battle area. The AEG J-1 and Junkers J-1 aircraft carried sheets of armour plate 5 mm thick to protect their two-man crews and, in the case of the latter, the engine. Neither the Allied front-line troops nor their covering fighter units possessed automatic weapons larger than rifle calibre, so the armoured aircraft were able to operate at low altitude over the battle area with a high degree of impunity.⁸

As well as being heavily outnumbered, the German Air Service had to contend with the cumulative effects of an Allied naval blockade that had lasted four years. The German fighter ace Ernst Udet later wrote:

“The strain of the war increased from day to day. For every one of our machines which took-off, five enemy machines started. And should one of them happen to be brought down on our side of the line we pounced upon it, and eagerly seized all instruments and articles of nickel and brass – metals which had long since ceased to exist in Germany. Against the abundant supplies at the disposal of the enemy, we had nothing to stake save our sense of duty and four years’ fighting experience. Now each start [take off] meant a fight, and we started often.”⁹

Against the abundant supplies at the disposal of the enemy, we had nothing to stake save our sense of duty and four years’ fighting experience



Among other items in very short supply were copper, rubber and leather, as well as a whole range of foodstuffs.

THE RAF PLAN

During the battle the French Air Force units in the south flew a similar pattern of operations to those of the RAF. The account that follows will concentrate on the RAF plan and its execution, however.

The RAF plan to support for the Amiens offensive was more detailed and ambitious than any previously attempted. In addition to the normal air superiority, reconnaissance, contact patrol and artillery direction tasks, the following were ordered:¹⁰

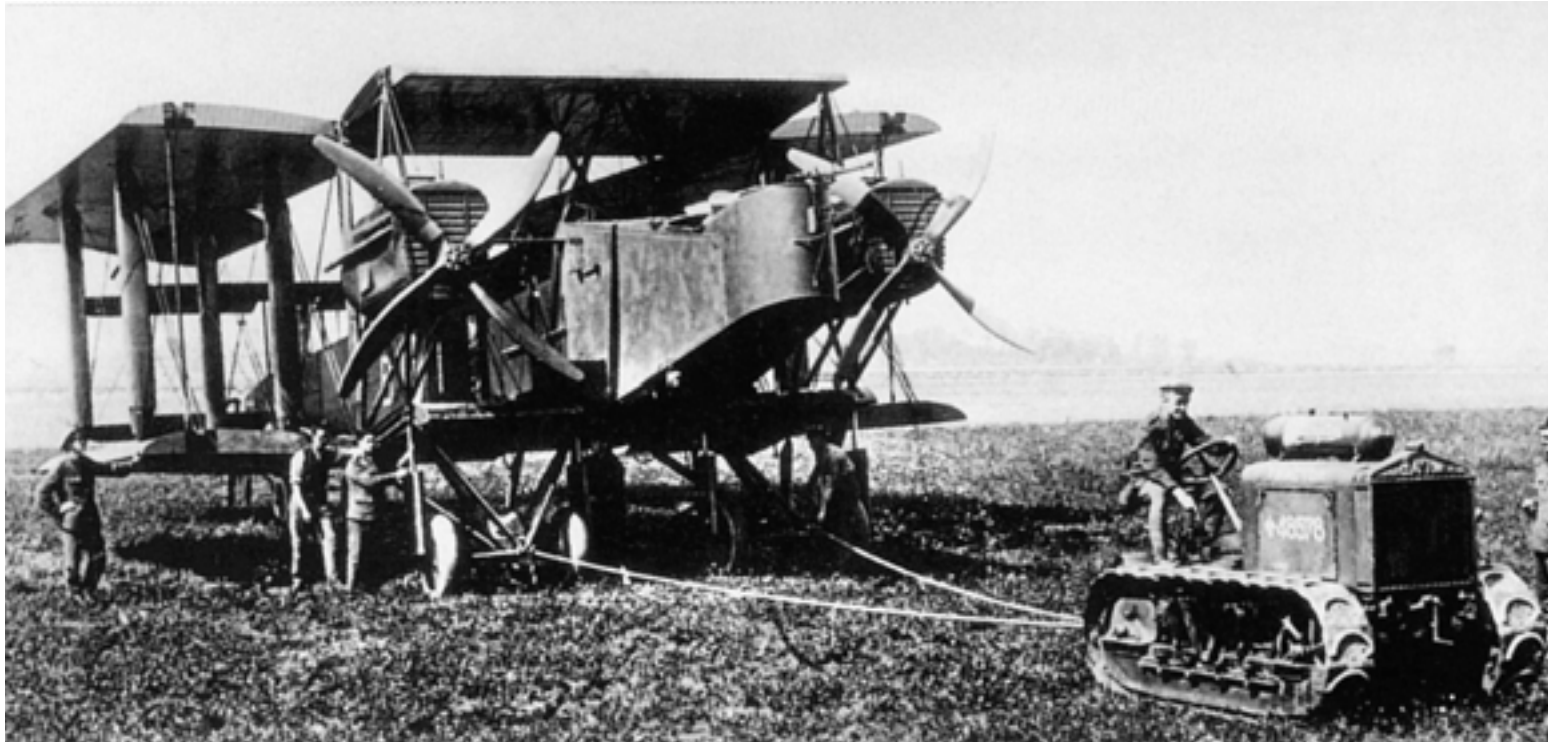
- (i) Soon after dawn on the first day, day bomber squadrons were to attack the main German airfields.
- (ii) Eight RAF fighter squadrons, with about 150 aircraft, were to deliver low-flying bombing and strafing attacks on enemy troops moving towards or away from the battle area.
- (iii) On the evening of the first day, when enemy reinforcements were expected to arrive in the battle area, day-bomber squadrons with fighter support were to hit the rail stations at Peronne, Chaulnes, Marchelepot, Villers Carbonnel, and Etricourt.

During this operation, for the first time, a squadron of Armstrong Whitworth FK 8 army co-operation planes was to work with the tank units, with an allocation of one flight of six aircraft to each of the three tank brigades. Before the battle these aircraft flew photographic sorties over the ground over which tanks were to pass, so tank commanders could pick suitable lanes through the defences. Once the offensive began, the aircraft were to fly contact patrols and deliver reports on the vehicles' progress to the various headquarters. These planes also were to scout the ground ahead of the advancing tanks, searching for enemy anti-tank gun positions which were to be put out of action by direct air attack or by air-directed artillery fire. Although there had been several experiments with systems to provide direct communication between tanks and aircraft, none had proved successful.¹¹

On the first morning, two squadrons of RE 8s were to drop lines of phosphorous bombs to produce smoke screens ahead of the advancing troops, to screen them from view. Later, one of these squadrons would be employed in parachuting boxes containing 1,000 belted rounds of machine gun ammunition, to units near the head of the attack that had run short.¹²

COURSE OF THE BATTLE

On the nights of August 6/7 and 7/8, a pair of twin-engined Handley Page 0/400 bombers flew up and down the front line for several hours dropping bombs and strafing any source of light seen in enemy territory. Any damage caused was incidental; the primary purpose of these flights was to conceal the noise from the British tanks as they moved into position for the attack.¹³



Any damage caused was incidental; the primary purpose of these flights was to conceal the noise from the British tanks as they moved into position for the attack

More than 1,380 field guns and howitzers, and 826 heavy guns, supported the offensive. At 0420 hours on 8 August these commenced a hurricane artillery barrage on the German forward positions, designated artillery batteries and other important targets. The torrent of high explosive and shrapnel shells arrived as a fortuitously thick blanket of mist covered much of the area. Three minutes after the barrage began, the gunners began a creeping barrage that advanced in 100-yard steps every three minutes. Following the barrage, British, Australian and Canadian infantry and tanks began their methodical advance. Their advance concealed by the mist, these troops quickly overran the German forward positions and moved on.¹⁴

Lieutenant Paul Winslow US Air Corps, flying an SE 5A with No 56 Squadron RAF, took part in a dawn patrol over the battle area that morning. Later he noted in his diary:

“We took off while it was still dark and got to 12,000 feet. All that could be seen were hundreds of our machines and thousands of gun flashes, denoting the top of the barrage. It was a wonderful sight to watch, and we were not bothered by Archie [anti-aircraft fire] so we could enjoy it. Landed at 7:00 am.”¹⁵

Lower down, the mist greatly hindered the work of those units assigned to the army co-operation and ground strafing tasks. Writing of the RE 8 operations that morning by No 3 Squadron Australian Flying Corps, the Official Australian Historian noted:

“In the event the airmen saw little of the opening of the attack. From the moment of ‘zero’ (4.20 am) till nearly 10 o’ clock in the forenoon fog assisted the artifice of the smoke-screens on the Somme in hiding all the conflict in the valleys and copses between Cerisy and Warfusee...The infantry attack, however, met with little or no difficulty. A lifting of the fog enabled contact patrols to locate the line at 10 am and 11.30. So swift and complete was the advance that the artillery and counter-attack machines had very little of their contemplated work to do. The German batteries were smashed or overrun. The German infantry delivered no counter-attack, for the simple reason that its reserves were rounded up and captured.”¹⁶



A few words are necessary at this point, to explain the various roles undertaken by the two-seat army co-operation planes operating over the battle area. Each Royal Air Force plane engaged in this work carried a Sterling spark transmitter operating in the 2-Megahertz band, with a maximum range of about 10 miles. These planes did not carry wireless receivers, however. The crews transmitted reports in Morse code, but messages from the ground to the aircraft were passed by signal lamp or by means of large signal panels laid out on the ground.¹⁷

The purpose of the contact patrols was to establish the location of the forward elements of the attacking infantry and tank units. Flown at altitudes below 1,000 feet, the mission required the aircraft to fly a series of tracks parallel to the start line and advancing methodically forwards. In those pre-R/T days, communications had to be improvised. At intervals the contact patrol aircraft sounded a Klaxon horn with the Morse letter “A” (dot dash) to ask “Where are you?” On hearing that signal, infantrymen responded by lighting flares and displaying reflective metal discs carried for the purpose. Once the forward edge of the battle line had been determined, the observer marked this on maps. These were placed in weighted message bags and delivered to the appropriate division, the corps and the army headquarters.¹⁸ Typical contact patrol reports from RE 8s of No 3 Squadron Australian Flying Corps that day ran:

“Lt R Armstrong pilot, Lt F. Hart observer. Contact patrol, airborne 10.30 landed at 11.30. Flares called for at 10.50 am and 11.30. Our line apparently runs [series of map references given]. Message and map dropped at 5th Australian Division, Australian Corps and 4th Army report centre. Height 1,000 feet. Tanks and infantry moving forward without opposition.”

“Lt Foale and Lt F. Sewell. Contact patrol, take off 11 am landed at 1220. Right division sector. Flares called for at 11.30. Line appears to run, [map references given]. Message and map dropped to 5th Australian Division, Australian Corps and Fourth Army Report Centre. Our troops and tanks well forward. Enemy shelling at [map reference]. Also scattered shelling all over the front. Our cavalry behind Harbonniers, also small body of cavalry along road in [map reference]. Discs were very easily distinguished, flares were difficult to see.”¹⁹

If a contact patrol ventured too far forward in the crew’s efforts to determine the extent of the troops’ advance, enemy tracer rounds heading in their direction would announce the fact. These planes were also in danger from the hundreds of “friendly” and enemy artillery shells passing over the battle area on their way to targets. Last, and certainly not least, there was the risk of attack from enemy planes engaged in the same task.²⁰ It was dangerous work, but it was vitally important to the success of the army’s operation. Ground commanders required regular reports on the progress of their forces, if they were to exert any degree of effective control over their forces.

Another important role carried out by army co-operation planes was that of mounting artillery-spotting patrols up to 10 miles beyond the front line, usually at altitudes above 7,000 feet. These planes had the task of calling down artillery fire on enemy batteries in action and not being engaged, and other worthwhile targets. Usually the pilot controlled the shoot by wireless, while the observer kept a wary eye for approaching German fighters.

A further role of the army co-operation planes during an offensive was that of maintaining patrols to warn of imminent counter-attack. These planes operated in the same area as the artillery spotters but at altitudes around 2,000 feet, as they searched for enemy infantry concentrations. On seeing such a concentration, the crew would call down artillery fire on it. Then the plane was to descend to low altitude and fly over the threatened friendly troops, heading for the centre of the enemy concentration and discharging a series of red flares to warn of the danger.²¹ The report from one such patrol on that day, again from No 3 Squadron AFC, ran:

“Lt Roberts, Lt Wilson. Took off 4.30 [pm], down at 6.15. Area as far east as Chuignolles through Foucaucourt – Vermandoville [7 miles east of the start line] under observation. No sign of impending counter attack.”²²

Throughout the day eight RAF fighter squadrons delivered low-altitude bombing and strafing attacks on retiring enemy troops. These Sopwith Camels, Sopwith Dolphins and SE 5As were armed with two .303-in machine guns and four 25-pound bombs. Each squadron sent out pairs of fighters at 20-minute intervals, to comb the battle area looking for targets of opportunity. On that first morning these attacks, made on enemy troops forced out into the open as they pulled back, hastened the collapse of the German defences at some points.²³ Major Raymond Collishaw, commanding No 203 Squadron with Sopwith Camels, later wrote:

“As in the case of the big German pushes earlier in the year there was a heavy ground mist but this time it favoured us and not the enemy. Despite this fog we were able to get off the ground about 5 o’clock and throughout the day flew a series of low-level bombing and strafing attacks on the Fourth army front against infantry, vehicles and other targets on the Roye road that leads to the south-east out of Amiens. I led four patrols during the day and although this low-level work was no more popular than it had been during the German advances in March and April, it was comforting to know that this time it was in support of an offensive of our own and that it was the enemy who was on the defensive. My logbook shows that I put in 11 hours 20 minutes in the air during the day, all at heights of 100 feet or less.”²⁴

Lacking armour protection, the fighters were ill equipped for this hazardous task. Collishaw’s unit escaped loss on 8 August, but others were not so fortunate. Hardest hit was No 201 Squadron, also with Camels, which lost seven aircraft that day with one pilot killed and five taken prisoner.²⁵

Each squadron sent out pairs of fighters at 20-minute intervals, to comb the battle area looking for targets of opportunity



Six squadrons of RAF fighters, with about 110 aircraft, flew offensive patrols over the battle area to drive away enemy aircraft. Throughout the day, these fighters were involved in several skirmishes. One of the largest of these involved six Camels of No 65 Squadron, two SE 5As of No 41 Squadron and a Bristol Fighter of No 48 Squadron. Captain James White, leading the Camels, later reported:

“About 12.25 p.m. I was attacked by 8 E.A. and climbed west and met Capt Brookes [and his flight]. I led the combined formation to attack the EA. During the fight which ensued I got on the tail of one EA and after firing a short burst it turned on its back and fell out of control. I got on the tail of another EA and chased it west. The remaining Camels all gathered behind this EA and it was forced to land behind our lines.”²⁶

A further important task assigned to both sides' fighters was the destruction of enemy observation balloons. Each balloon carried a couple of observers linked to the ground by a telephone cable, and would call down accurate artillery fire on enemy troops and other targets. Filled with potentially explosive hydrogen gas, lacking onboard defensive weapons and sitting stationary in space at altitudes between 3,000 and 4,000 feet, the balloons might seem an easy prey. Yet as many a fighter pilot discovered, this was not the case.

Hydrogen in an enclosed container – such as a balloon envelope – is not inflammable. Like petrol, it becomes explosive only if mixed with air in the correct ratio. To set a balloon ablaze a fighter pilot had first to puncture the envelope to allow the hydrogen to escape and mix with the surrounding air. To ignite the mixture the attacking pilot had to concentrate his fire on the same part of the balloon, often closing to within 50 yards before breaking off the attack. If the balloon was wet or the air was damp, getting the hydrogen-air mixture to ignite often proved frustratingly difficult.

Light machine guns and anti-aircraft guns were positioned beside the balloon winch to deter attacking fighters. Lookouts were continually on watch for approaching hostile planes. If an enemy aircraft closed on the balloon, on a warning from the ground the observers jumped from their basket and descended by parachute. Meanwhile the ground crew winched down the balloon as rapidly as possible, presenting the attacker with a difficult descending target.

Once the Allied offensive began, German balloon units in front of the advance had to pull back to avoid capture. During these moves the balloons, flying close hauled just above the ground, made enticing if not easy targets. At 10 am Lieutenant Norman Mawle of No 84 Squadron, flying an SE 5A, came upon a pair of observation balloons in the process of moving back. The report of the action stated:

“While on a ground strafing expedition Lt Mawle sighted two enemy balloons, each being towed by a team of horses, east of Harbonniers... He dived on the first, but did not succeed in shooting it down. Heedless of machine guns being fired from the ground, he turned and dived on the second, which was approximately at a height of 25 feet. He fired into it causing it to burst into flames. He immediately made a climbing turn and dived on the first balloon but, however, was unsuccessful.”²⁷

Mawle was hit in one wrist and his stomach but succeeded in regaining his base. In the course of the day, SE 5A pilots claimed the destruction of five more German balloons.²⁸ A German pilot attacked one RAF balloon, but although his rounds punctured the envelope they failed to ignite the gas.²⁹

THE BOMBERS STRIKE

The RAF plan called for the day-bomber units operating de Havilland 4s and DH 9s to attack the German airfields at Moislains, St Christ and Bouvincourt to disrupt air operations on the first day of the offensive. In each case cloud hindered and in some cases prevented the attackers from finding their targets.

Ten DH 4s of No 57 Squadron, flying in to two “V” formations each of five aircraft, attacked the airfield at Moislains at 8.10 am. Five of the planes carried two 112-pound bombs each; the other five carried twelve 25-pounders each. The two formations crossed the front line at 7,000 feet and on reaching the target area they separated. Each DH 4 descended individually to between 1,000 and 2,000 feet to deliver their bombs.³⁰ Lieutenant Andrew MacGregor, piloting one of the bombers, later wrote:

“To achieve success, surprise is vital. On this occasion we had arrived over the German aerodrome and, coming down through the light clouds, had carried out the attack before the people on the ground understood what was happening. The attack was very successful, two sheds being destroyed with the aircraft inside them, as well as two fighters on the tarmac outside. Re-organising the formations at a distance from the objective, all aeroplanes flew to the lines at a low height.”³¹

As the attackers withdraw, several Fokker D.VIIs engaged the bombers and shot down one. MacGregor’s observer fired at a Fokker and was credited with sending it down out of control. Another DH 4 crew also claimed the destruction of an enemy fighter.³²

No 205 Squadron’s DH 4s set out to attack the airfield at Bouvincourt: one flight attacked the target but the results were not observed. The other flight failed to locate the target and instead bombed the railway station at Chaulnes.³³

The force sent to deliver the initial attack on St Christ airfield, comprising fourteen DH 9s of No 27 Squadron, failed to find the airfield and instead bombed targets of opportunity near Peronne. Later in the day eight DH 9s of No 98 Squadron found the airfield and bombed it, causing some damage.³⁴

THE AIR ATTACK SHIFTS TO THE BRIDGES

During the late morning, RAF crews returning from operations spoke of severe congestion on roads leading to the bridges over the River Somme as German troops began to pull back. For example Lieutenants Hellet and Blair, each flying an SE 5A of No 48 Squadron, returned from a reconnaissance patrol over enemy territory at 11 am to report:

“General line of our tanks Guillaucourt – Caix. General enemy movement Eastward. EKB [enemy kite balloon] being towed E towards Harbonnieres. Caix being evacuated. Train going east from Rosieres. Artillery retiring at [map ref].”³⁵



At 1.p.m the crew of a Bristol Fighter of No 48 Squadron returned from a reconnaissance patrol over another part of the front at 2,000 feet, and filed a report similar in tone:

“Corbie – Bray Road, from [map ref] to Bray congested with mixed traffic moving East. From [map ref] to Proyart road full of horsed transport moving East. Amiens – St Quentin Road between Proyart and Estrees seen to be congested with mixed traffic, general trend easterly...”³⁶

If the Somme bridges could be broken, the German troops’ escape would be problematical. Accordingly Major General John Salmond, the RAF commander, cancelled his planned programme of attacks by the day bombers and ordered that the Somme bridges were to be bombed “as long as weather and light permits”. Fighters were to join in the attacks, each carrying their usual load of four 25-pound bombs.³⁷

The bridge at Brie, an essential artery, was allocated to the DH 4s of 205 Squadron and the DH 9s of No 107 Squadron; each plane carried two 112-pound bombs. The Sopwith Camels of No 54 Squadron, each carrying four 25-pound bombs, supported the attack. Descending below 1,000 feet so pilots could deliver their bombs “by eye”, the bombers aimed fifty-six 112-pounders at the bridge without inflicting any serious damage. The Camels’ 25-pounders caused some casualties against German troops on their way to the bridge. The same units repeated their attack on the bridge during the afternoon, again without success. One DH 9 and one Camel were lost.³⁸

The bridge at Bethencourt twice came under attack from DH 9s of No 49 Squadron assisted by SE 5As of No 32 Squadron, but emerged unscathed. In these actions three DH 9s were lost and two more suffered severe damage.³⁹

The DH 9s of No 27 Squadron delivered unsuccessful attacks on the bridges at Voyennes, Pithon and Offoy, supported by Camels of No 73 Squadron. There the raiders came under attack from enemy fighters, which shot down two DH 9s and two Camels.⁴⁰

The bridges at Peronne came under attack from the DH 9s of No 98 Squadron, the SE 5A’s of No 1 Squadron and the Camels of No 43 Squadron, but without success. One DH 9 and three Camels were lost during the engagement.⁴¹

OTHER TARGETS

No 22 Squadron sent fifteen Bristol F2B Fighters to escort the DH 4s of No 18 Squadron attacking the important Somain rail junction, through which German reinforcements would need to pass in order to reach the battle area from points to the north. German fighters attempted to engage these bombers, but on each occasion the escorting Bristol Fighters drove them away and the force suffered no losses.⁴²

THE DEFENCE STIFFENS

From the afternoon of the first day, German air reinforcements began arriving in the area. The most significant of these was Jagdgeschwader 1 equipped with the newest version of the Fokker D.VII. Oberleutnant Hermann Goering commanded the unit, but he was on leave at the time and played no part in the battle. Leutnant Lothar von Richthofen, (brother to Manfred, the top scoring German pilot of the conflict, who had been killed a few months earlier) held temporary charge of the unit.⁴³ A skilful air fighter himself, Lothar von Richthofen had been credited with 32 aerial victories to date.

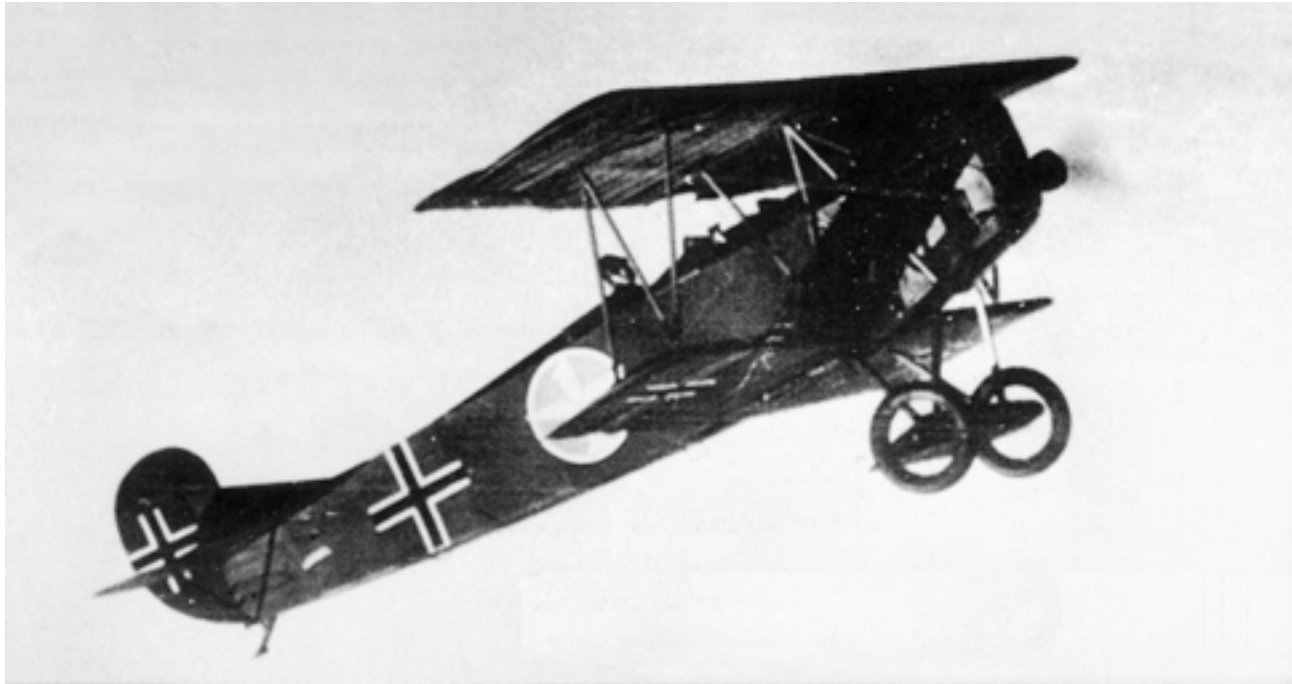
Jagdgeschwader 1 moved to its new base at Ennemain close to the new battle area from Laon, some 60 miles to the southeast, bringing only 21 fighters out of its established strength of 52. Knowing that a hard fight was in the offing, von Richthofen had decided to leave his novice pilots behind even though this greatly reduced the effective strength of his Staffel. Later he wrote on the unit's state that day:

"I was flying with Lowenhardt and the best men from our two Staffeln. In my Staffel, things were very shaky. There was actually only one [other] pilot who was any good. It was the same with Lowenhardt's Staffel. The best had fallen; the new pilots were good for very little."⁴⁴

Leutnant Erich Lowenhardt, top scorer in the Geschwader at that time, was credited with 49 victories.

Lieutenant Ernst Udet, credited with 44 victories up to that morning, led other fighters of JG 1 to the new base. He later wrote:

"The further we went the more evidence we saw of the desperate character of the fighting that was taking place below. Near Fontaine le Cappy, I discovered an enemy infantry co-operation machine, flying low over our trenches. Detaching myself from the flight, I dived at him, and opened fire. After about twenty rounds, the 'plane was struck in a vital part, and crashed near the trenches. The time was in the afternoon, and our petrol would not last much beyond [half an hour]. Our supplies were getting low, [because] we took-off with half-filled tanks. Of late it had been very difficult to get sufficient petrol for ordinary purposes, let alone for a longish cross-country flight, such as we were now engaged upon. It was imperative that we should land and refuel."



From the afternoon of the first day, German air reinforcements began arriving in the area. The most significant of these was Jagdgeschwader 1 equipped with the newest version of the Fokker D.VII

“Below us lay a small aerodrome, and we dropped on to it like starlings on to a field of corn. Machine stood by machine, until the whole ‘drome was covered. The flight commanders reported to the com-mandant of the aerodrome, a charming man, who would have been delighted to help us, had he not required the petrol for his own machines ... Eventually we managed to persuade the commandant to provide the necessary ‘schnapps’ for our machines. There would be just enough to last us for ten minutes’ flying, just enough to take us to our destination.”⁴⁵

LOSSES

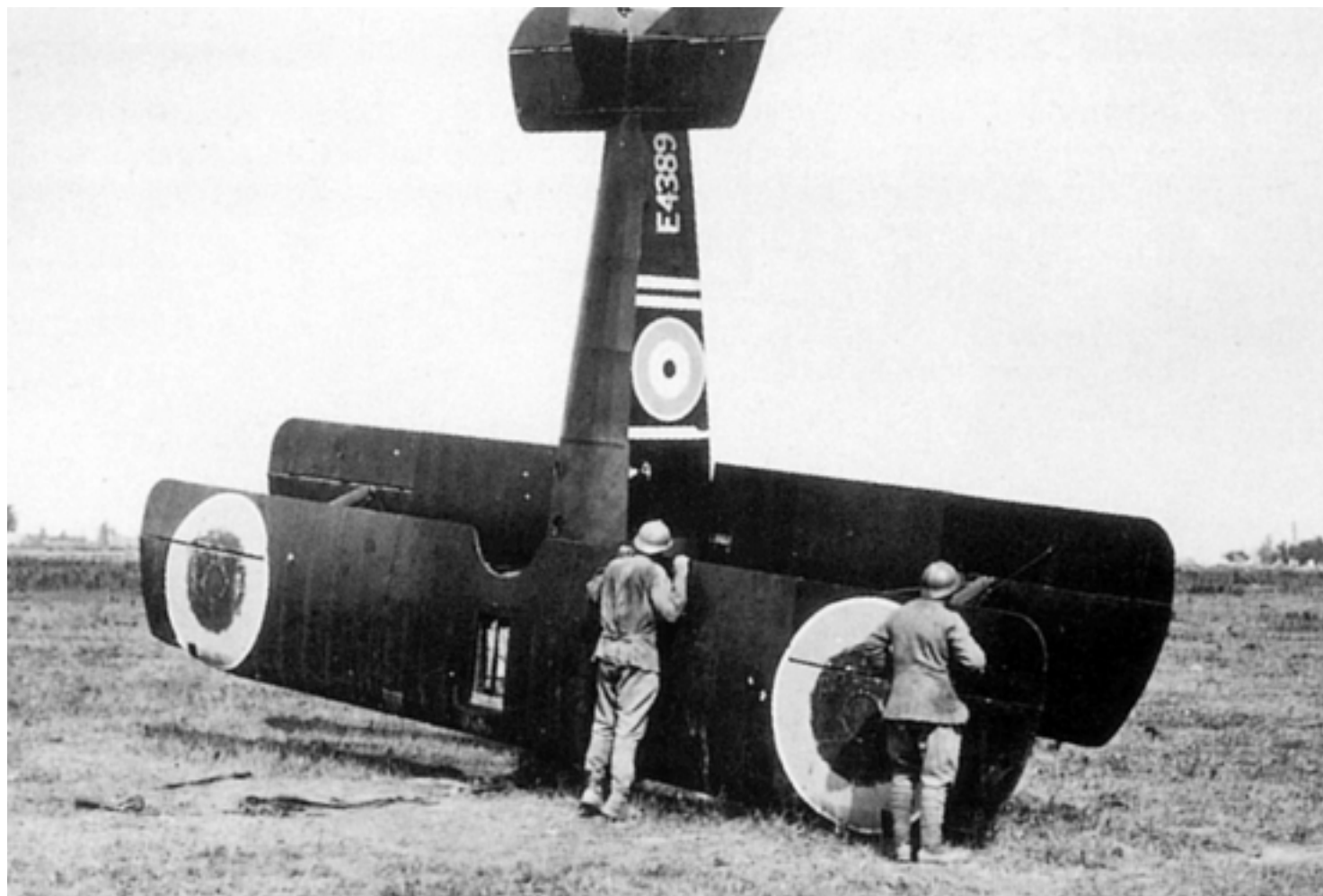
During the first day of the offensive the RAF suffered relatively heavy losses – 42 aircraft destroyed and 52 damaged beyond repair – about 13 per cent of the sorties flown. The heaviest losses were suffered by the fighter and bomber units making low altitude attacks on ground targets, amounting to 23 per cent of their sorties.⁴⁶

Many of these planes fell to ground fire. Of the 77 aircrew aboard these planes 31 were killed, 13 were wounded and 33 were taken prisoner.

German losses during these actions were far less, around ten aircraft. Yet, while the RAF could easily replace the pilots and planes it lost, by this stage of the war any gaps in the German ranks were difficult to fill.

By nightfall on the first day, the leading tank and infantry units had advanced seven miles. By the standards of that conflict, British and Commonwealth troop losses had been light at around 9,000 killed, wounded, missing and taken prisoner. German records give their losses during the day at 28,000 of all ranks, including 15,000 taken prisoner.⁴⁷

During the night of 8th/9th, RAF night bomber units maintained the attack on bridges over the River Somme, still without success. Up to dawn on the 9th a total of 162 sorties had been flown against eleven bridges.





THE FOLLOWING DAYS

On the second day of the offensive, 9 August, German resistance in the air stiffened further with the arrival of more units from other parts of the front. The pattern of operations by the RAF continued much as on the previous day, though two fighter squadrons switched from ground strafing to flying offensive patrols over the battle area. The Somme bridges remained the main target for the day bombers, with 173 sorties flown against these and 33 flown against other (mainly rail) targets. One bomb hit the bridge at Brie, but the damage was not serious and the structure continued in use.⁴⁸

No 8 Squadron, the unit assigned to assist the tank units, successfully reported the positions of the leading tanks, as well as those that had broken down and needed recovery. The attempt to use aircraft to locate and knock out enemy anti-tank guns ahead of the tank advance was a failure, however. During the first two days of the offensive, the squadron found and attacked only one such position.

Total RAF losses on the second day were 45 aircraft shot down or damaged beyond repair.⁴⁹

On the third day (10 August) the RAF continued with this general pattern of operations, having received a reinforcement of five squadrons with about ninety fighters to replace aircraft lost.⁵⁰

By this time small numbers of German assault planes, some fitted with protective armour, were operating at low altitude over the battle area. On the evening of the 10th German low flying ground attack planes, assisted by ground artillery, halted an Australian advance along the Amiens – Brie road. To protect British ground forces from these low flying planes, further RAF fighters were switched from ground staffing to low altitude counter-air patrols.⁵¹

On the 10th the Somme bridges remained the main targets for the day bombers, though there was some reduction in emphasis: 105 sorties were flown against the bridges, compared with 93 against all other targets. Following the losses incurred during the previous two days the bombers now delivered their attacks from higher altitudes, around 10,000 feet, to remain beyond the reach of effective ground fire.⁵² This further reduced their chances of hitting those small targets, however.

On the final day of the offensive (the 11th), the entire RAF fighter force was employed on counter-air patrols and these planes delivered no attacks on ground targets. The bombers moved their attack away from the Somme bridges (25 sorties) and concentrated on other targets, mainly rail facilities (93 sorties).⁵³

On the afternoon of the 11th, the Allied ground offensive ended. The troops had broken into the German defensive line and advanced up to 12 miles in places, but there had been no breakthrough. With the arrival of large German troop reinforcements, the law of diminishing returns took effect. In contrast to the long battles of attrition that had proved so costly in the past, the Allied commanders had decided this would be a “bite and hold” operation.



Throughout the battle there had been considerable air activity. The outnumbered German fighter units gave a good account of themselves, but suffered heavy casualties in proportion to their numbers. The Jagdgeschwader 1, for example, was reduced to 11 fighters and had to withdraw from the battle to reform.

On the evening of the 11 August, German night bombers achieved a rare success for this type of mission. Ten twin-engined bombers attacked two mechanical transport depots near Calais and set both ablaze. About a hundred vehicles, and huge quantities of spare parts, were lost.

During the Amiens offensive in 1918 the RAF employed a greater concentration of aircraft than ever before, in its efforts to support the ground forces. In this section we shall consider which aspects of air power proved effective, and which did not.

First, let us look at those aspects of air power that provided major assistance to the ground forces. Prior to the offensive, the RAF and the French Air Force successfully prevented German reconnaissance planes from photographing or otherwise observing the preparations. During the two nights leading up to the attack, aircraft flying up and down the front line successfully masked the sounds of tanks moving to their attack positions. Taken together, these moves prevented the defenders gaining an inkling of what was afoot. Only when the bombardment opened was there a clear indication that the Allies were attacking at that point on the front. Surprise is the most important single ingredient for a successful land attack, and it is impossible to exaggerate its importance on this occasion.

Also prior to the offensive, the systematic Allied photography of the German defences allowed the gunners to pre-register targets for engagement once the preparatory bombardment started. Those targets were hit even though the mist on the first morning prevented visual observation.

When the mist cleared on the first day, artillery fire designated from the air inflicted considerable damage and helped to unhinge the defences. Reports from aircraft on contact patrols and counter-attack patrols were invaluable in providing commanders with information on the course of the battle and the locations of the leading troops. That made possible the effective deployment of reserves, the effective use of artillery, etc.

The vigorous patrolling by the Allied fighters over the battle area made life difficult for German aircraft flying contact or artillery patrols. During their forays over the battle area German two-seaters flew in units of three or five planes for mutual protection, often with single-seat fighters providing top cover.

Once German troops were forced to leave their trenches and began to withdraw, the strafing and bombing attacks by low flying fighters added greatly to the confusion. Apart from the casualties caused, these operations delayed the re-establishment of an effective defensive line. The squadrons involved in these attacks suffered serious losses from ground fire, however.

Now let us look at those aspects of air power which failed to make any major contribution to the land battle. Despite the large number of sorties flown, the RAF day bombers inflicted little physical damage of any importance. Initially the day bombers



attacked airfield and rail targets. One airfield attack inflicted moderate damage, the rest were failures. There is no evidence that any bomber attack on a rail target caused any serious delay in the inflow of German reinforcements. From the first afternoon, the day bombers switched their attacks to the Somme bridges. They scored hits on one or maybe two of the structures, but no bridge was rendered unusable.

The main reasons for the RAF bombers' failure to inflict significant damage were the inaccuracy of the bombing and the use of light bombs with feeble explosive power. The de Havilland 4 and DH 9 bombers involved in the attacks each carried two 112-pound bombs or twelve 25-pounders. The sights used for high altitude bombing were rudimentary, while during low level attacks the bombs were usually released "by eye". Given the limited weight and accuracy of the attacks, bridges and railway installations were not suitable as targets since the chances of success were minimal. Several decades would pass before there was a full appreciation of the limited destructive power of high explosive bombs, when these failed to score direct hits.

As mentioned above, the attempt to use aircraft to locate and knock out enemy anti-tank guns ahead of the tank advance was also a failure. During the first two days of the offensive, only one such position was attacked. In the course of its low flying operations over the battle area to assist the tanks, No 8 Squadron lost half of its eighteen planes for the most part to ground fire.

From the early afternoon of the first day, once the panic withdrawal by German troops ended, the effectiveness of the low altitude bombing and strafing attacks by RAF fighters rapidly diminished.

After the war Wing Commander (later Marshal of the RAF Sir) John Slessor conducted a detailed study of air operations during the Amiens battle. His candid and perceptive comments on the use of air power during the battle appeared in the 1936 book "Air Power and Armies". They are appropriate to round off this study:

"In the event, the RAF made two contributions of great importance to the success of the initial attack on August 8th. First, the complete surprise achieved was largely due to the high degree of air superiority prevailing... Secondly the action of the low-flying fighters on the 8th was a factor of first-class importance in the overwhelming success of the initial break-in. But apart from those two factors it is impossible to assert with any confidence that the result of the battle after about 1400 hours on the 8th [the first day of the offensive] would have been materially different, or that the ultimate line reached and held by our forward troops on the 11th [the last day] would have been materially short of where in fact it was, if not a bomb had been dropped or a round fired by aircraft against ground objectives."

"If this is so it is a damaging admission, in view of the fact that this battle saw the greatest concentration of air strength in any battle of the War..."⁵⁴

...it is impossible to assert with any confidence that the result of the battle on the first day of the offensive would have been materially different, or that the ultimate line reached and held by our forward troops on the last day would have been materially short of where in fact it was, if not a bomb had been dropped or a round fired by aircraft against ground objectives

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Royal Air Force VC-10 Tanker
refuelling Tornado F3

New Zealand's Fast Jet





This article is something of a departure from the normal run of the material submitted for publication in the Air Power Review. It chronicles the demise of the Skyhawk from the Royal New Zealand Air Force inventory leaving them with no offensive air capability. This opens up considerable scope for wider debate – one of the key aims of this journal. Defence budgets are always under pressure and scrutiny – even in times of total war. When either cash is short, or physical resources limited, the key question must be one of force definition. In the inter-war years, the Royal Air Force struggled year in and year out to decide on the balance between fighters and bombers. Other roles were often squeezed almost to extinction: but never quite to the point where a complete capability was lost. In current times, the debate on a European defence identity brings with it the enticing prospect of role specialisation, and by implication, role elimination. The New Zealand government have now set the precedent.

New Zealand's Fast Jet

By Nick Lee-Frampton

Retirement is not unusual for a combat aircraft type but rarely does it mean eliminating the air combat element of an air force. However, when the surviving Skyhawks of the Royal New Zealand Air Force are shut down at base Ohakea in December 2001 the ability of the RNZAF to conduct air combat effectively will cease too.¹ An ambitious plan to lease surplus F-16A/Bs from the US as Skyhawk replacements was cancelled by the incoming New Zealand government which, last May 2001, announced that the Skyhawks will be withdrawn 'before Christmas.'² Following the end of flight operations both no's 2 and 75 Squadrons RNZAF will be disbanded, as will 14 Sqn with its Aermacchi MB-339CB trainers for whom the Skyhawks were its raison d'être. The only jets remaining in operational RNZAF service will be the two Boeing 727s purchased, second-hand, in 1981. This is a brief account of the 31 years the A-4K Skyhawk has served with the RNZAF.

In June 1962 when Air Vice-Marshal Ian Morrison was appointed its Chief of Air Staff, the RNZAF was in dire straits with obsolescent Sunderlands, vintage Vampires and relatively sophisticated Canberras.

'The Air Force was waning at that time. It was urgent that we get some new equipment into service and get morale up.'³ AVM Morrison applied himself to re-equipping the RNZAF with 'first class' aircraft and in 1964 Air Staff Requirement No.5/Air set out the service's requirement for a Canberra replacement. It was to be a long range aircraft with the primary role of counter-air/interdiction and secondary roles of close air support and air defence. Some £23 million was set aside for the new combat aircraft to enter service by 1970.

...the NZ media reported that Morrison wanted the F-111, a claim which drew a sharp response from the Government. Mr Marshall, acting Prime Minister, said 'I don't think such things should be discussed in public'

During 1964 the NZ media reported that Morrison wanted the F-111, a claim which drew a sharp response from the Government. Mr Marshall, acting Prime Minister, said 'I don't think such things should be discussed in public.'⁴ Ironically, Morrison says he was misquoted:

'The newspaper said I wanted F-111s and I chose not to correct them.'⁵

By December 1965 the requirements for the Canberra replacement included the ability to provide effective air support for ground forces, high reliability and robustness, long range and the ability to operate closely with both American and Australian forces. Among the types considered for the role at the time were the McDonnell Phantom F-4, Northrop F-5, Dassault Mirage III, Douglas A-4 Skyhawk, LTV A-7 Corsair II and Lockheed's F-104G Starfighter. Unofficially, however, the RNZAF's Canberra pilots favoured the Buccaneer.

'We all thought they were marvellous. Two-place, twin-engined, a classic strike aeroplane ...'⁶

Officially, however, the F-4 Phantom was the preferred option. In comparison with its perceived rivals, the F-5 and the Mirage III, the F-4 offered greater range, versatility and all-round performance. However, the F-4's flyaway price was approximately \$2.1 million compared with \$1.6 million for the Australian-built Mirage III and a relatively paltry \$900,000 for the F-5. Nevertheless, in August 1966 the RNZAF formally asked the NZ Government for 16 F-4s. When the Cabinet's Defence Committee considered the matter in early December it became clear that cost was not the only obstacle confronting the RNZAF's plans. Echoing today's political environment some Cabinet members doubted whether combat aircraft per se were even necessary!

By early 1968 the political spotlight had focused on the Skyhawk which had been rejected by the RNZAF two years earlier because it was subsonic, single-engined and had only limited self-defence capabilities. Moreover, the A-4 had first flown in June 1954, only five years after the prototype Canberra and there was concern at the time that it might shortly be withdrawn from front-line service in the United States. However, the Skyhawk had continuously been improved and, crucially, at a flyaway price of \$935,000, it was affordable. Thus, in April 1968 an RNZAF evaluation team flew to the US, effectively to negotiate a Skyhawk purchase.

Fred Kinvig was just finishing an exchange tour with the USAF, flying F-4 Phantoms, when he was ordered to join the evaluation team in Los Angeles.⁷ Kinvig had been very disappointed with the Phantom's range performance and was 'a little bit sceptical' of the A-4's combat radius. He arranged to carry out a maximum weight take-off in an A-4F and after flying for almost three hours was ordered to land because the evaluation team was tired of waiting for him!

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'I still had fuel left and I could have kept going for some time. ... I was most impressed with the [Skyhawk's] range figures.'⁸

The NZ Government was accordingly advised that the A-4 would make a very satisfactory Canberra replacement in the ground attack role and the evaluation team recommended the purchase of 18 Skyhawks, including four attrition aircraft. The US Department of Defence offered New Zealand two purchase options: either 14 aircraft (10 single-seat A-4Ks and four two-seat TA-4Ks) or 18 aircraft (12 A-4Ks and six TA-4Ks). Both options were valid only until 1st July 1968. After some four years of argument and inconclusive debate, the New Zealand Government suddenly had only a few weeks in which to decide whether or not to buy the A-4.

On 10th June 1968, the government approved the purchase of 10 A-4Ks and four TA-4Ks for the RNZAF. The entire package, including spares, support and training equipment, air and ground crew training in the US and new infrastructure in NZ, was estimated to cost less than \$25 million. RNZAF personnel had mixed feelings about the order.

AVM Morrison: 'Once the F-4s were turned down for being too expensive, an evaluation team was formed to go to the States and see what was left.'

'I'd been saying I would rather have six [F-4s] than 20 of the others, but in the event they came back and said these 1954 vintage aircraft could do the job with certain modifications ... and, by the grace of God, they've turned out remarkably well.'⁹

Squadron Leader John Scrimshaw: 'I remember thinking it would be better having a flight line full of A-4s than three or four F-4's with only one of them serviceable.'¹⁰

Wing Commander John Lanham: The RNZAF's Canberra pilots still wanted Buccaneers, or F-4s or F-111s or even TSR-2! There was gloom, despondency and horror [regarding the A-4].¹¹

‘...I would rather have six [F-4s] than 20 of the others, but in the event they came back and said these 1954 vintage aircraft could do the job with certain modifications ... and, by the grace of God, they’ve turned out remarkably well’

CAS John Hosie: ‘The expectation of the Air Force was that we’d probably buy F-4s ... I mean we expected the F-4. Anyway, out of the blue comes the A-4. We didn’t know what it was, we hadn’t even heard of it. I guess the reaction was that we’d got this wrong.’¹²

Replacing the two-seat, two-engined Canberra with the single-seat, single engined Skyhawk that, moreover, lacked the former’s range and self-starting capability didn’t make sense to the young pilot.

‘It seemed to us we were going backwards ... somehow we felt we’d been sold down the river. I think that was the general feeling.’¹³

John Scrimshaw was the first RNZAF pilot to go solo in a (US Navy) Skyhawk in Florida in February 1970.

‘The training was quite a challenge for us, a big jump from the Vampires.’

The Skyhawks were equipped with Tacan which was new to the Kiwis and the pilots also were unfamiliar with flying in the US. The RNZAF almost lost its first Skyhawk before it had even seen it: USN pilots flew the first three RNZAF Skyhawks from California to Florida and the pilot of NZ6201 had a problem.

‘There was a slight murmur in the engine and he radioed that he was thinking about [ejecting]. I said, “Look there’d be a bloody national emergency, a national disaster if you do that!”’¹⁴

Thereafter, RNZAF pilots flew the delivery flights.

For their trans-Pacific passage to New Zealand the Skyhawks were chained to the deck of the helicopter carrier USS Okinawa.¹⁵ Following a safe landfall in the port of Auckland the Skyhawks were towed to the nearby RNZAF base at Whenuapai from where they would be flown to their operational base at Ohakea. At this point none of 75 Sqn’s pilots had flown a Skyhawk for more than a month. Sqn Ldr Scrimshaw’s log book shows his previous Skyhawk flight was to San Diego on 15th April, six weeks earlier.

“We had minimum hours on the things, we didn’t have Tacan in place at Ohakea and we still had jagged hexagonal concrete blocks on the runways. The risk of blowing a tyre was quite high.”¹⁶

Moreover, there was no ability at the time for making arrested landings in the event of a burst tyre.

‘We were actually at our most vulnerable right at the beginning and I’m quite proud of the fact that we didn’t have any accidents.’¹⁷

At least paperwork wasn't a problem!

'There were all these nice new aeroplanes but not a stick of furniture! Not a desk, not even a book in the hangar. We were so busy we didn't have the time to set up offices.'¹⁸

On 10th June 1970 the NZ Government formally handed over the Skyhawks to the RNZAF's Strike Wing and the first A-4K conversion course began (on schedule) two weeks later. Initially there was a chronic demand for formation fly-pasts, though they were not prominent on John Scrimshaw's agenda.¹⁹

'My feeling was we'd bought the Skyhawks as weapons, as close-support platforms. So we were totally concerned at finding targets and hitting them. To me, success was being within two seconds of time-on-target and getting a direct hit. That's what it was all about.'²⁰

Exercise Flashover, the RNZAF Skyhawk's first overseas deployment began on 1st March 1971. Led by Sqn Ldr Scrimshaw, four Skyhawks flew to RAAF base Williamtown, near Sydney, in just over three hours. A RNZAF P-3 Orion provided search & rescue, navigation and communication support for the deployment. The day after arriving at Williamtown the Skyhawks took advantage of the RAAF Mirage's 420kt low-level corridors which compared favourably with the 360kts limit in New Zealand. The Skyhawks' camouflage proved effective in Australia except for the white drop tanks which proved conspicuous until they too were camouflaged. In July 1971 the Skyhawks used live weapons, including 500lb bombs, 5-in Zuni rockets and 20mm cannon shells, for the first time.²¹

Exercise Vanguard 14, the annual deployment to Singapore, took place in late October that year with the Skyhawks departing Ohakea for Richmond, Townsville and Darwin in Australia thence, via Bali, to Tengah air base in Singapore, some 5,800 miles (9,400km) from Ohakea.²² Interestingly, the Skyhawks arrived at Tengah on the day the Five Power defence pact 'ANZUK' came into operation. Over the next three weeks, the Squadron flew from Malaysian bases at Butterworth, Kuantan and Kuala Lumpur.

The first of the new 'bent' refuelling probes was fitted during May 1973.²³ The modification had become a priority because the straight refuelling probes originally fitted occasionally leaked, allowing raw fuel to enter the starboard engine air intake. The new probes allowed the overseas deployment of a two-seat TA-4K for the first time.²⁴ This had not happened earlier because air-to-air refuelling was prohibited with the original probes. The Skyhawk's deployment procedure was much admired overseas.

'The Australians, for example, are amazed to see an RNZAF C-130 arrive half-an-hour before the eight Skyhawks, and in that time [get] out and ready all the equipment needed to service them.'²⁵

John Hosie recalls that in those days the Skyhawks didn't have a park brake.

'You had to hold the aircraft on the brakes all the time, or have a chock. So when you shut down you needed someone to put chocks in and you needed a ladder to get down. That's basically all you needed, but to get started you needed power

and you needed air. And probably someone to take the chocks away, so you weren't in a position to go on your own.'

In those days the A-4K had a doppler navigation system. If you're flying at high altitude there can be slippage. Over a flat sea it would often go to memory mode, because it's not getting a good return.

'It gave you a continuous readout of latitude & longitude and, I think, distance to go, but still we'd have to navigate with the map spread out ... That's why we devised strip maps.'²⁶

To ensure continuous communications en route, the P-3K used to take off an hour ahead of the Skyhawks.

'[We] would pass it about midpoint. We worked all this out before hand. ... That way we would be in continuous UHF contact.'

'Incidentally, we devised a fall-back position where we could do this with a C-130, but it wasn't so good ...'

'So the [P-3K] Orion [kept] track of where we were ... they had inertial navigation, so they kept an eye on us over long ocean legs and told us if we were wandering off track too much. Because really we were working blind. Sometimes you would get airborne and the doppler would stay in memory for the whole trip.'

'It was surprising how good we got at navigating ourselves across.'

'...the [P-3K] Orion [kept] track of where we were ...and told us if we were wandering off track too much. Because really we were working blind. Sometimes you would get airborne and the doppler would stay in memory for the whole trip'



In October 1974 the Skyhawks were tasked to perform foreign fishing vessel (FFV) patrols of NZ territorial waters. On the first such sortie a Skyhawk flew around the coast line without identifying a single foreign fishing vessel.²⁷ That month too the RNZAF lost its first Skyhawk when 6207 crashed after its engine failed due to an oil pump problem. The pilot, Wg Cdr Fred Kinvig, then CO operations wing at Ohakea, ejected but broke his right leg on landing.²⁸

In January 1975 all of the RNZAF Skyhawks' ejection seats were modified and four aircraft were grounded because of cracks beneath their starboard air intakes. Ironically, 11 Skyhawks were grounded for three days in early February when it was found that their ejection seats had been incorrectly assembled! The first AIM-9G Sidewinders were quietly introduced to operational service in July 1975, a process not completed until October.²⁹



The New Zealanders' high bomb scores led to enquiries regarding the Kiwis' recipe for success, although the answer, the TLAR 'That Looks About Right weapon aiming system' usually came as a surprise

On the 30th March 1976 came a unique opportunity for the Skyhawks to fire their guns in anger! HMNZS Taupo, on fishery protection duties, had detected a Taiwanese squid boat, the Kim Nan, fishing illegally within the 12-mile limit. As the Taupo approached her, the fishing boat headed for international waters, ignoring radio calls and warning shots. The order was given to scramble a pair of Skyhawks armed with 20mm cannon shells and rockets. After repeated low passes across the bows of the fishing boat had no effect, the pilot of '01' was ordered to fire a burst of 20mm cannon 100 metres in front of the Kim Nan, which he did, causing the squid boat to stop immediately, approximately 100km off shore. The Taupo was then able to come alongside and put a boarding party aboard, so ending a seven-hour pursuit.³⁰

June that year saw the Skyhawk's fifth Australian deployment, this time for Exercise Spanish Dollar at RAAF Williamtown. The exercise included ACM with RAAF Mirages and the A-4G Skyhawks of the RAN's VF805 Sqn. On the last night of the exercise, a Skyhawk had problems with its undercarriage and then both its hydraulic systems failed, causing the aircraft to be intermittently uncontrollable. Although more than justified in ejecting, US exchange pilot Capt Carter managed to land the aircraft, a feat which earned him the Air Force Cross.³¹

In April 1976 Sqn Ldr Ching Fuller and Flt Lt Al Curtis, both British, began their Skyhawk conversion in what was swiftly dubbed the Pom Pom Conversion Course. (Alan Curtiss was later killed flying a Sea Harrier in the Falklands). The two men finished their conversion course on the 25th June becoming fully fledged members of the 'Colonial Strike Force.'³² The world's media took no notice of that event, but New Zealand's air space attracted international attention in January 1977 with reported sightings, in the Kaikoura region, of unidentified flying objects!³³

Participation in the Hawaii-based Cope Thunder exercise in 1981 helped raise 75 Sqn's reputation.³⁴ The New Zealanders' high bomb scores led to enquiries regarding the Kiwis' recipe for success, although the answer, the TLAR 'That Looks About Right weapon aiming system' usually came as a surprise.³⁵ That month saw the 40,000th RNZAF Skyhawk hour, representing an average of more than 3,600 hours/year since May 1970.³⁶

In the early 1980s the Skyhawk force was increased with the purchase of A-4G models from the Royal Australian Navy. On the 9th July 1984 a nine-man team set off for Nowra to familiarise themselves with the RAN A-4G's that were shortly to become RNZAF property. Compared with the A-4K the -G models had no avionics hump on the upper fuselage, no drag chute, different radios and a slightly different cockpit layout. The absence of a drag chute was arguably the most significant difference for on 3rd June 1985 one of the A-4Gs blew both main tyres when landing at Townsville and overturned. The pilot was uninjured, although doubtless upset to find himself inverted at such a low altitude. The incident served to highlight the value of having a braking chute available and prompted renewed efforts to have all the ex-RAN A-4's fitted with 'chutes as soon as possible.³⁷

Twenty seven years after being disbanded, No.2 Squadron RNZAF was reformed in December 1984 at Ohakea and equipped with Skyhawks. In 1991 the squadron moved to Nowra in New South Wales to begin a decade of flying mainly in Australian skies.

...it had become clear that upgraded Skyhawks could emulate much of the F-16's capabilities, especially in the maritime and close air support roles, for less than a fifth of the cost of a new aircraft!



KAHU

Project Kahu, updating both A-4G and A-4K Skyhawks with new radar and avionics, originated in the late 1970's when the RNZAF began wondering whether to replace the Skyhawks or update them. New Zealand's 1978 Defence Review mentioned a requirement to upgrade the aircraft's navigation and weapons delivery systems and the loss of a second Skyhawk, early in 1981, also raised the matter of adequate aircraft numbers. With only twelve Skyhawks remaining of the original 14, the credibility of the RNZAF's combat force was becoming suspect. Moreover, the increasing sophistication of new combat aircraft threatened to render the A-4K obsolescent.

'It had no computing power, a fixed gun-sight even more primitive than the one we'd had in Vampires and very simple, rudimentary avionics,' recalls Stu White, Kahu project manager.³⁸

In 1981, after defining its operational requirements, the RNZAF began evaluating the acquisition of new aircraft while

also considering options for modernising the Skyhawks. By 1983 it was concluded that F-16s were the answer. However, it had also become clear that upgraded Skyhawks could emulate much of the F-16's capabilities, especially in the maritime and close air support roles, for less than a fifth of the cost of a new aircraft! There still remained the matter of replacing aircraft lost through attrition. Then in May 1983, with exquisite timing, the Royal Australian Navy (RAN) announced that its ten remaining A-4G & TA-4G Skyhawks were for sale. The decision to purchase the Australian Skyhawks was announced on 29th June 1984.

Also authorised was their conversion to 'K' specification, structural repairs to extend their fatigue life and, in principle, an upgrade programme to improve the Skyhawk's operational capabilities. The RFP elicited seven proposals from British, French, Israeli and US companies. All were carefully evaluated before Lear Siegler's bid was selected.³⁹ When the RNZAF first considered improving the Skyhawk's effectiveness, emphasis was placed on the close air support role. This, after all, was the focus the Government had adopted when seeking a Canberra successor. However, as mentioned in the 1983 Defence Review, maritime strike was now prominent in the Skyhawk's repertoire and this was emphasised in a new RFP, this time covering not 12 but 22 Skyhawks. Because of this change in focus, a multi-mode radar was substituted for the earlier requirement of a laser range finder and target seeker. Consideration was also given to replacing the 9,300lb thrust J-52 turbojet with a more powerful engine, but it was rejected as not being a cost-effective option. Six companies submitted tenders for the second RFP and once again Lear Siegler's bid was considered the best, both on technical and on financial grounds.

The NZ Government approved the \$148 million modernisation plan in May 1985 and eight months later the prime contract was awarded to Lear Siegler, now known as SLI Avionics Systems Corp, following a take-over by the British avionics firm Smiths Industries. RNZAF Flight Lieutenant Steve Moore was chosen to test-fly the Kahu prototypes and accordingly attended the Empire Test Pilots' School (ETPS) at Boscombe Down in 1985. Implementing Kahu fell behind schedule and installation work on the prototype only started in July 1987. Positioning the HUD was a major problem, says Moore:

'We had to have a second go at that in the single-seaters. When first installed it was far too low, ... even motoring the seat right down I couldn't get my eye low enough to see the HUD properly, so we had to get it higher.'⁴⁰

The RNZAF's Skyhawks were equipped with the Ferranti model 4513 HUD which was unique in displaying both analogue and digital data. This combination of symbology resulted from having the benefit of test flying on the F-18, F-16, F-20, updated RAF Jaguars and the Mirage 2000, says Stu White.

'We were able to take best HUD features out of those aircraft and combine them into the A-4 to fully meet our requirements.'⁴¹

When the customary eight Skyhawks deployed to Williamtown for Willoh 86-3 in October 1986 the squadron had its first encounter with the RAAF's new F-18 Hornets of 3 Sqn. Within days 75 was claiming gun kills on the Australian's latest fighter.⁴² In the closing months of 1986 the RNZAF purchased 100 AIM-9L missiles at a cost of \$11.6 million as well as second-hand AGM-65B Maverick TV-guided missiles from the Jordanian Air Force as an interim measure until IR -65G missiles became available. Celebrations in 1987 for the RNZAF's 50th anniversary included a remarkable formation of 30 aircraft, comprising RNZAF Skyhawks and Strikemasters and RAAF F-18s and Mirages. About this time too a visiting RAF VC-10 tanker allegedly plugged into a Skyhawk's buddy store but with commendable restraint took no fuel. Six RAAF F-18's (including a two-seater) of 77 Sqn arrived at Ohakea for a Willoh exercise in mid-November 1987. The F-18's technical advantages couldn't overcome the problem of its camouflage, which proved unsuitable for lo-level overland strike missions. Almost the opposite case applied to the Skyhawks, with excellent grey/green camouflage but minimal sophistication. During Vanguard 88 over the Malaysian jungle the pilots found their aircraft's new camouflage scheme, so effective by day, was disconcertingly effective at night when trying to maintain formation. Reflective tape was applied to make the Skyhawks suitably visible!⁴³

April 1989 saw the first live firings of AGM-65B (TV guided) Maverick missiles. Overseas, the (pre-Kahu) Skyhawks on Vanguard had redeployed to Williamtown for a Willoh and used the opportunity to test their skill at getting within Sidewinder or guns range of the AIM-7 Sparrow armed Hornets. The last pre-Kahu Skyhawk flight was on the 28th June 1989 when 11 was flown from Ohakea to RNZAF Woodbourne for conversion. On 18th February, 1991 2 Sqn made its 'final' flight at Ohakea with a fly-past led by the squadron's new CO, Steve Moore. The squadron was redeployed to the RAN base at Nowra where the Skyhawks have assisted RAN warships' crews practise air defence as well as cooperating with RAAF exercises and providing new pilots with type conversion.

In the past 18 months many of the most experienced members, both aircrew and groundcrew, of the two Skyhawk squadrons have resigned, leaving 2 Sqn with only four pilots for its five aircraft and 75 Sqn with just six pilots, one of them on exchange from the RAF

'In the nearly three and a half years I was at Nowra there we carried out 22 deployments in total, a lot of those were to Williamtown, flying with the Hornet squadrons. Most of our flying was for the Navy.'⁴⁴

Australian authorities naturally are dismayed that this valuable contribution to their military training will cease when the Skyhawks are phased out. In January 1991 Skyhawk pilots' monthly flying hours were officially reduced from 23.5 hours/month to 13.2 hours/month when the Gulf War caused the price of aviation fuel to almost double. However, over the previous six months actual flying hours for line pilots on 75 Sqn had averaged only 15 hours/month.⁴⁵ In the past 18 months many of the most experienced members, both aircrew and groundcrew, of the two Skyhawk



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NOTES

- 1 RNZAF base Ohakea is 22km west of Palmerston North in the lower North Island.
- 2 Officially the Skyhawks cease operating on 1 December 2001 but as this is a Saturday, flying will cease on 30 November 2001.
- 3 Interview, 1995.
- 4 The Dominion newspaper, Wellington, 29th June 1964.
- 5 Interview, 1995.
- 6 Interview 1996 with Wing Commander John Lanham, RNZAF (ret'd) erstwhile CO 75 Sqn.
- 7 Interview 1995, erstwhile CO of 75 Sqn.
- 8 Ibid.
- 9 Interview, op.cit.
- 10 Interview 1995, John Scrimshaw was CO of 75 Sqn until 1971
- 11 Op.cit.
- 12 John Hosie, Interview 1995 when he was CAS.
- 13 Ibid.
- 14 Op.cit.
- 15 Then technical NCO Barry Brinsdon, interviewed, says the carrier encountered a severe storm when close to its destination, Auckland. 'We didn't get any hot food – and very little sleep – for three days. Over half the Okinawa's crew were sea-sick ... The Skyhawks often disappeared in spray and foam.'
 "One night the Captain [of the Okinawa] said if we didn't get out of the storm in the next 18 hours he was going to have to lighten the ship ..."
- 16 Op. cit.
- 17 Op. cit.
- 18 Op. cit.
- 19 For example The Dominion newspaper, Wellington, NZ, 16 February 1973, reported that the RNZAF had staged three Skyhawk fly-pasts in the past week, one for a US Marine pilgrimage party, another for Dutch Prince Bernhard's departure from Auckland and a third for the opening of Parliament.
- 20 Op. cit.
- 21 75 Sqn official diary entry.
- 22 Ian Uffindell, interview, says that on that first transit through Bali the support Hercules he was on was surrounded by armed guards upon landing and none of the occupants were allowed off. 'The RNZAF were charged \$10 for each Skyhawk drag chute collected off Bali's runway and had to pay hundreds of dollars to get passports processed.'
- 23 75 Sqn official diary entry.
- 24 Exercise Vanguard 17 October/ November 1973.
 Interview Des Ashton.
 A lot of things that were wrong with the A-4 when they entered RNZAF service were gradually put right, he says.
 'I'm sure, for instance, in the old pilots' manual there was a note that ... during takeoff, the oil low light might come on. ... But that should never have happened. That warning got in [the manual] through the US Navy and I could never figure out [why].'
 Then one day the oil warning light illuminated on a Skyhawk during take-off. 'We couldn't fault the system and when we took the sensor out of the oil tank, we found [it] had been wired back to front at manufacture! It was a closed, sealed-up unit and there were a whole [batch] like that.'
- 25 Wg Cdr Boys RNZAF, reported in NZ Wings magazine, January 1974.
- 26 Op. cit.
- 27 John Lanham, op. cit 'It was really nonsense because if we saw anything we didn't recognise it, there was nothing we could do about it and there was no way we could check its distance offshore!'
- 28 The following year the Labour Party Conference debated a motion that the Government should not replace the lost Skyhawk. Defence Minister Bill Fraser said that the original purchase decision may not have been the right decision at the time, but that now the country was 'stuck with it.', research by author.

Seven RNZAF Skyhawks have been lost:

A-4K NZ6207 crashed 18 October 1974

TA-4K NZ6253 crashed 25 March 1981

A-4K NZ6210 crashed 24 October 1989

A-4K NZ6208 crashed 23 July 1992

A-4K NZ6203 crashed 20 June 1996

A-4K NZ6211 crashed 16 February 2001

TA-4K NZ6256 crashed 20 March 2001

29 75 Sqn op. cit.

30 John Hosie recalls hearing about the incident from an unexpected quarter. 'I remember being up at Hawaii on a seminar some three or four years after that [incident] and this US Coastguard Captain said: "You go down to New Zealand and ... mess about down there with fishing and don't have the right licences, they'll just blow you out of the water, no questions asked." I said to him afterwards, "Where did you get that from?" "Well it's true isn't it?," he said "A Taiwanese boat was down there and you sent some of your aircraft to attack it with rockets and guns." We never had any trouble for years after that [incident]; not a problem. It doesn't hurt to be able to do something a little nasty.'

31 75 Sqn op. cit.

32 Ibid.

33 Two Skyhawks were put on alert on the night of 2nd January 1979 but the call to scramble never came.

34 The squadron first exercised its Skyhawks at Hawaii in 1978.

35 'It is considered to be a credit to the RNZAF that 14 pilots could take eight aircraft with relatively unsophisticated nav/attack systems some 4,000 miles and compete credibly against some of the most expensive and advanced aircraft in the world. The flexibility displayed by our pilots in changing between roles in a forever changing environment proved the value of RNZAF training. Then to achieve the highest serviceability rate and equal, if not better, the results of the Americans in the air is truly something to be proud of,' signalled CAS, Sept 1984.

Interview 1995 with 75 Sqn Warrant Officer, Evan Wright. 'They're just a big lump of aluminium and bits of metal and wire, but maybe I don't have such an intimate relationship with them as other tradesmen do...'

'... The exercise scenario isn't a lot different to what we do in NZ in that we attempt to get as many aircraft available at any one time as possible.'

'Very seldom will we be able to deploy with the same people on consecutive exercises. It's a bit of a juggling act; you must keep the experienced people to look after the young guys, but you've got to take the young guys to give them the experience ...'

'Since Kahu the pack-up has actually got bigger, but they're giving us fewer Hercules to use ...'

36 75 Sqn op.cit.

37 Although badly damaged, 6218 was eventually repaired and returned to operational service five years later.

38 Interview.

39 The May 1982 RFP stipulated that

- Most of the work be conducted in New Zealand
- Both the A-4K and the TA-4K were to be modified
- There should be minimal structural change

Other major requirements included the provision of a head-up display (HUD), a weapons delivery computer, a radar warning system, an attitude reference system, a sophisticated navigation system, a laser ranging/target seeking system – and the elimination, so far as possible, of the cockpit's many deficiencies.

40 Steve Moore, interview.

Another problem involved the aircraft's centre of gravity. With all the new equipment in the nose, the centre of gravity had moved forwards. Although still within limits, it affected the aircraft's handling characteristics.

'You couldn't stall the two-seaters. So we ended up having to throw 106lb of lead into the tail of all the aircraft to compensate for it.' - Interview, Stu White.

41 'The entire system was developed and flown artificially to our satisfaction before it was installed on the prototype aircraft, all within 20 months of signing the contract,' says Stu White.

42 75 Sqn op.cit.

43 Ibid.

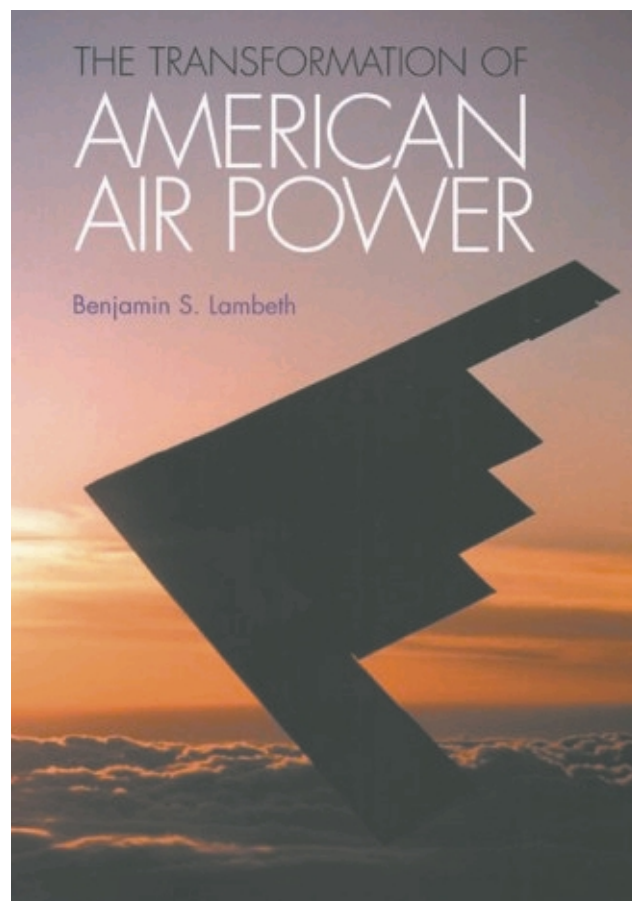
44 Interview op.cit.

45 75 Sqn op.cit.



**Eurofighter 2000 equipped
with AIM-9 Sidewinder and
AIM-120 AMRAAM missiles**

Benjamin S. Lambeth



RAND-analyst Benjamin S. Lambeth argues that the United States has witnessed, over the last two or three decades, a non-linear growth in air power's ability to contribute to the outcome of joint operations. Although many factors have played their part in this development, the author emphasises that air power's increased leverage is a result of "stealth", precision and "stand-off" capabilities combined with the expanded battlespace awareness made possible by recent developments in C4ISR.¹ Lambeth advances his thesis by

applicable, but that recent developments have increased the *relative* combat potential of air power considerably *in comparison* to that of other force elements. The work is as such a timely and comprehensive survey that merits attention by those interested in the utility of contemporary aerospace power and the larger debate on defence investments.

Rather than perceive air power as synonymous with bombs, Lambeth stresses that “in its totality, air power is a complex amalgam of hardware and less tangible but equally important ingredients bearing on its effectiveness, such as employment doctrine, concepts of operations, training, tactics, proficiency, leadership, adaptability, and practical experience”.² With this definition in mind, the author’s point of departure is that air power failed miserably in Vietnam, but that it is insufficient to accept the classic air power advocate argument that the misuse should be attributed to the limits *on* air power rather than limits of air power. Although the micro-management of Lyndon B. Johnson and Robert McNamara had a degrading effect on the application of air power, the author argues that there were organisational problems within the military force that did not allow it to be effective, and that there were considerable shortcomings in equipment, training, doctrine and operational proficiency that have to be accounted for in the overall assessment. The air weapon was largely ill-suited in the proxy-fed war of insurgency in South Vietnam and the “Rolling Thunder” campaign was ineffective partly as a result of self-deceiving measures of effectiveness and needlessly self-imposed operational restrictions that hampered aerial combat and exposed aircraft to the North Vietnamese surface-to-air missile threat. Lambeth argues that the

Lambeth discusses how the USAF improved its inventory and concepts of operations throughout the 1970s and 1980s, but the author does not deal with the “Fighter Mafia” and the “Military Reform Movement” explicitly. The development of the technologically sophisticated F-15 and the more manoeuvrable F-16, combined with Colonel John R. Boyd’s role therein, deserves consideration. One side argues that the Movement was critical of the very technology that makes air power and thus largely irrelevant in the wider defence debate, while the other side argues that John Boyd, William S. Lind, Norman Polmar, Pierre Sprey and others strongly influenced the military thinking that eventually prevailed during “Desert Storm”.⁶ According to Colin Gray, “John Boyd deserves at least an honourable mention for his discovery of the ‘OODA [Observation-Oriented-Decision-Action] loop’ The OODA loop may appear too humble to merit categorisation as grand theory, but that is what it is. It has an elegant simplicity, an extensive domain of applicability, and contains a high quality of insight about strategic essentials”.⁷ In discussing John Boyd one is reminded of Martin van Creveld’s comment on Machiavelli in his survey of military theorists: “The reason for including him in these pages is principally because he is *there* and because in other respects he is a commanding intellectual figure. Like a major general standing in the middle of the road, one must salute him whether one wants or not”.⁸

While technological progress was vindicated in 1991 the author next discusses the operational impact of stealth throughout the decade, including the advent of B-2. Lambeth explores a new generation of munitions, allowing for accurate through-the-weather ground-attack capabilities, and discusses the formal shift from a nuclear to a conventional bomber force that took place with the disestablishment of the Strategic Air Command (SAC) and the Tactical Air Command (TAC) in June 1992. The author demonstrates the improvements found in technology, which have been part of shaping the operational concepts for the Post-Cold War era, and as American bases worldwide are being severely reduced he speculates that the future might bring more attention to an Air Expeditionary Force (AEF). In evaluating operations in Bosnia, the author states that “Deny Flight” was a near disaster and “little more than a costly exercise in converting jet fuel into noise”,¹³ “while Deliberate Force” was a clear success and a good example of coercive diplomacy working with air power. As with the Israeli surprise attack on the Iraqi nuclear reactor

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In the last chapter Lambeth concludes that improved battlespace awareness, heightened aircraft survivability, increased weapons accuracy and improved understanding of concepts of operation witnessed today have made it possible for air power to achieve strategic effects without having to mass numbers. If, however, the promise of air and space power outlined in this book is to be realised in the future force posture, the author suggests several recommendations that must be adhered to. First, air power proponents must candidly acknowledge what air power cannot do, and moreover, “to argue for an aerospace-centric U.S. defense strategy for all occasions is possibly the single most self-destructive error that air power proponents can make”.¹⁸ Second, airmen must accept that achieving and maintaining air superiority is a means to an end and that it does not amount to achieving a military victory. Third, airmen must unburden themselves with the belief that urban-industrial bombing can undermine the enemy’s will to fight to the degree that bombing alone can win the war. Fourth, air power theories must be developed for attacking ground forces, rather than relying on a reductionist attrition approach of destroying as many tanks and artillery pieces as can be seen. Fifth, airmen should convince their military colleagues what air power can do for them. Sixth, one has to redefine or specify what the terms “winning” and “victory” actually mean: “This canonical image of victory entails defeating an enemy’s ground forces in detail, occupying his territory, and controlling his population on an open-ended basis. Yet the latter

Overall Assessment

Lambeth's main argument nevertheless stands scrutiny: American air power has been transformed over the past two-three decades to a point where it has become strategically realisable outside the Cold War paradigm. Air power has a relative advantage in its relationship to the other elements of military force in the sense that it can influence the outcome in part because of stealth, precision and information dominance on the one hand and speed, range and

One could of course criticise the author for not having accounted for the technological improvements of the other services, but it may well be that technology has not increased the real preponderance of land power and sea power. Armies in the future will have flanks, but whether they will be able to add depth is quite another matter, and navies seem often to be subordinate to armies in waging and winning wars. In conclusion it seems as though the traditional combined-arms ground offensive has witnessed a paradigm shift, where the organic army assets of tanks and attack helicopters play a more subordinate part to fixed-wing aircraft and unmanned vehicles than previously. The Pentagon's research on futuristic "space bombers" that could destroy targets on the other side of the world in thirty minutes strengthens Lambeth's conclusion.²²

“The Transformation of American Air Power” is primarily written for policy-makers who require a greater appreciation of the technical and doctrinal issues involved in the application of air power, and secondly for the general audience who is interested in air power and defence matters. It is based on secondary sources rather than archival documentation and provides in summary a comprehensive, well-

book reviews

field". See Tom Clancy with General Chuck Horner (Ret.), *Every Man a Tiger*, (New York: G. P. Putnam's Sons, 1999), p. 22.

- 13 Benjamin S. Lambeth, *The Transformation of American Air Power*, p. 179.
- 14 According to General Short there was no defined Fire Support Co-ordination Line (FSCL) in the war over Kosovo. See Lieutenant General Michael C. Short, "An Airman's Lessons from Kosovo", in John Andreas Olsen (ed.), *From Manoeuvre Warfare to Kosovo?*, (Trondheim: The Royal Norwegian Air Force Academy, 2001), p. 264.
- 15 Dana Priest, "Air Chief Faults Kosovo Strategy", *The Washington Post*, 22 October 1999. See also John A. Tirpak, "Washington Watch: Short's View of the Air Campaign", *The Air Force Magazine*, 82, vol. 9, September 1999, pp. 43-49.
- 16 Lieutenant General Michael C. Short, "An Airman's Lessons from Kosovo", p. 258.
- 17 Benjamin S. Lambeth, *The Transformation of American Air Power*, p. 298.
- 18 Benjamin S. Lambeth, *The Transformation of American Air Power*, p. 307.
- 19 Benjamin S. Lambeth, *The Transformation of American Air Power*, p. 312.
- 20 Ian MacFarling, *Air Power Terminology*, second edition, (Canberra: Aerospace Centre, 2001), p. 34.
- 21 Mark Clodfelter, Book Review: "The Transformation of American Air Power", *Joint Force Quarterly* (JFQ), forthcoming 22 March 2001.
- 22 See for example "U.S. Looking At Spacecraft As Bomber", *Los Angeles Times*, 28 July, 2001, p. 1. For a different perspective, see for example Barry R. McCaffrey, "Cutting Ground Forces is Dangerous", *Commentary*, 1 August 2001.

- 1 C4ISR is short for Command, Control, Communications and Computers -
combined with Information, Surveillance and Reconnaissance.
- 2 Benjamin S. Lambeth, *The Transformation of American Air Power*, (Ithaca:
Cornell University Press, 2000), p. 9.
- 3 See particularly Mark A. Clodfelter, *The Limits of Air Power: The American
Bombing of North Vietnam*, (New York: Free Press, 1989).
- 4 Benjamin S. Lambeth, *The Transformation of American Air Power*, p. 53.
- 5 Richard G. Davis, *The 31 Initiatives: A Study of Air Force-Army
Cooperation*, (Washington D.C.: Office of USAF History, 1987).
- 6 See for example Grant T. Hammond, *The Mind of War: John Boyd and
American Security*, (Washington D.C.: Smithsonian Institution Press,
2001).
- 7 Colin Gray, *Modern Strategy*, (Oxford: Oxford University Press, 1991),
pp. 90-91.
- 8 Martin van Creveld, *The Art of War: War and Military Thought*, (London:
Cassell & Co, 2000), p. 73.
- 9 See H.P. Willmott, "When Men Lost Faith in Reason", draft, 1999, chapter
V, pp. 14-15.
- 10 Benjamin S. Lambeth, *The Transformation of American Air Power*, p. 117.
- 11 JSTARS is short for Joint Surveillance Target Attack Radar System. It
identifies tanks, artillery and movement on the battlefield. It does for the
ground picture what AWACS does for the air picture.
- 12 Push CAS is, according to General Charles A. Horner, "that aircraft would
be designated for [Close Air Support] CAS , but where, how, and when
they would be used would be determined "on the run" by events in the

BOMBER BARONS

By Chaz Bowyer

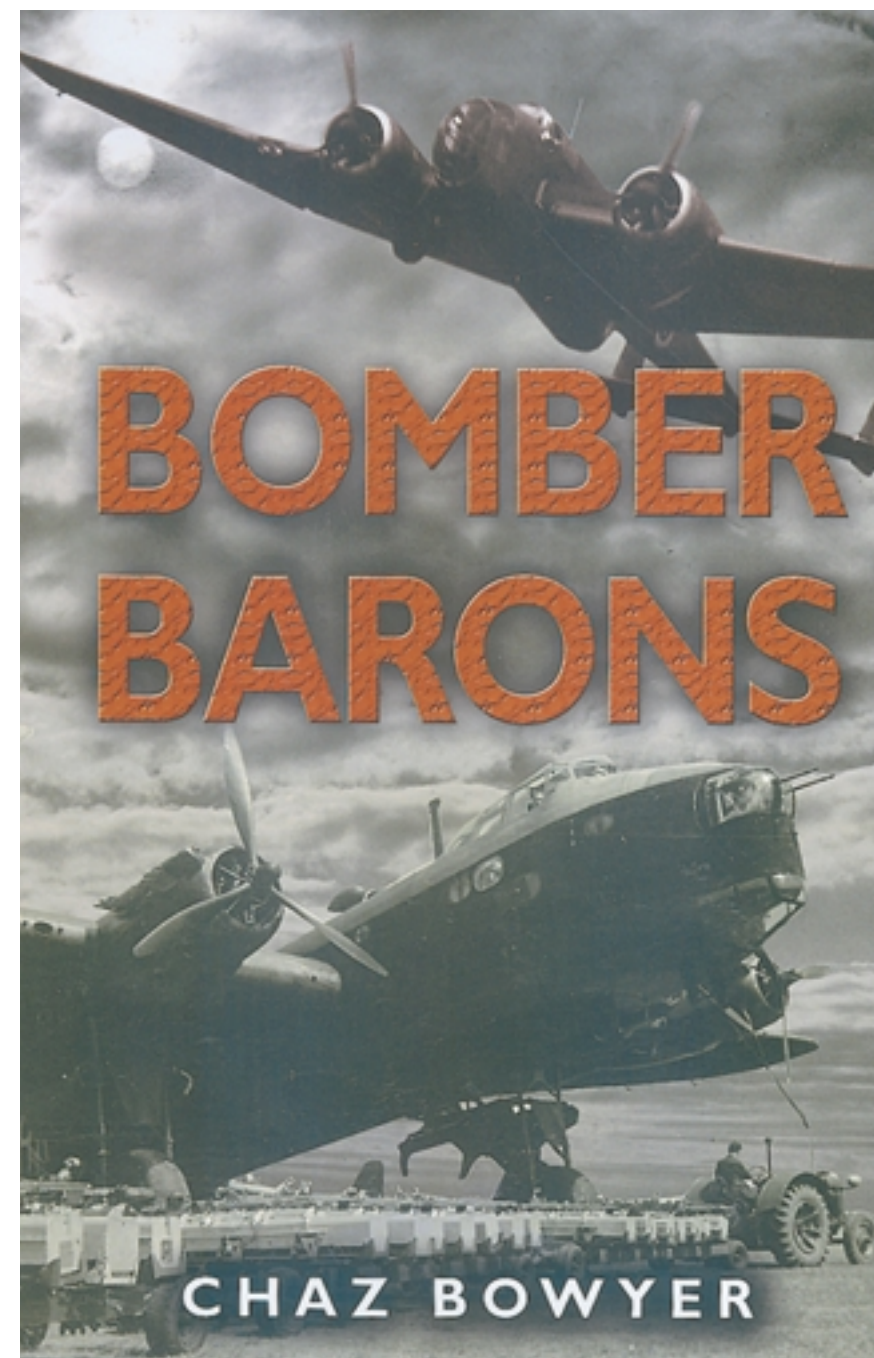
**Published 2nd August 2001, £19.95 Hardback,
ISBN 0 85052 802 X**

By the end of the Second World War, a grim total of 55,000 air crew of Bomber Command had lost their lives. This figure comprised no less than seventy per cent of RAF fatalities. Yet, unlike their more glamorous fighter pilot colleagues, very few bomber pilots or crewmen were familiar household names to the general public. However, within the ranks of the RAF itself, some individuals stood out gaining high reputations for their courage and leadership, a respect achieved regardless of the decorations they had won or the number of sorties flown. These were the Bomber Barons.

In this authoritative book, Chaz Bowyer chooses a selection of these men, Leonard Cheshire, Guy Gibson, Hughie Edwards, Nick Knilans, Syd Clayton and Jo Lancaster to name but a few. For each, the author gives details of their careers and relates episodes that reflect the qualities that made them outstanding.

At the same time, the reader learns of the unfolding dramatic development of Bomber Command from the comparatively uncoordinated, non-cohesive raids of the early part of the war to the highly-trained and deadly offensive weapon it became under Sir Arthur Harris, from 1942 AOC-in-C of Bomber Command, and the Greatest Baron of them all.

Chaz Bowyer joined the RAF aged 16 as a Halton Aircraft Apprentice and went on to complete twenty-six years' regular service. After retiring voluntarily he became a full-time professional aviation history author, researcher and consultant. He has published some forty hardcover titles and hundreds of feature articles.





Patron: The Chief of the Air Staff President: Air Chief Marshal Sir Patrick Hine GCE GBE

The Air Power Association (APrA), which was founded in 1947, aims to foster awareness of the Royal Air Force, its role, people and equipment and to bring together people and organisations with an interest in air power.

The Association's role has grown since it was founded in 1947 as the Air Public Relations Association. C P Robertson, who served in the Royal Flying Corps and was then Director of Public Relations (RAF), was the moving spirit behind its formation and foresaw a largely social Association comprising former Air Ministry Information Division people.

Few people today have first hand experience of the armed forces and defence is rarely at the top of the political agenda.

In a move to foster greater public awareness, recommendations to make the Association a more effective and attractive networking organisation were accepted by the 2000 AGM – the most major change being the new name – “The Air Power Association”. The original mission statement and articles of association were revised to reflect APrA's new role.

Since then, the Association has been revitalised to provide a forum that is attractive to the RAF, the aerospace and defence industries, the media, opinion formers and all those with an interest in air power.

The Association's Patron is, by tradition, the current Chief of Air Staff. The President is Air Chief Marshal Sir Patrick Hine GCB GBE.

Chairmanship of the Association's Executive Committee devolves upon the serving officer currently holding the post of Director of Corporate Communications (RAF).

The Association has three categories of the membership: Official Sponsor (currently BAE Systems, Boeing, GKN Westland, and Rolls-Royce); Corporate (which include Flight International, Raytheon, and Thales); and individual membership.

What membership offers you

- The opportunity to make new RAF, industry and media contacts and renew acquaintances.
- The Association's “The Bulletin” to keep you up-to-date with developments in air power.
- The chance to hear top level speakers from industry and the RAF at Association lunches at the RAF Club.
- The opportunity to attend the Association's annual Industry Dinner, where the speaker is a government Minister.
- Attend special events, such as presentations and visits to RAF stations, organised by the Association.

Forthcoming Services 2001

<i>Date</i>	<i>Time</i>	<i>Event</i>	
Monday, 10th December	6pm	Carol Service	The Savage Club
Thursday 13th December	12.15pm	Carol Service	Exxon Mobil
Thursday 13th December	7.30pm	The London Welsh Male Voice Choir will give a concert produced by 1475 Squadron A.T.C.	
Friday 14th December	5pm	Carol Service	Lawrence Graham
Advent 3	11am	Carol Service in aid of St. Christopher's Fellowship.	
Sunday 16th December		Lessons and Readers to be advised.	
(Following this Service there will be the usual Christmas Lunch in the Crypt for all Guild members and their friends)			
Thursday 20th December	12 noon	Carol Service	Shell
Thursday 20th December	6pm	Carol Service	Taylor Joynson Garrett
Advent 4 Choral Matins		Old Testament: Micah 5 2-5	Anna Siraut
Sunday 23rd December		New Testament: Luke 1 26-38	John Siraut
Christmas Eve	11.30pm	1st Reading: Isaiah 9 2-7	Ivan Packman
Monday 24th December		2nd Reading: Titus 2 11-14	Keith Grout
Midnight Choral Eucharist		Gospel: Luke 2 1-14	Resident Chaplain
Christmas Day	11am	1st Reading: Isaiah 52 7-10	Brian Poag
Tuesday 25th December		2nd Reading: Hebrews 1 1-12	Keith Grout
Choral Eucharist		Gospel: John 1 1-14	Resident Chaplain
Sunday 30th December		1st Reading: Isaiah 63 7-9	Ken Allen
Choral Eucharist		2nd Reading: Hebrews 2 10-18	Ivan Packman
		Gospel: Matthew 2 13-23	Resident Chaplain



ST. CLEMENT DANES, STRAND, LONDON

CENTRAL CHURCH OF THE ROYAL AIR FORCE

This beautiful Wren church, which is also the Royal Air Force Central Church, has a world-wide following and is open daily from 08.30 am – 4.30 pm. There is Choral Eucharist or Matins every Sunday at 11.00 am, sung by the famous choir. Civilians and all members of the Armed Forces are welcome to visit the church and attend the Services.