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FOREWORD

Welcome to the first edition of the *Royal Air Force Air Power Review* in the year 2001 and the eleventh edition overall. When the *Air Power Review* was launched in 1998 by my predecessor as Director of Defence Studies (RAF), Group Captain (now Air Commodore) Stu Peach, I suspect even he had little idea how quickly it would become one of the leading journals in its field. With a print run of over 11,000 copies per edition and a distribution that is genuinely worldwide, the *Air Power Review* has fulfilled its stated aim to become "an open forum for study which stimulates discussion and thought on air power in its broadest context". This is reflected in the range and quality of the articles that are now being submitted for inclusion in future editions. I would therefore encourage anyone who feels they have a contribution to make to put pen to paper (or, more likely, finger to keyboard!).

Turning to this latest edition, few bombing raids have generated as much impassioned debate as the attack on Dresden by RAF Bomber Command and the USAAF Eighth Air Force on 13-14 February 1945. Dresden has since been represented as the epitome of all that is immoral, unethical and illegal about the allied strategic bombing campaign in the Second World War. Yet to the operational commanders and the crews of the bombers, Dresden was just another raid, remarkable only because of its stunning success. In the first article, therefore, I take a fresh look at this controversial episode in the history of air power. I begin by attempting to situate the combined raids on Dresden in the wider geo-political strategic framework prevailing in 1944-45. Following a brief account of the raid itself, I then examine the legal and ethical issues that have arisen both from the raid in isolation and from the broader context of the strategic bombing campaign.

The second article, by Lieutenant Colonel Paul Strickland of the United States Air Force, was first published in the Fall 2000 edition of the USAF Aerospace Power Journal. Colonel Strickland examines the application of USAF air power doctrine during Operation Allied Force. He argues that Allied Force endured strong interference by NATO's political leadership which revealed tension between NATO's political objective (preserving the alliance) and its military objective (compelling Serb forces to leave Kosovo and halting ethnic cleansing). This tension resulted in a gradual, coercive air campaign which was the antithesis of the decisive air power doctrine favoured by the USAF. Senior air force officers blamed this 'misapplication' of air power doctrine for the failure of the air campaign to deliver a more rapid victory for the alliance. However, if the United States is more likely in future to be involved in Balkan-style conflicts than a major theatre war, the author argues that USAF air power doctrine should endorse a less idealistic decisive philosophy in favour of a more realistic coercive use of air power.

The third article, by Wing Commander Chris Finn, is based on the thesis he wrote as part of his Master of Philosophy degree in International Relations at the University of Cambridge, undertaken under the auspices of the Royal Air Force Higher Level Defence Studies scheme. His subject is the increasing use of precision weapons. Starting with a brief summary of the history of precision weapons, from their debut in Vietnam, through the Gulf War and punitive actions in Iraq, to Bosnia and finally Kosovo, the author then conducts a detailed analysis of the technical, doctrinal, legal and ethical implications that have emerged from their use in these conflicts. He concludes by identifying the underlying trends and specific lessons that can be drawn from his analysis which might better inform the ongoing debate about the future use of precision weapons in so-called wars of choice.

In the next article, Wing Commander Kevin Baldwin addresses the highly topical question of whether Europe can project air power without the support of the United States. Recent conflicts in the Gulf and Former Yugoslavia have emphasised the shortfalls in Europe's collective ability to provide balanced air forces and have highlighted its dependence on the US. However, following recent political initiatives within Europe, and perceived US discontentment with European efforts in Bosnia and Kosovo, there have been calls for Europe to develop an independent military capability. Using recent conflicts as case studies, and by reviewing UK and European air power capabilities, the author challenges the proposition that Europe could, or even should, project air power without American support.

In the final article, Wing Commander Grant Bremer looks at the provision of future cost-effective combat air power for the UK. The utility of combat air power depends on technical innovation, potentially offering a surgical approach to combat operations – an attractive proposition for the resolution of conflicts. Combat air power is, however, in direct competition for scarce Treasury funding and must be provided, and operated, cost-effectively. The author examines the many factors that affect the provision of combat air power and shows that they may conflict with military judgement at times. He concludes that Smart Procurement will drive costs down, but that the operational doctrine underpinning combat air power must evolve to ensure that optimum use is made of all possible contributions to the capability.

This edition of the *Air Power Review* concludes with the usual series of recent book reviews. I would particularly like to draw your attention to the two very detailed reviews provided by Dr John Andreas Olsen. His first review is of *Winning in Fast Time*, a book co-authored by John A Warden, the architect of the Gulf War air campaign. His second is of *Strategy, Air Strike and Small Nations* by Wing Commander Shaun Clarke RNZAF. We are always on the look out for good book reviews, so if you have read any good books lately…

CONTRIBUTIONS TO THE ROYAL AIR FORCE AIR POWER REVIEW

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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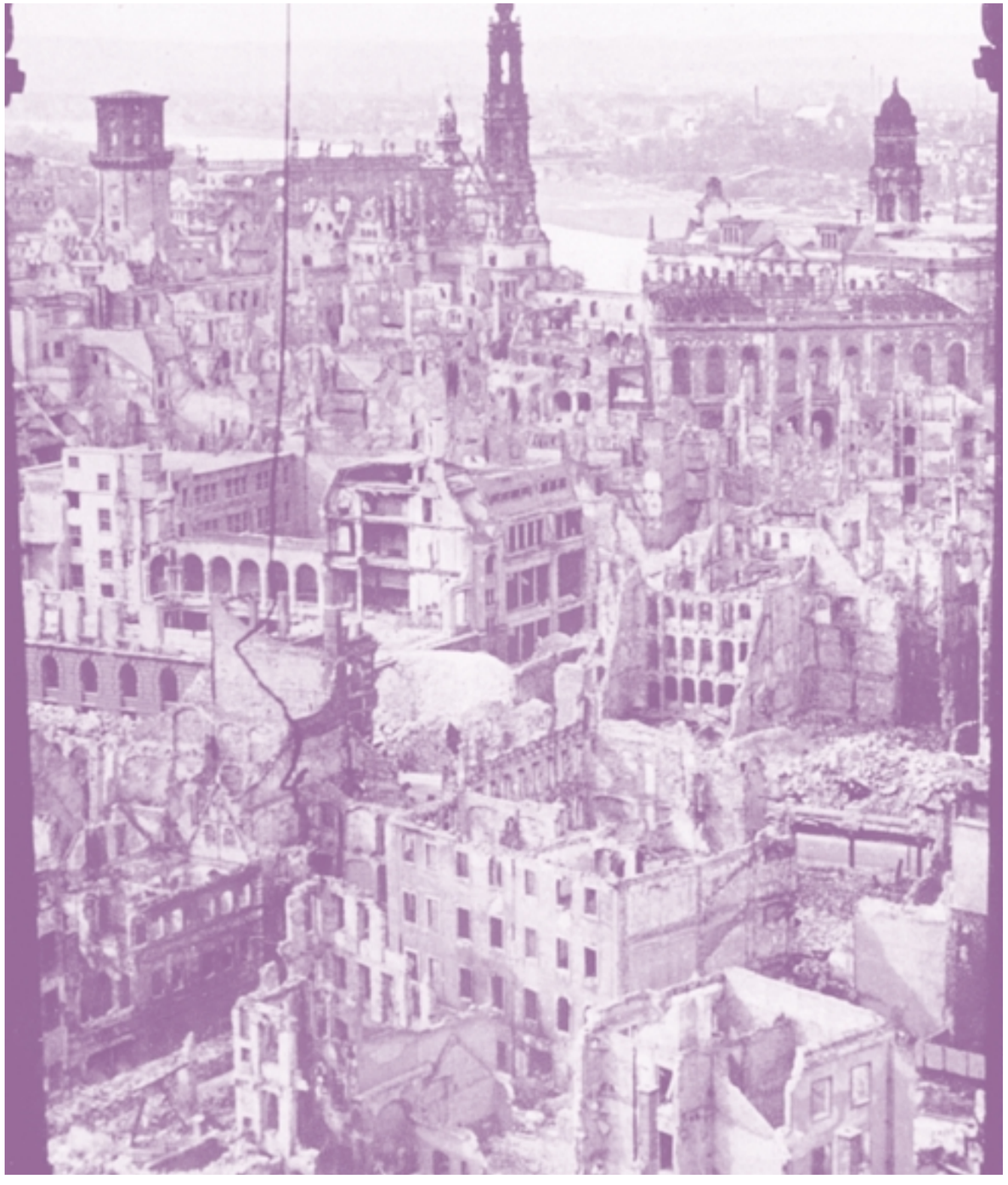
RAF VC-10 refuels Tornado F3s

A view of Dresden's inner city after the fire storm

Dresden 1945 - Just Another Raid?

Bomber Command of the Royal Air Force was active throughout the Second World War and, for a significant proportion of the time, was the only means by which we could carry our resistance into the heartland of the enemy and his conquered territories. Over one third of a million sorties were flown over the course of the war in Europe alone with some 9,000 aircraft lost and 50,000 allied personnel killed or reported as missing in action.[1] Targets for the heavy bomber force varied from Berlin, through the V1/V2 rocket sites at Peenemunde, to German Army positions opposing the Normandy landings. On numerous occasions, the area attacked consisted of little more than arable fields – particularly when decoys had been deployed or bombing accuracy was suspect. Some raids, such as the attacks on the dams, have entered the annals of history and legend; others have faded from the memories of all but the remaining survivors. Yet the combined Bomber Command/ USAAF Eighth Air Force raids on Dresden on 13-14 February 1945 have probably occasioned more impassioned debate than the rest put together. This debate has inevitably been fuelled by retrospective moralising, self-conscious justification of positions and an unhealthy dose of Cold War propaganda. The scope for rational discussion has been further reduced by the furore surrounding the author of the first monologue on the subject – Mr David Irving.[2] The fact that his book has admirably stood the test of time and is not, contrary to popular suggestion, an essay in Nazi apologia has been lost in the heat.[3]



In his memoirs, Marshal of the RAF Sir Arthur Harris points out that the attack on Dresden was 'at the time considered a military necessity by much more important people than himself'

Dresden has been represented as the epitome of all that was immoral, unethical and illegal about the allied strategic bombing campaign in World War II. Even in the immediate aftermath of the raids, the talk was increasingly of 'acts of terror and wanton destruction'.[4] The casualty figures have been debated, revised and contested. And even those responsible for the planning and execution of strategic and operational policy have sought to distance themselves from the horror of what was, in reality, an eminently successful raid. In his memoirs, Marshal of the RAF Sir Arthur Harris points out that the attack on Dresden was 'at the time considered a military necessity by much more important people than himself'.[5] This was a very muted response considering the many efforts to make him the scapegoat. Air Marshal Sir Robert Saundby, who was Deputy Commander-in-Chief at Bomber Command and was therefore directly involved in the planning for the raid, provided the foreword to Irving's book. He wrote:

> *'That the bombing of Dresden was a great tragedy none can deny. That it was a military necessity few, after reading this book, will believe. It was one of those terrible things that sometime happen in wartime, brought about by an unfortunate combination of circumstances. Those who approved it were neither wicked nor cruel, though it may well be that they were too remote from the harsh realities of war to understand fully the appalling destructive power of air bombardment in the spring of 1945.'*[6]

This paper will attempt to situate the combined raids on Dresden in the wider geo-political strategic framework prevailing in 1944-45. It will then look briefly at the raid itself and then examine the legal and ethical issues that have arisen, both from the raid in isolation and from the broader context of the strategic bombing campaign. Documentary sources have been used wherever possible. Oral evidence has been eschewed, partly because much of it is concerned with detail. With no disrespect for those involved at the time, or subsequently, there is also the risk that oral sources may alter their standpoint to suit more appropriately the moral or ethical views of the age in which they were asked to testify.

The Strategic Context and Bomber Command Policy

Churchill promised in 1940 that there would be a 'continuous and relentless air offensive'. Technology, or the lack of it, ensured that the doctrinal imperative of attacking the morale of the people was adhered to due to the impracticality of more precise targeting

Notwithstanding the debate that has ensued over the years concerning the differences of opinion between Harris (as C-in-C Bomber Command) and Portal (Chief of the Air Staff), it is important to remember that the Strategic Bombing Policy was not the brainchild of one man and his staff. Rather it was an iterative process guided, from time to time, from the grand strategic level. The primacy of the strategic bomber had been a cornerstone of British and American air power thinking for much of the inter-war period. After Dunkirk, and for the next three years, it became the only feasible method by which Britain could strike back at Germany. Churchill promised in 1940 that there would be a 'continuous and relentless air offensive'. Technology, or the lack of it, ensured that the doctrinal imperative of attacking the morale of the people was adhered to due to the impracticality of more precise targeting. Improvements in navigation aids, and the increases in bomb loads, resulted in a gradual improvement in Bomber Command efficiency. The emphasis, however, was on the incremental nature of the change. Watersheds were few and far between.

A key opportunity for a major re-evaluation of policy came with the American entry into the conflict. Strategic bombing policy was discussed at the Casablanca Conference in 1943. 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.[7] 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'.*

Left to right: Lady Tedder, Squadron Officer Sarah Oliver (née Churchill), Air Chief Marshal Sir Arthur Tedder, Mrs Churchill and the Prime Minister.

Tedder (as Deputy to Eisenhower) advocated that priority continue to be given to transportation and communications targets

As Biddle has pointed out, this contained something for everyone and gave the commanders a deal of latitude,[8] both in target sets and methodology.

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.

In late 1944 and into early 1945, it was increasingly evident to military planners that the defeat of Germany was a matter only of time and/or resources. There was, however, no room for complacency. The Germans were far from beaten and showed no sign whatsoever of merely rolling over. The Ardennes offensive in the dying days of December 1944 badly rattled the Allies,[9] not least because they had hoped to have won the war by Christmas of that year. Furthermore the threat of new terror weapons, and even the deployment of nuclear bombs, was a very real consideration at the time.[10] The Russians had already lost huge numbers of men killed and the Allies were facing mounting casualty lists as they fought their way into the heartland. Every means was therefore sought to shorten the war.

The Allies and the Russians had accepted, as early as 1943, that the strategic bomber offensive would continue to play a key role in operations against Germany.[11] By the time of the Octagon Conference in September 1944, the British Chiefs of Staff considered that it might become ‘desirable in the immediate future to apply the whole strategic bomber effort to the direct attack of German morale’.[12] They also agreed that attacks could usefully be undertaken in support of the Russian armies.

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These discussions culminated in the formulation of a plan entitled *Thunderclap*. The Chief of the Air Staff, Sir Charles Portal, presented this to his fellow Chiefs of Staff in August 1944.[13] This envisaged a massive attack on Berlin at about the time that the German Army had been defeated in the field. The strategic bomber force would then deliver the coup de grace ending further resistance. By 1945, the Air Staff considered that *Thunderclap* might well appear to the Germans as an excellent example of close co-ordination with the Russians thereby greatly increasing the morale effect.[14] In January 1945, the Joint Intelligence Committee (JIC) played down the possibility of German resistance crumbling, but highlighted the scope for confusion in the movement of reinforcements and refugees if, by implication, critical towns in the infrastructure were attacked.

The JIC report coincided with preparations for the Allied discussions in Malta that were the precursor to the Yalta conference with the Soviets. In the meantime, Churchill had asked the Secretary of State for Air, Sir Archibald Sinclair, what plans the Royal Air Force had for 'basting the Germans in their retreat from Breslau'. Portal's advice was that *Thunderclap* would be both costly and indecisive. He recommended that oil targets should have absolute priority along with Me 262 factories and submarine yards. Portal also echoed the sentiments of the JIC report recommending attacks on Berlin, Dresden, Leipzig, Chemnitz, 'or any other cities where a severe blitz will not only cause confusion in the evacuation from the East, but will also hamper the movement of troops from the West'.[15] Sinclair replied to Churchill in a cautious tone on 26 January suggesting that oil targets should remain the priority with attacks on East German cities as a secondary option when the weather was too poor. The Prime Minister was obviously not satisfied that sufficient emphasis was being given to his wish that support be given to the Russian advance. His blistering response is worthy of quotation in full:

> *'I did not ask you last night about plans for harrying the German retreat from Breslau. On the contrary, I asked whether Berlin and no doubt other large cities in East Germany, should not now be considered especially attractive targets. I am glad that this is 'under examination'. Pray report to me tomorrow what is going to be done.'*[16]

Without further ado, the Deputy Chief of the Air Staff, Sir Norman Bottomley, wrote to C-in-C Bomber Command formally instructing him to carry out these attacks. Sinclair confirmed this to Churchill on 27 January; this minute was acknowledged and elicited no further comment. After a series of meetings involving Portal, Bottomley, Tedder and General Carl Spaatz it was agreed that oil would remain the number one priority for strategic bomber forces operating from the UK. This would be followed

in priority by attacks on Berlin, Dresden and Leipzig; destruction of communications feeding the respective fronts; and finally the Me 262 plants.[17] In London, the Vice-Chiefs confirmed these priorities with the addition of a more sustained effort against tank factories.

The plot now moves to Yalta where the debate over who said what to whom becomes complex. Cold War Soviet propaganda has emphasised that the Russian delegation in the Crimea had no responsibility for the bombing of Dresden.[18] The Allies were unequivocal in their inclusion of Dresden in the target list, in particular with its importance on the Berlin – Leipzig – Dresden railway. The Russian Deputy Chief of Staff, General Antonov, submitted a formal memorandum to the Allies requesting, *inter alia*, that air attacks against communications should be carried out 'in particular to paralyse the centres: Berlin and Leipzig'.[19] The use of the wording 'in particular' makes it, at best, disingenuous for the Russians subsequently to suggest that they had not requested action at Dresden. Although the documentary evidence from the Russian perspective is limited, it is highly improbable that informal or non-minuted discussions had left them in any doubt as to Allied intentions. It is worthy of note at this stage that Harris's role had been no more sinister than as a recipient of very high-level instructions.

The Raids

Dresden had a pre-war population of about 600,000. By 1944, this had been swollen by refugees, prisoners of war and undoubtedly a number of folk seeking to exploit the city's reputation as being exempt from air raids. For what was Germany's 7th largest city to have escaped until 7 October 1944 had not gone unnoticed. The city and its environs hosted numerous targets of military and industrial significance. These included an optical factory, a glass works, two plants producing radar components, an arsenal and finally a poison gas factory. Dresden had become a key nodal point in the German postal and telegraph system.[20] In addition, the infrastructure of Saxony was such that Dresden was indeed a key point in the communications of the region for refugees and the military. It was the hub connecting the two major rail lines between Berlin and Leipzig and accordingly was a troop concentration area. There was therefore no logical reason – other than its distance from

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Lincolnshire – for it to have been exempt from air attack. The USAAF Eighth Air Force first visited Dresden on 7 October 1944 with 30 effective sorties against the industrial areas. This attack was followed with a raid on the marshalling yards 16 January 1945 (133 effective sorties).[21]

By early 1945, German night fighter defences had become threadbare. The crews were tired and aviation spirit was at an absolute premium. Even though the area of the homeland and occupied territory that had to be defended had shrunk considerably under Allied and Soviet attack, the scale of air attacks was steadily increasing. The impact of the combined bomber offensive with its escorting long-range fighters had taken its toll on the Luftwaffe. Furthermore, the demand for heavy calibre artillery was huge; it has been estimated that even though over 20,000 artillery pieces were deployed for air defence purposes (and therefore not available for land warfare), there were still insufficient guns to protect everything.[22] Dresden was comparatively low on the priority list, hence its earlier escape from air attack contributed to its eventual demise.

A reconnaissance photograph of Dresden-Friedrichstadt marshalling yards after the bombing raids.

Harris planned his attack on Dresden accordingly. He elected to use a double blow. The first wave would convince the Luftwaffe that it was the main raid and their fighters would be back on the ground refuelling when the second and larger raid would have unfettered access to the target. The gap between waves was to be three hours during which time the defences and rescue services would be swamped, and still in the open when the main raid arrived. Over 800 aircraft were launched on the two raids with devastating effect. These were followed the next day by the USAAF with over 200 sorties against the marshalling yards. In terms of precision targeting, 'marshalling yards' have been used by the USAAF as a euphemism for area bombing. But by early 1945, accuracy had improved to the point whereby such targets could be defined with a reasonable expectation that they would be

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hit. The importance and scale of the yards made them a worthwhile target in their own right.[23] Furthermore, the designated MPIs (mean points of impact) for the 92nd Bomb Group show seven precise targets (five based on the rail network and two industrial) with the centre of the city as an eighth 'target of opportunity'.[24] For Bomber Command, contemporary maps held by the Air Historical Branch unequivocally show the aiming point as the centre of the Old Town.[25]

Casualty figures have been extremely contentious, but it is estimated that some 25,000 people were killed and at least the same injured. More emotive estimates are ten times these figures

Considerable areas of the city were devastated by the ensuing firestorm with its attendant hurricane force winds. Most public buildings along with all of the Old Town were gutted. The arms plants were reduced to about 20% of their earlier capacity. Casualty figures have been extremely contentious,[26] but it is estimated that some 25,000 people were killed and at least the same injured. More emotive estimates are ten times these figures. The Eighth Air Force was to revisit Dresden on 2 March and 17 April. For Bomber Command it was a highly successful raid and the city dropped to 62nd on their target list and was not revisited.[27]

The Immediate Aftermath

For those directly involved in the planning of Bomber Command operations, the immediate response to the raids was almost certainly one of relief that the casualty lists were relatively low, followed by satisfaction over its success. The whole issue was, however, compounded by a press release and interview given by Air Commodore C M Grierson at the Supreme Headquarters Allied Expeditionary Force in Paris.[28] The ensuing Associated Press (AP) despatch stated that Allied Air Chiefs had made the 'long awaited decision to adopt deliberate terror bombing of German population centres as a ruthless expedient to hastening Hitler's doom'.[29] This was widely published in America and was broadcast in Paris. Public opinion in the US had hitherto been fed a diet that emphasised the precision of the American bombing campaign. Concern was only partly alleviated by Marshall's statement that it had been carried out at Russian request.

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The despatch gained a brief exposure in London prior to heavy censorship. The matter was subsequently raised in parliament on 6 March 1945 by Mr Richard Stokes MP.[30] As he rose to speak in the House, Sinclair rose from his seat and pointedly left the Chamber. Stokes read out the AP despatch in full and then accused the government of hiding the true nature of the

bombing campaign from the British public. Sinclair replied some hours later that the government was not wasting its time on purely terror tactics. Although criticism was relatively muted, the seeds had been sown for later outbursts of conscience.

At a more elevated level, the Prime Minister put pen to paper in what has been described variously as among the 'least felicitous… of the long series of war-time minutes'[31] and 'an astonishing minute'.[32] He wrote:

> *'It seems to me that the moment has come when the question of bombing German cities simply for the sake of increasing terror, though under other pretexts, should be reviewed. Otherwise we shall come into control of an utterly ruined land…. The destruction of Dresden remains a serious query against the conduct of Allied bombing. I am of the opinion that military objectives must henceforth be strictly studied in our own interests rather than that of the enemy.'*[33]

Portal immediately instructed Bottomley to ask for Harris's comments. His personal letter to the C-in-C is reproduced in full in Saward's *'Bomber' Harris*.[34] Bottomley summarised the Prime Minister's note, reiterated extant policy and invited the C-in-C to comment. Harris's reply was prompt and predictably pungent. He pointed out in characteristically blunt terms that the suggestion that the Bomber offensive had been conducted for the 'sake of increasing terror, though under other pretexts' was an insult both to the Air Ministry policy and to the crews that had carried it out. Harris went on to highlight the misperceptions over Dresden that would be obvious to any psychiatrist – 'it is connected to German bands and Dresden shepherdesses'. Rather, 'Dresden was a mass of munition works, an intact government centre and a key transportation point to the East. It is now none of those things.' He went on to discuss the policy underlying the Bomber offensive, concluding with the warning that such scruples as the Prime Minister was considering would lengthen the war and increase the task facing the army both in Germany and against Japan.

Portal strongly backed the stance taken by his C-in-C and Churchill withdrew his minute. The revised version made no mention of Dresden. The attack, however, was something of a turning point in that the genie was now out of the bottle and the role and purpose of the offensive was subject to rather more debate – on both sides of the Atlantic. In the UK, this increased as it became more obvious that the war was going to be won and that such destruction would require to be more rigorously justified. In America, the USAAF had to go to considerable lengths to disguise the extent to which area bombing had been undertaken. Webster and Frankland suggest that Dresden represented something of a turning point in terms of the morale of the German people. They point out the Gestapo had maintained 'an artificial morale' until word got out as to the scale of the destruction[35] in Dresden. They admit, however, that unwillingness to admit defeat remained widespread until the bitter end.

…the Gestapo had maintained 'an artificial morale' until word got out as to the scale of the destruction in Dresden

10 Legal and Ethical Factors

At first sight, it must appear to be faintly ridiculous for legal and ethical issues to feature at all in what, at the time, was total war against the most obnoxious regime ever to challenge world peace. A quick glance, however, at the indexes of a wide range of books on international legal issues and ethics shows that Dresden features as almost as regularly as does debate on the wider strategic bombing campaign. As stated above, the AP Despatch effectively ensured that the genie was let out of the bottle at this point even though other raids (such as those on Hamburg) could have provided the turning point if it had been based on tangible criteria such as the use of firestorm tactics.

The presentational aspects of warfare as an extension of political activity have considerable importance for those involved, especially at the higher levels, in the prosecution of a campaign. Adherence to the tenets of international law was, and remains, an integral part of this process – notwithstanding the ephemeral nature of the discipline as it was understood prior to the formation of the United Nations. In the relatively calm pre-war (and hence pre-Warsaw, Rotterdam and Coventry) days of June 1938, Neville Chamberlain cited international law in his formal guidelines to Bomber Command. He stated unequivocally that:

In the relatively calm pre-war (and hence pre-Warsaw, Rotterdam and Coventry) days of June 1938, Neville Chamberlain cited international law in his formal guidelines to Bomber Command

‘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 taken in attacking those military objectives so that by carelessness a civilian population in the neighbourhood is not bombed.’[36]

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 statements on the understood legal principles of the time were entirely consistent with those laid down by Trenchard in 1928 in what effectively became his 'last will and testament'. In a paper that started as a presentation to the Imperial Defence College and was then circulated to fellow Chiefs, he 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'.[37]

The air staff, a decade later, was more concerned with expediency than with the legalities. 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 dismissed the Draft Hague Rules (see below) out of hand and concluded that, without doubt, 'sooner or later, the gloves would have to come off'.[38]

Attempts to regulate the conduct of warfare had gathered pace towards the end of the 19th Century with, *inter alia*, the formal prohibition of the bombardment of undefended towns. By 1907, the possibility of bombardment from the air led to the inclusion of the clause 'by whatever means'.[39] The Hague Conference of 1925 had no hesitation in banning chemical and biological forms of warfare, but the regulation of air warfare was left in draft form. The 1923 Draft Hague Rules were never adopted in binding form, but at the time they were regarded (by lawyers if not by the Air Staff) as an authoritative attempt to clarify and formulate rules for the conduct of air warfare. They were based on the customary rules and principles underlying the laws of war on land and at sea. Article 22 precluded the use of 'Aerial bombardment for the purpose of terrorising the civilian population, of destroying or damaging private property not of military character'.[40] Notwithstanding the absence of formal ratification the Draft Rules did acquire a positive standing and were generally taken to be authoritative at the 1932-34 Geneva Disarmament Conference. Efforts to ban military aviation in toto were to no avail and binding resolutions were not forthcoming.[41] As war spread through Europe, all of the rules, however imprecisely formed, were broken by all sides. What adherence there was, such as to the prohibition of chemical warfare, was more out of fear of the opposition's capability than for jurisprudential considerations.[42] Geoffrey Robertson QC has suggested that Allied embarrassment over the RAF's use of area bombardment 'against Dresden and other German cities' resulted in this form of warfare not being specifically outlawed in the 1949 Geneva Conventions.[43] It could be argued, however, that this had more to do with post-war reliance on nuclear weapons, which would flatten cities, than concern over Dresden. It nevertheless shows the frequency with which the raid appears in such work.

Geoffrey Robertson QC has suggested that Allied embarrassment over the RAF's use of area bombardment 'against Dresden and other German cities' resulted in this form of warfare not being specifically outlawed in the 1949 Geneva Conventions

By winter 1944, with the war far from won,[44] international legal considerations were barely worthy of note. Ethical issues, if considered at all, were dominated by the need to win the war as quickly as possible. As has been suggested, the AP Despatch

was probably the catalyst for the formation of post-war ethical stances. The advent of the Cold War greatly exacerbated the temperature of the rhetoric. The annual tolling of bells throughout East Germany to correspond to the duration of Bomber Command raid on Dresden is evidence of the propaganda effect sought and achieved – especially when it was mimicked in West Germany. The ethical and philosophical debate has continued ever since. To some extent, this is understandable and even beneficial. Clark has argued that just because a principle is ignored in practice, there is no reason to question its philosophical force.[45] Clark does not mention Dresden in this context – he talks more generally about strategic bombing before going on to the nuclear debate.

This more general approach to the whole ethical debate has much to commend it – raising the issues at stake to the big picture rather than taking a raid in isolation. Talking only of Dresden invites emotive debate as forewarned by Harris with his pithy comments on 'Dresden shepherdesses'. Garrett in *Ethics and Airpower in World War II*, adopts a broader approach in advocating that alternatives to the area bombing campaign, as a means of attacking Germany and utilising assets, could have been explored at the military strategic level or above. Examples include transfer of Bomber Command assets to the anti-U boat campaign. Walzer in *Just and Unjust Wars*[46] places Dresden in its wider context, pointing out that not only should the raid be seen in the context of other attacks against cities such as Hamburg and Berlin, but also in the light of the numbers killed during the siege of Stalingrad.

The Allied bombing raids on Dresden have remained the subject of intense debate ever since the publication of the AP Despatch with its connotations of 'terror bombing'. A possible cause of the interest may have been the remarkable results of the operation in comparison with other raids. Hamburg and Berlin were devastated, but had to be revisited many times. Nuremberg was attacked, but is remembered more for the scale of Bomber Command losses than the devastation wrought below.

It could be argued, however, that the extent of the ensuing debate alone has ensured that Dresden has been consigned to a category of its own. The result of this has been an inflationary spiral in which scholars have become increasingly wound up in the minutiae. This paper has sought to bring a sense of perspective to the whole, rather than to concentrate on detail. The decision to attack key communications cities as 'targets of first importance' was not only taken at the highest levels but tardy behaviour was criticised by the Prime Minister. The attacks on these cities were entirely consistent with Allied bombing policy of the time – on both sides of the Atlantic. Furthermore, the planning, execution and weapon selection were consistent with the standard procedures of the time. There is no question of the scheme having been hatched within Bomber Command, the Air Staff and certainly not by Harris in isolation.

Much has been made as to whether or not the Russians specifically requested attacks on Dresden. The controversy was largely fuelled by Cold War propaganda rather than the merits of the answer *per se*. Even if surviving documentary evidence does not specifically include Dresden by name, its strategic importance would guarantee its inclusion *de facto*. Unless Allied

and Soviet discussion had specifically excluded the city, its fate was sealed. Dresden was in any event a strategic target in its own right. Its industry as well as its communications links made Germany's seventh largest city vulnerable to attack.

In retrospect, Dresden may have appeared to those at political and military strategic levels to have been a turning point in their pragmatic, ethical or legal thinking about the prosecution of the war. At the time, it was more likely that it was just another event in the long process of bringing the war to a speedy conclusion. Admittedly it came at a time when thoughts were turning increasingly to the management of the post-war mess and the likely advent of the Cold War. That the destruction of a fine city should have become a propaganda tool does justice to neither the plight of the victims on the ground nor the bravery of the crews for whom Dresden was the 'target for tonight'.

To the operational commanders, the formation commanders and the crews in their charge, the raids on Dresden, and other East German cities, were part of the complex tapestry that represented their part in waging war against the most odious regime then known to mankind. To them, it was just another raid.[47]

NOTES

1 Figures taken from Martin Middlebrook and Chris Everitt, The *Bomber Command War Diaries*: An Operational Reference Book 1939 –1945, Midland Counties Publications, Leicester, 1996, page 11.

2 David Irving, *The Destruction of Dresden*, Kimber, 1963.

3 See for example, Roger Boyes, 'Dresden Strafing Myth is Shot Down', *The Times*, April 19 2000, page 18.

4 Alexander McKee, *The Devil's Tinderbox, Dresden 1945*, London, Souvenir Press, 1982, Chapter 11. An attempt to produce a book review of this volume was the catalyst for this paper. Much of it is highly emotional and air power students should not necessarily regard it as a 'standard historical work'.

5 MRAF Sir Arthur Harris, *Bomber Offensive*, London, Greenhill Books, page 242. First published by Collins in 1947.

6 Air Marshal Sir Robert Saundy, Foreword to David Irving, *The Destruction of Dresden*, Elmfield Press, Morley, 1974.

7 For a full discussion on the Casablanca Conference from a non air power perspective see David Fraser, *Alanbrooke*, Harper Collins, London, 1997, pages 283 – 298.

8 Tami Davis Biddle, 'British and American Strategic Bombing', in John Gooch (ed), *Air Power Theory and Practice*, Cass, London, 1995, page 120.

9 B H Liddell Hart, *History of the Second World War*, Cassell, London, 1970, page 639 describes the £5 bet between Eisenhower and Montgomery that the war would be over before Christmas 1944. The American was destined to lose by a considerable margin.

10 Sir Maurice Dean, *The Royal Air Force and Two World Wars*, Cassell, London, 1979, page 287.

11 Confirmed in the Tehran Conference 28 November – 11 December 1943.

12 CCS.520/3 (Octagon)

13 Sir Charles Webster and Noble Frankland, *Strategic Air Offensive Against Germany 1939 –1945*, Vol III, Part 5, HMSO, London, page 100.

14 Webster and Frankland, *ibid*, page 101.

15 Webster and Frankland, *ibid,* page 101.

16 Webster and Frankland, *ibid*, page 103.

17 Webster and Frankland, *ibid*, page 104 and David R Mets, *Master of Air Power; General Carl A Spaatz*, Presidio Press, California, 1988, page 274.

18 For an example of the lengths to which the post-war Allies had to go to counter such propaganda, see the declassified USAF study carried out by the Historical Division of the Research Studies Institute of the Air University, *Historical Analysis of the 14 –15 February 1945 Bombings of Dresden*, 13 April 1953. It runs to 37 pages plus supporting documents.

19 Webster and Frankland, *ibid*, page 105.

20 Irving, *ibid*, page 71.

21 Figures taken throughout from the Eighth Air Force Target Summary cited in Webster and Frankland, page 109.

22 Figures kindly supplied by Seb Cox, Head of the Air Historical Branch (RAF).

23 Biddle, *ibid*, page 125.

24 Mark A Clodfelter, 'Culmination Dresden: 1945', in *Aerospace Historian*, September 1979, page 135.

25 Dresden and Freital District Map No 82 A.1.9; Zone Map of Dresden Air Ministry No 484/29; Bomber Command Report N585. Also night photographs Nos 558 & H2S photo No 30.

26 See the discussion in Dudley Saward, *'Bomber' Harris*, Sphere Books, London, 1985, page 392. Irving initially estimated the death toll as being between 35,000 and 220,000. In a letter to *The Times* on 7 July 1966, he revised these figure downwards to 18,375.

27 Clodfelter, *ibid*, page 136.

28 Clodfelter, *ibid*, page 136.

29 Webster and Frankland, *ibid*, page 113.

30 Stephen A Garrett, *Ethics and Airpower in World War II – The British Bombing of German Cities*, St Martin's Press, New York, 1993, page 118. It should be noted that this book does not command universal approval as a balanced survey on the ethical debate of the era.

31 Webster and Frankland, *ibid*, page 112.

32 Saward, *ibid*, page 382.

33 Prime Minister to General Ismay (for Chiefs of Staff Committee) and the Chief of the Air Staff; 28 March 1945.

34 Saward, *ibid*, page 383.

35 Webster and Frankland, *ibid*, page 224.

36 Garrett, *ibid*, page 28.

37 The full text, along with the responses from CIGS and the First Sea Lord can be found in Webster and Frankland, IV, pages 71 – 83. See also H Montgomery Hyde, *British Air Policy between the Wars 1918 – 1939*, Heinemann, London, 1976, page 223.

38 MRAF Sir John Slessor, *The Central Blue; Recollections and Reflections*, Cassell, London, 1956, pages 213 – 214.

39 For a full discussion on this area see Frits Karshoven, *Constraints on the Waging of War*, International Committee of the Red Cross, Geneva, 1991, Chapter 2.

40 Reproduced in full in Adam Roberts and Richard Guelff, *Documents on the Laws of War*, Oxford University Press, Oxford, 1989, page 121 et seq.

41 Roberts and Guelff, *ibid*, page 122 and Philip S Meilinger, ' Clipping the Bomber's Wings:The Geneva Disarmament Conference and the Royal Air Force, 1932 – 1934', *War in History*, 1999 – 6 – 3.

42 Geoffrey Roberston QC, *Crimes Against Humanity: The Struggle for Global Justice*, Penguin, London, 2000, page 174.

43 Robertson, *ibid*, page 185.

44 The casualty figures for February 1945 onwards – and the Russian statistics in particular – bear eloquent testimony to this bland statement.

45 Ian Clark, *Waging War: A Philosophical Introduction*, Clarendon, London, 1988, page 90.

46 Michael Walzer, *Just and Unjust Wars: A Moral Argument with Historical Illustrations*, Harper Collins, 1977, page160.

47 The title for this paper and its ending comments were based on the statement by MRAF Sir Michael Beetham made in a newspaper report (Alan Evans 'RAF Top Brass stay away from Dresden event', *The Times*, 13 Feb 95) marking the 50th Anniversary of the raid; he commented 'It may seem a bit cynical but Dresden was just another target. It was a devastating blow to German morale and contributed to Hitler's defeat'.

Eurofighter 2000
The black paint scheme is not an operational feature of the aircraft.

USAF

Aerospace-Power Doctrine

Decisive or Coercive?

War is too important to be left to the generals.

– Georges Clemenceau

WHILE NORTH ATLANTIC Treaty Organization (NATO) aircraft prosecuted an air campaign of unprecedented precision against the former Republic of Yugoslavia, NATO marked its 50th anniversary in Washington, D.C. NATO solidarity was at stake. For 78 days, the world's most powerful alliance appeared on the verge of fragmentation. To NATO's relief, Serbia capitulated after a military campaign fraught with gradualism and obtrusive political meddling. For many airpower proponents, Operation Allied Force vindicated decisive airpower doctrine. For others, Allied Force was a misapplication of core US Air Force aerospace doctrine. Without NATO's political interference, many believed the air campaign would have netted a more rapid and asymmetric victory for the alliance.

Allied Force highlighted a significant doctrinal imbalance between decisive and coercive airpower. US Air Force aerospace-power doctrine focuses almost exclusively on the idea that airpower is decisive in a major theater war scenario. Consequently, it minimizes discussion regarding the coercive application of airpower in nontraditional types of conflicts like Kosovo. The result is a doctrinal void of guidance in the education of future Air Force leaders to understand the complexities and truly coercive nature of airpower. Allied Force was a prime example of coercive airpower application resulting in far less than decisive outcomes. The root cause of this ineffective coercive air campaign nested in clashing positive and negative political/military objectives.

…this ineffective coercive air campaign nested in clashing positive and negative political/military objectives

In his book *The Limits of Air Power,* Mark Clodfelter defines positive objectives as "those that [are] attainable only by applying military power" and negative objectives as goals "achievable only by limiting military force."[1] He explains "that political controls on air power flow directly from negative objectives, and that the respective emphases given to positive and negative aims can affect air power's political efficacy."[2] Our purpose here is not to endorse Clodfelter's choice of terms, which can be misleading if misinterpreted to imply a moral valuation. Yet, simply using his typology affords a clearer understanding of Kosovo's complex interaction of military and political factors. Clodfelter's intent is to strike a comparison between potential bipolar military and political objectives that collide to create opposing and coercive consequences of military action. The air campaign over Kosovo was just such an example.

Allied Force endured strong interference by NATO's political leadership, which revealed tension between NATO's negative political objective (preserve the alliance) and the positive military objective (destroy or compel Serbian forces to depart Kosovo and halt ethnic cleansing). This chasm between negative and positive objectives fostered friction and frustration among senior officers, which worked against a rapid conclusion of the air campaign. Over time, several factors plus airpower (lack of Russian support, the involvement of the Kosovo Liberation Army, and Serbian successes in achieving their tactical objectives), coerced Serbian forces to pull back from Kosovo. One can argue, then, that airpower was indecisive in preventing regional destruction, refugee migrations, and ethnic cleansing – all originally positive military objectives. Clearly, NATO's negative objective to preserve the alliance dominated the decision to implement a laborious incremental air campaign. Moreover, counter to the positive effects of unlimited application of airpower, the gradualism of Allied Force may well be the norm for future coalition conflicts. In contrast to decisively oriented US Air Force aerospace-power doctrine, all positive military objectives became subordinate to the negative political objective, and Allied Force used coercion to oust the Serbian army from Kosovo.

…airpower was indecisive in preventing regional destruction, refugee migrations, and ethnic cleansing – all originally positive military objectives

Allied Force raises questions concerning the scope of US Air Force airpower doctrine. Is doctrine intended as a practical warfighting educational medium, or is it a marketing strategy designed to compete with sister services in a scarce budget environment? In fairness, the US Air Force Doctrine Center is tackling such issues by focusing doctrine at an operational warfighter's level. Several revised doctrinal publications, such as Air Force Doctrine Document (AFDD) 2-1, *Air Warfare*, examine a broad spectrum of operational applications of airpower. The documents correctly emphasize the importance of understanding the ambiguities inherent in warfighting and applying sound doctrine: "Training, therefore, involves mastering the necessary level of knowledge and then developing the judgement to use that knowledge in the fog of war."[3] Yet, there is little mention that the application of airpower might not be decisive, might not be allowed to attack in parallel, and might not be allowed to leverage its asymmetrical advantages against a nontraditional enemy. In this case, AFDD 2-1 lacks an important discussion about applying airpower outside current doctrinal thinking.

AFDD 2-1 describes a "new American way of war" that "uses the rapid employment of sophisticated military capabilities to engage a broad array of targets simultaneously, strongly, and quickly, with discriminate application, to decisively shape the conflict and avoid the results of previous wars of attrition and annihilation."[4] The essential point rings clear: Modern aerospace power is decisive, and because it is decisive, the Air Force must not repeat past mistakes where airpower was applied incrementally, gradually, and with coercive effects. In effect, AFDD 2-1 prescribes a set of standards demanding decisive execution by airmen.

Future Aerospace-Power Doctrine: Decisive or Coercive?

In light of the assumption that the United States will likely fight all future conflicts as a multilateral coalition, is the US Air Force better served by adopting a doctrine that reflects the decisive or coercive character of airpower? Which of the two better serves the war fighter when faced with major theater war (e.g., the Gulf War) or nontraditional conflicts like Kosovo?

The answer resides in the expectations of military commanders and how those expectations are interwoven into service doctrine. In his discussion on the coercive nature of airpower, Robert Pape addresses himself to the need for a fresh assessment of aerospace-power application. In the process, he postulates three distinct types of coercive military strategies: campaigns of punishment, risk, and denial. First, *punishment coercion* campaigns inflict "suffering on civilians, either directly or indirectly by damaging the target state's economy. Bombing or naval blockades can cause shortages of key supplies such as food and clothing or deprive residents of electrical power, water, and other essential services."[5] By design, punishment campaigns are meant to quickly compel the opposing government to concede or to convince the population to revolt. Second, risk coercion strategies center around gradual destruction of civilian and economic targets "in order to convince the opponent that much more severe damage will follow if concessions are not made."[6] Third, *denial coercion* strategies specifically "target the opponent's military ability to achieve its territorial or other political objectives, thereby compelling

concessions in order to avoid futile expenditure of further resources."[7] After an analysis of World War II, Korea, Vietnam, and the Gulf War, Pape concludes that "coercion by punishment rarely works… (when) coercion does work, it is by denial."[8]

This insight offers a way to assess the application of coercive aerospace power in relation to the positive and negative military and political objectives of Operation Allied Force. Pape believes that:

> studying military coercion may be even more relevant to policy now than it was in the past. The end of the Cold War and the rise of potential regional hegemons are shifting national security policy away from deterring predictable threats toward responding to unpredictable threats after they emerge, making questions about how to compel states to alter their behavior more central in international politics. This trend is also apparent in the growing role of airpower in U.S. military strategy.[9]

Ethnic cleansing in Kosovo presented just such a challenge to aerospace power.

Operation Allied Force Planning

The NATO air campaign against the former Republic of Yugoslavia stemmed from the 1991–95 genocide in Bosnia-Herzegovina. Politically, NATO aimed to prevent a repeat of the atrocities committed in Bosnia, partly because NATO members saw the Balkans as the seat of historic instability in Europe. Following the initiation of Serbian military operations to cleanse the Kosovo province, NATO rallied around reactionary diplomatic negotiations in Rambouillet, France, and started planning for military action against Serbian ground forces.

As early as June 1998, US planners developed multiple versions of an air campaign against Serbian forces. These planners dealt with three critical issues: military and political objectives, the proposed command relationships and command structure, and senior leadership dynamics.

Strategic Military and Political Objectives. Prior to the first bomb crater in Kosovo, NATO's primary positive military and political objectives were to stop Serbian forces from ethnic cleansing and to compel Slobodan Milosevic, Serbia's president, to recall his military forces from Kosovo. As such, Gen Wesley K. Clark, the supreme allied commander Europe (SACEUR), faced a daunting task of selling a credible air campaign plan to 19 ministers of defense while convincing NATO members they were accountable for their commitments to use military force, if so ordered by the NATO North Atlantic Council (NAC). For reasons of security and capabilities, selected US Air Force planners executed nearly all combat planning efforts, and NATO planning remained inconsequential and limited. Consequently, General Clark's priority became consensus-building among NATO political members who knew little about the detailed air campaign plan. SACEUR's overall positive political objective clashed with the emerging negative political objective of maintaining NATO consensus

Even the purest notions of applying decisive aerospace doctrine became subservient to the negative political impact resulting from a lack of consensus by NATO

and cohesion. As a result, SACEUR's finalized plan, a three-phase air campaign, fell drastically short of US Air Force expectations to achieve the positive military objectives. Even the purest notions of applying decisive aerospace doctrine became subservient to the negative political impact resulting from a lack of consensus by NATO.

SACEUR's guidance regarding air campaign planning was perceived by warfighting staffs as reactionary and unpredictable. The NATO Combined Air Operations Center (CAOC) at Vicenza, Italy, and the US Air Force's 32d Air Operations Group (AOG), Ramstein, Germany, received evolving planning guidance depending on SACEUR's adjudication of the conflicting negative political and positive military objectives. As chief of staff at the CAOC, and also as a temporary special assistant to SACEUR, Col William L. Holland, USAF, reflected on the air campaign ambiguities and the negative influence of political objectives on the planning process:

> The NATO Advisory Council (NAC) was supposed to approve the planning, but the guidance came from a variety of sources. We were given direction, and alternative plans, or branches and sequels, that weren't branches and sequels. They were totally different plans based on different guidance. We planned a lot and produced few valid plans. It was a planning nightmare. Planning was more a reaction than strategic vision. As the environment, or the media changed, SACEUR gave reactive planning guidance.[10]

The resultant air campaign plan was a compromise between "punishment," "risk," and "denial" coercive strategies that placated NATO's fragile consensus.

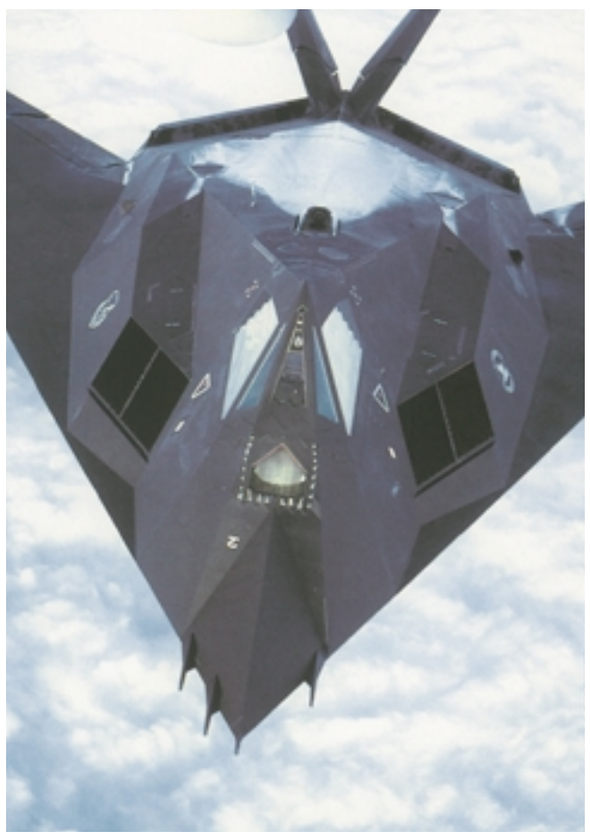
Phase 1 involved striking Serbian integrated air defense systems and command-and-control bunkers in order to gain local air superiority. In Phase 2, air strikes were planned against military targets below 44 degrees north latitude. These strikes included "risk coercive" interdiction targets and "denial coercive" targets against Serbian fielded forces in Kosovo. "Punishment coercive" targets (leadership, economic, and population targets in and around Belgrade) were specifically excluded. In Phase 3, NATO

aircraft were to strike "punishment" targets north of the 44th parallel, including Belgrade targets.[11] In the end, this phased campaign revealed the incremental and gradual air campaign strategy embraced by NATO and SACEUR.

From the perspective of the CAOC and specifically Lt Gen Michael C. Short, the combined forces air component commander (CFACC), the NATO-approved air campaign plan failed, due to political constraints, to employ decisive aerospace power to achieve political and military objectives. General Short felt a swift "punishment" air campaign was the answer by arguing

> many times to his superiors that the most effective tactic for the first night of the war would be a knockout punch to Belgrade's power stations and government ministries. Such a strike had worked in Iraq in 1991, and it was the foundation of air power theory, which advocates heavy blows to targets with high military, economic, or psychological value as a way to collapse the enemy's will.[12]

The CFACC's arguments centered around a belief that the air campaign plan failed to target the correct Serbian centers of gravity (COG). US Air Force aerospace-power doctrine describes a COG as a target of "fundamental strategic, economic, or even emotional importance to an enemy, loss of which would severely undermine the enemy's will or ability to fight."[13] General Short felt strongly that the Serbian Third Army in Kosovo was *not* the COG that, if destroyed, would compel Milosevic to stop ethnic cleansing.



While General Short favored an air war of "punishment," General Clark envisioned a campaign of "coercive risk and denial." SACEUR sought to target gradually the Serbian Third Army (south of the 44th parallel) and to compel Milosevic's forces to withdraw from Kosovo. Although General Clark's "risk and denial" air strategy stiff-armed decisive aerospace doctrine, he felt this was the best operation he could get NATO to approve.[14] Soon after the 1998 Rambouillet peace agreements began to unravel, SACEUR perceived the negative political objective of NATO cohesion: "I was operating with the starting assumption that there was no single target that was more important than the principle of alliance consensus and cohesion."[15]

Application of decisive aerospace-power doctrine was usurped by NATO political constraints, and the result was a "risk" and "denial" strategy. Although this approach subverted the decisive application of airpower, it should be considered a potential norm for most future US/coalition-based conflicts. Whether right or wrong, the negative political objective established the guidance for all remaining Allied Force planning.

Application of decisive aerospace-power doctrine was usurped by NATO political constraints, and the result was a "risk" and "denial" strategy

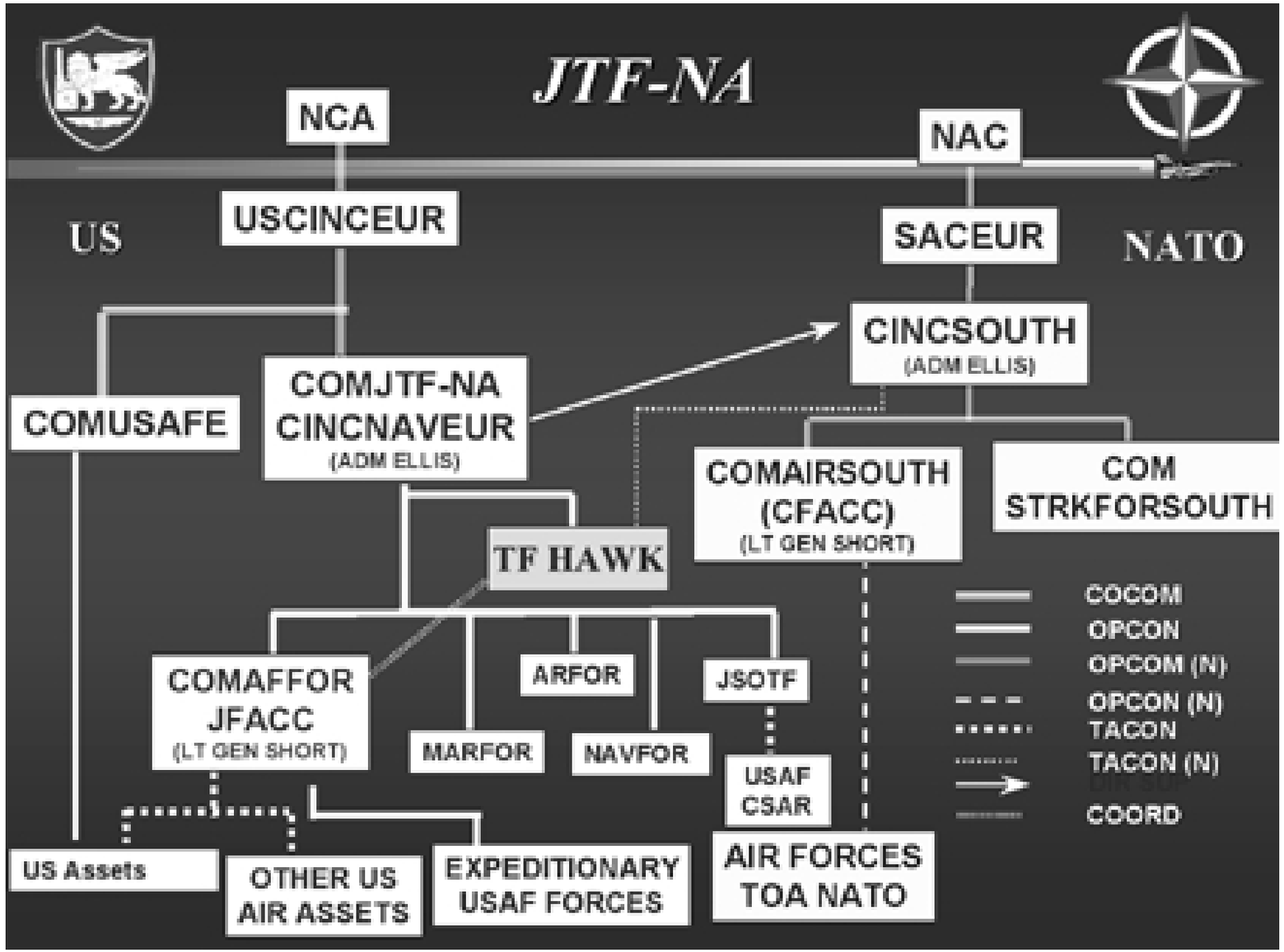


Figure 1. Shown above are the complicated, interdependent command relationships in Operation Noble Anvil (NA), the NATO operations against Serbian forces.

The juxtaposition between the CFACC's warfighting concept and SACEUR's strategic guidance caused significant friction. Many of the arguments revolved around a perceived notion that SACEUR did not understand airpower theory. Colonel Holland expressed this frustration:

> There was a lack of understanding about what airpower should do, not what it can or can't do, but what it should do. Our desired air strategy was to take it to the people who had an effect on the fighting. Not the people who were just carrying out the orders. The biggest failing, in my opinion, was a lack of an attempt by the military leadership to explain the strategy, rationalize it to the political leadership, that this is what we have to do to accomplish the objectives set forth by NATO.[16]

It is unclear how much political savvy is required to convince politicians on how best to achieve positive military objectives. Moreover, when these positive military objectives clashed with a negative political objective, prosecuting the optimum warfighting plan became secondary to the desired political outcome. Given the likelihood of a broad array of nebulous military and political objectives, Allied Force suggests that in the future, the decisive employment of aerospace power will be supplanted by the coercive application of airpower.

Lack of Unity of Command. Lack of unity of command contributed toward the coercive application of airpower during Allied Force. AFDD 2, *Organization and Employment of Aerospace Power,* highlights the US Air Force doctrinal inclination for clear lines of command authority, arguing command relationships in war should be unified.[17] But this ideal command structure is often not possible politically, particularly in coalition warfighting. In fact, the command structure for Allied Force was complicated by parallel structures (fig. 1).[18]

In Allied Force, multiple factors inhibited unity of command. First, there were dual NATO and US chains of command. General Clark, Adm James O. Ellis, General Short, and Vice Adm Daniel J. Murphy Jr. all wore dual NATO and US command hats because of US insistence to control specific classified weapons systems. For example, Admiral Ellis, as the joint force commander (JFC), theoretically oversaw all air, land, and sea operations with his skeleton joint staff from Naples, Italy. The Naples staff, however, controlled only *US classified weapons* systems. As the combined force air component commander (CFACC) under Admiral Ellis, General Short controlled *nonclassified US and NATO* assets with a robust warfighting staff from the CAOC in Vicenza, Italy. General Short was the primary warfighter, and yet he lacked direct command authority over critical weapons systems that were not intended to integrate with NATO assets. Near disaster occurred when NATO and US assets shared common times over targets in congested Serbian airspace. Ultimately, the joint task force (JTF) staff impeded the warfighting efforts of the CAOC staff and breached doctrinal concepts of unity of command.[19]

Colonel Holland suggested that the Allied Force command structure reflected a poor understanding of joint/combined warfighting:

> SACEUR stood up the U.S.– only JTF, yet he didn't let the JTF be the warfighter. Admiral Ellis wore two hats, the U.S. and NATO hats, and was stuck in the middle. The JTF should have been built at Lt. General Short's level, and let him be the warfighter. If SACEUR would have looked at it with a mission objective focus instead of a rank focus, he might have drawn the wiring diagram a lot differently.[20]

There were additional mission-oriented reasons why the command structure was faulty. The JTF staff was not joint, hardly combined, and not a trained warfighting staff. Admiral Ellis, the JFC, recognized that "JTF-Noble Anvil was not formed around a predesignated (and trained) theater staff."[21] The undermanned JTF staff reflected long-term manpower shortfalls plaguing the United States and the NATO countries. General Short felt the JTF obstructed operations:

> I think the JTF never understood its function. I think the JTF was an unnecessary level that was inserted for reasons that continued to escape me. We were given the reason that we needed a U.S. – only capability to control U.S. – only assets. We [CAOC] could have controlled the U.S. – only piece…The JTF saw themselves as fighting the air war as opposed to synchronizing the efforts of the components. The JTF was no value added, from my perspective.[22]

The JTF staff interfered with the warfighting staff at the CAOC, particularly in the target-approval process and management of classified US weapons. Decisive airpower doctrine was undermined by a lack of unity of command.

Senior Leadership Dynamics. Senior leadership dynamics worked against sound planning for Operation Allied Force. Historically, the personalities of leaders has affected military operations: Gen Dwight D. Eisenhower struggled mightily with Field Marshal Bernard Montgomery and twice relieved the cantankerous Gen George S. Patton; President Harry S. Truman fired a defiant Gen Douglas MacArthur; and Gen Billy Mitchell was court-martialed for his strident opinions. Allied Force had similarities. According to Admiral Murphy, "There was a fundamental difference of opinion at the outset between General Clark, who was applying a ground commander's perspective…and General Short as to the value of going after fielded forces."[23] One heated exchange between the two men ended only when General Clark reminded General Short who outranked whom. General Short himself recognized this aspect of their relationship:

> When SACEUR said something that I thought was out of the ballpark and I took him on as a three-star, I had people call me telling me I can't do that. On one of SACEUR's visits to the CAOC he threw everyone out of the room and remarked that I was very sharp with him. I replied that I didn't mean to be, but was appalled at the guidance given to me. I felt I did everything I could to get SACEUR to understand airpower. I did everything I could to oppose what I thought was bad guidance. I don't absolve myself of the responsibility, and clearly I'm responsible for the air campaign, but I don't know what more I could've done to get SACEUR to understand the process.[24]

While General Short focused on the positive military objective of defeating Serbia's will and ability to fight, General Clark's range of warfare was conditioned by the negative political objective of NATO cohesion. General Clark "didn't need any convincing about strategic targets," and he too wanted "to strike Serbian forces in Kosovo."[25] But without NATO cohesion, Operation Allied Force may have unraveled a 50-year alliance. General Clark spent much time "fending off proposals from the political leaders of some NATO countries – particularly Italy and Greece – who wanted to suspend the bombing altogether."[26]

In addition to this leadership tension, the video teleconferencing (VTC) medium of communication between General Clark, Admiral Ellis, Vice-Admiral Murphy, and General Short created some misgivings. Daily VTCs were unrestricted to audiences of all ranks. Consequently, when disagreements on objectives or strategies emerged, many people witnessed inappropriate senior-level confrontations. Admiral Ellis noted that VTCs were "subject to misinterpretation as key guidance is filtered down to lower staff levels… [and]…enables senior leadership to sink to past comfort levels where discipline is required to remain at the appropriate level of engagement and command."[27] Although VTCs allowed expedient communications, they showcased open dissent among key senior decision makers, while in turn fostering a poorly focused air campaign.

Operation Allied Force Execution

From the start of Allied Force, the CAOC was unable to produce a *timely and accurate* air tasking order (ATO). The primary cause was the absence of a doctrinally based joint/combined targeting guidance and approval process. For the first *40 days* of the air campaign, target lists, instead of target sets based on desired effects against Serbian forces, were approved and

disapproved spontaneously during daily VTCs. This procedure was anathema to the ideal envisioned in US Air Force doctrine. Furthermore, it highlighted a lack of doctrinal education, training, or unintentional disregard by senior leaders who assumed the threat of NATO bombing would cause Milosevic to capitulate quickly.

Misapplication of Joint/Combined Air Operations Center Doctrine. AFDD 2 explains the function of a joint/combined air operations center (J/CAOC):

> The commander's guidance and objectives will identify broad categories of tasking and targeting priorities … this guidance will also include the apportionment decision. Tasks and targets are nominated to support the objectives and the commander's priorities. The final prioritized tasking and targets are then included in a Master Air Attack Plan (MAAP) that forms the foundation of the ATO.[28]

Doctrinally, the CFACC receives strategic planning guidance from the commander in chief (CINC) or JTF commander. Target sets are developed from a master target list (MTL) and are approved based on the desired effects and objectives. A joint/combined targeting control board (JTCB) convenes to consolidate the target sets into prioritized objective-oriented categories. The resultant joint/combined prioritized target list (JPTL) is incorporated into a master air attack plan, which marries assets to tasking in the form of the ATO.

…senior military leaders believed "the political objective was to prompt Milosevic to accept the Rambouillet peace agreement, and NATO calculated that by dropping a few bombs Milosevic would do so"

Strategic guidance should be clear so that nominated target sets have a decisive effect on objectives. Warfighting staffs should be provided a robust MTL that supports the CFACC's effects-based targeting guidance. Also, the CFACC should transmit warfighting guidance to his staff through a daily air operations directive (AOD). None of this occurred during the first phases of Allied Force.

Contrary to sound doctrinal practice, senior military leaders believed "the political objective was to prompt Milosevic to accept the Rambouillet peace agreement, and NATO calculated that by dropping a few bombs Milosevic would do so."[29] At the outset of bombing, the MTL consisted of a meager

100 targets, of which slightly over 50 were approved for the initial air strikes. The lack of approved target sets perplexed General Short, who recalled thinking that "SACEUR had us all convinced we didn't need very many targets, and we didn't need an air campaign, and Milosevic just needed a little bit of spanking, and it was all going to be done. We never really ran an air campaign in a classic sense."[30]

SACEUR faced a pivotal problem: acquiesce to dissenting political desires of fickle NATO allies or risk damaging NATO cohesion by unleashing "punishment" attacks on Belgrade's population and leadership target sets. With the predominance of the negative objective, SACEUR's only realistic choice was to ensure NATO cohesion and resolve and do what he could about Belgrade's behavior in the margins. NATO's consensus revolved around a brief sanitary operation with limited targets not aimed at leadership or population COGs. The initial air campaign was the antithesis of decisive-oriented US Air Force aerospace doctrine.

Delay in Joint/Combined Targeting Approval and Guidance Process. It took four weeks of mismanaged combat operations to recoup the capability to nominate, weaponeer, approve, and incorporate target sets in a coordinated joint/combined planning and guidance process. Along with the consensus that Milosevic would capitulate quickly, four other issues factored into this delay: General Clark's comfort level with the initial target approval process; the absence of a senior airman advisor to SACEUR; the political interplay of target approval/disapproval; and the initial absence of a strategy/guidance, apportionment, and targeting (STRAT/GAT) cell at the CAOC.

SACEUR's Comfort Level. The initial VTCs between SACEUR, the JFC, CFACC, CMFCC, and other key players usurped the doctrinal model for target approval. Colonel Holland remembered:

> SACEUR did not understand the targeting approval process. As airmen, we should have been pushing that forward with a package from the CAOC to SACEUR. I don't know what happened. We started off allowing SACEUR to have tactical control of everything. The first VTCs supported this preconceived notion of how the target approval process would work. Because of the preconceived notions, the first VTC started off reviewing the nuts and bolts of each individual target, and that's what drove us to be well within [preempting] the doctrinal planning cycle.[31]

The first VTC cemented SACEUR's comfort level with a doctrinally unsound target-approval process. The result in the CAOC was a round-the-clock scramble to identify and plan short-notice targets, rapid construction of mistake-ridden ATOs, and tasking aircrews as they walked to their aircraft. The process debilitated the CAOC planning staffs and aircrews. Interdiction targets of little significance were hit repeatedly, while attacks on elusive enemy forces inside Kosovo proved difficult at best.*

*Author's note: As part of the CAOC warfighting staff, I recall that weather precluded many attacks on fielded forces in Kosovo. However, for the initial 40 days of the campaign, numerous insignificant targets were repeatedly bombed into rubble due to a lack of freshly approved target sets.

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Absence of Airman Advisor to SACEUR. Many blamed the faulty target-approval process on the notion that there was no assigned senior-level US or NATO air force airman vigorously advising SACEUR. In retrospect, Maj Gen Charles D. Link, USAF, Retired, suggested the lesson of Allied Force was the need to "place air campaigns in the hands of an 'Airman' commander. Put that commander in direct dialogue with the political authorities so that his specialized competence can be brought to bear in the planning phase as well as the execution. Military means are appropriately subordinate to political ends, but political leaders deserve expert advice – direct from the airman's mouth."[32]

Many onlookers felt General Short should have been General Clark's senior air advisor. General Short described his perception of the problem:

Military means are appropriately subordinate to political ends, but political leaders deserve expert advice – direct from the airman's mouth

> Look at the SHAPE [Supreme Headquarters Allied Powers Europe] staff. A U.S. Army four-star is SACEUR, a British Army four-star is Deputy SACEUR, and a German Army four-star is the Chief of Staff, until you get to the Air Force two-star. SACEUR had no air expertise. Not that the two-star isn't an expert, but you can't go head-to-head with a four-star. There was no air expertise at the appropriate level. General John Jumper [four-star Commander of U.S. Air Forces Europe], the senior airman in the theater was several layers removed and physically absent from SHAPE headquarters.[33]

Although General Jumper did assist SACEUR on numerous occasions, he was a supporting commander and not directly in the NATO chain of command. NATO officers at the CAOC felt the SHAPE structure overlooked the need for a senior airman advisor to SACEUR. Col Hans-Peter Koch of the German air force, one of several battle staff directors tasked with coordinating the real-time air strikes at the CAOC, believed "the biggest shortfall was that SACEUR did not have a NATO airman in his close proximity."[34]

Interplay of Politics on Target Appoval/ Disapproval. General Clark's comfort level with the VTC venue of target approval and the absence of an airman in his inner circle were not the only obstacles to a functioning target-guidance and approval process. Incremental target approval from selective NATO nations was a chronic problem. Politics thwarted the execution of Allied Force. Stephen Aubin correctly discerned

> that the military had been politically constrained right from the start. What seems clear is that the political leaders, especially those in Washington, never intended to fight an all-out war. Military force was to be applied tentatively and in limited doses in support of continuing diplomatic initiatives.[35]

Indeed, a politically motivated and convoluted target-approval process meted out the tentative use of military force. General Short argued that the political interference in choosing targets was sanctioned at the highest US and NATO military levels:

> We went right back, from my perspective to 1968, where the President of the United States was approving targets. The Joint Staff drove this to an unacceptable degree. Targets were picked and turned down by the Joint Staff. Once Washington approved the target, you had to get it through the NATO North Atlantic Council (NAC). Then the targets had to go to the five Chairmen of Defense [members] (United Kingdom, Germany, Italy, France, and the U.S.). That's where each nation would weigh in.[36]

Doctrinally, the JFC and CFACC should have been allowed to recommend *block* target sets for *block* approval based on the desired effects mandated by the military objectives. Instead, the incremental target-approval process wreaked havoc on doctrinally supported synchronized air operations. Colonel Holland remarked that "targets were not available to the CAOC planning staff until approved through two chains: the U.S. and NAC. Target approval was piecemealed."[37] Worse, following US and NAC approval, targets were subject to scrutiny through the US European Command and the JTF staff in a trickle-down manner. The result was an incremental bombing campaign roughly framed around a phased strategy that lacked decisive effects. As Admiral Ellis concluded, "The political environment caused an 'incremental' war instead of decisive operations."[38]

NATO's fear of collateral damage exacerbated the target-approval quagmire. Four major collateral-damage events occurred during the air campaign: the AGM-130 rocket-powered bomb that hit a moving passenger train; the unintentional bombing of Kosovar refugees and the mistaken destruction of a passenger bus; the inadvertent opening of a cluster bomb; and the mistaken bombing of the Chinese Embassy. All four instances of collateral damage threatened to fracture NATO cohesion and cause a halt to the air campaign. As Dana Priest of the Washington Post noted, "When bombs accidentally hit Albanian refugees or Serbian civilians, the international outcry was swift, and popular support for the war waned. So political leaders became deeply involved in the nitty-gritty of targeting decisions."[39] This meant tighter restrictions on the types of targets hit, narrowly specified types of bombs for certain targets, controlled timing of air strikes, restrictive avenues of approach for NATO aircraft, and an overall political micromanagement of the entire target approval process.

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Initial Absence of a STRAT/GAT Cell at the CAOC. There was yet another obstacle in the 40-day delay in implementing a doctrinally aligned targeting approval process: the initial absence of a STRAT/GAT cell at the CAOC. On the first night of Allied Force bombing, the existing CAOC STRAT/GAT cell was manned with a temporary and untrained staff. As a result of CAOC

senior leadership expectation for a short air victory, there was little forethought in establishing a doctrinally robust STRAT/GAT cell. General Short, schooled in CFACC staff requirements, recognized the deficiency:

> We were prepared to fly a few sorties and bomb them for a couple of nights. Here are your targets; don't think, just execute. I fault myself for waiting four weeks to stand up the STRAT/GAT cell. It made an incredible difference. I should've realized that's what was needed in the beginning.[40]

The absence of a robust STRAT/GAT cell had long-term effects on the unity of effort within the CAOC. Also, against sound airpower doctrine, the CFACC did not produce a daily air operations directive (AOD) outlining the apportionment and weight of effort for the air tasking order. Granted, the intense political interplay on target approval inhibited a clear sense of guidance for the first week of operations, but the JFC and CFACC fell significantly behind in their obligation to formulate and transmit daily written guidance to planners and operators on the CAOC warfighting staff.

Effects of Dual ATOs. The lack of a doctrinally based joint/combined target-guidance and approval process caused undue difficulties as the CAOC tried to produce a timely and accurate ATO. The creation of two parallel ATOs, instead of a traditional centralized ATO, complicated an already frustrated and confused CAOC warfighting staff and violated the fundamental doctrine of unity of command.

The original purpose of a separate ATO stemmed from US desires to cloak (even from NATO) the use of stealth aircraft, and to control the use of cruise missiles. Colonel Koch concluded that the "dual ATO" process caused dangerous confusion:

> I could not manage the battle. I had aircraft which I did not know when they were to show up, what support they needed, and what route they were flying. We had several situations where some assets on the U.S. – only ATO were flying at the same time and in the same airspace as NATO assets executing air strikes. The secrecy of the U.S. – only ATO kept important information from the NATO battle staff. This was a major shortfall of the two ATOs. If you don't tell the battle managers whose [sic] flying, it's dangerous.[41]

As with the targeting-approval process, SACEUR reached a comfort level with the US Air Force-sponsored dual ATO process because he was shielded from the confusion. As a consequence, the doctrinally indecisive dual ATO shattered unity of command, created tactical and operational confusion, and caused an indecisive application of aerospace power.

Operation Allied Force was indicative of the debilitating influence of negative political objectives on positive military objectives. Additionally, faulty command structures, conflicting senior leadership dynamics, and a lack of doctrinally sound target guidance and approval diluted the decisive application of airpower. The dual ATO system shattered all doctrinal notions of unity of command. General Clark conceded that "the air campaign was an effort to coerce, not to seize."[42] General Clark's admission suggests the broader need for airmen to understand that although airpower can be potentially decisive, in the larger context and frequency of nontraditional conflicts, airpower is most pragmatically a coercive tool seen as likely to be restricted by the

The coercive nature of Allied Force was, in effect, the most likely method for success. This suggestion is objectionable to airmen and is the antithesis of US Air Force aerospace-power doctrine. However, it is the probable reality for future conflicts

politics of war and influenced by senior leaders' capacities to function efficiently within the complex combat environment. Pape dispels the assumption that "coercive punishment" would have been more effective than a "denial" campaign:

> The evidence shows that it is the threat of military failure, which I call denial, and not threats to civilians, which we may call punishment, which provides the critical leverage in conventional coercion. Consequently, coercion based on punishing civilians rarely succeeds. The key to success in conventional coercion is not punishment but denial, that is the ability to thwart the target state's military strategy for controlling the objectives in dispute.[43]

The coercive nature of Allied Force was, in effect, the most likely method for success. This suggestion is objectionable to airmen and is the antithesis of US Air Force aerospace-power doctrine. However, it is the probable reality for future conflicts.

Allied Force and the historic prerogatives of political objectives in war raise two questions: Should US Air Force aerospace-power doctrine be more coercively oriented? and Is the gradualistic application of aerospace power the norm for future conflicts?

The answer to the first question is an emphatic yes. US Air Force aerospace-power doctrine should be more coercively oriented than idealistically decisive. Coercive airpower is the most likely reality in future

wars (outside of nuclear conflict). Allied Force is but one example where aerospace power was subjected to recurring, predictable, and legitimate political constraints. Airpower is wholly an extension of coercive military force.

Current aerospace-power doctrine is a two-edged sword. One edge utilizes doctrine as a marketing tool to compete in the joint service arena for future military programs, while the other edge attempts to guide airmen in sound warfighting principles. The challenge is to minimize the marketing utility of doctrine and maximize the operational relevance to the warfighter.

Whether or not the gradualistic application of aerospace power in Allied Force serves as a template for future conflicts is more problematic. During an Eaker Institute forum on Allied Force, General Jumper endorsed the probability that gradualism may be the required strategy of future conflicts:

> From the air campaign planning point of view, it is always the neatest and tidiest when you can get a political consensus of the objective of a certain phase, and then go about achieving that objective with the freedom to act as you see militarily best. But that is not the situation we find ourselves in. We can rail against that, but it does no good. It is the politics of the moment that is going to dictate what we are able to do… If the limit of that consensus means gradualism, then we are going to have to find a way to deal with a phased air campaign with gradual escalation…We hope to be able to convince politicians that is not the best way to do it, but in some cases we are going to have to live with that situation.[44]

General Jumper is not alone in his recognition that gradualism may be the template for future air campaigns. Gen Joseph Ralston echoed this notion:

> In spite of what might indicate the success of a gradualism strategy, the U.S. Air Force no doubt will continue to maintain that the massive application of airpower will be more efficient and effective than gradual escalation. Yet when the political and tactical constraints imposed on air use are extensive and pervasive – and that trend seems more rather than less likely – then gradualism may be perceived as the only option.[45]

The US Air Force should focus on maximizing airpower responsiveness and efficiency within the constraints of political gradualism. US Air Force aerospace-power doctrine should endorse a less idealistic decisive philosophy and favor a more rational and realistic view of the coercive use of airpower. The result of educating leaders on realistic coercive airpower application will be a smarter, more efficient, more rapid, and a more effective use of lethal aerospace power across the spectrum of conflict.

NOTES

1 Mark Clodfelter, *The Limits of Air Power: The American Bombing of North Vietnam* (London: Collier Macmillan Publishers, 1989), xi.

2 Ibid.

3 Air Force Doctrine Document (AFDD) 2-1, Air Warfare, 20 February 2000, 63.

4 Ibid., vii.

5 Robert Pape, *Bombing to Win: Airpower and Coercion in War* (Ithaca, New York: Cornell University Press, 1996).

6 Ibid., 19.

7 Ibid., x.

8 Ibid., 15.

9 Ibid., 2.

10 Interview with Col William L. Holland, chief of staff, CAOC, 5ATAF, Vicenza, Italy, 22 June 1999.

11 Dana Priest, "United NATO Front Was Divided Within," *Washington Post*, 21 September 1999.

12 Interview with Lt Gen Michael C. Short, Air Forces South commander, NATO Allied Forces South, Naples, Italy, 16 June 1999; see also John A. Tirpak, "Short's View of the Air Campaign," *Air Force Magazine* 82, no. 9 (September 1999): 43–47.

13 AFDD 2, *Organization and Employment of Aerospace Power*, 28 September 1998, 6.

14 Priest, "United NATO Front Was Divided Within."

15 Ibid.

16 Holland interview.

17 Briefing, United States Air Force, subject: Organization and Employment of Aerospace Power, AFDD 2, briefing slides 29 and 30, 2 September 1998.

18 Air South Command briefing (Vicenza, Italy) presented to Air University, Air War College, Maxwell AFB, Alabama, 23 October 1999. Operation Allied Force command relationships showed dual NATO and US command lines. SACEUR , JFC, and CFACC were dual-hatted to NATO and US command chains. On the US side, as part of the NSC, the Joint Staff added complexity to the US command structure, while individual national ministers of defense added complexity to the NATO chain of command.

19 AFDD 1 and AFDD 2 effectively warn of the consequences of disjointed unity of command.

20 Holland interview.

21 Adm James O. Ellis, commander, Allied Forces Southern Europe, "A View from the Top," briefing to the secretary of defense (SECDEF), 21 October 1999.

22 Short interview .

23 Priest, "United NATO Front Was Divided Within."

24 Short interview.

25 Priest, "United NATO Front Was Divided Within."

26 Ibid.

27 Ellis briefing.

28 AFDD 2, 65.

29 Stephen P. Aubin, "Operation Allied Force: War or 'Coercive Diplomacy'?" *Strategic Review* 27, no. 3 (Summer 1999): 10.

30 Ibid.

31 Holland interview.

32 Maj Gen Charles D. Link, USAF, Retired, "Airpower? – Why Not?" *Daedalus* Flyer 39, no. 2 (Summer 1999): 9.

33 Short interview.

34 Interview with Col Hans-Peter Koch, German Air Force, battle staff director, CAOC, 14 June 1999.

35 Aubin, 6.

36 Short interview.

37 Holland interview.

38 Ellis briefing to SECDEF.

39 Dana Priest, "France Acted As Group Skeptic," *Washington Post,* 20 September 1999.

40 Short interview.

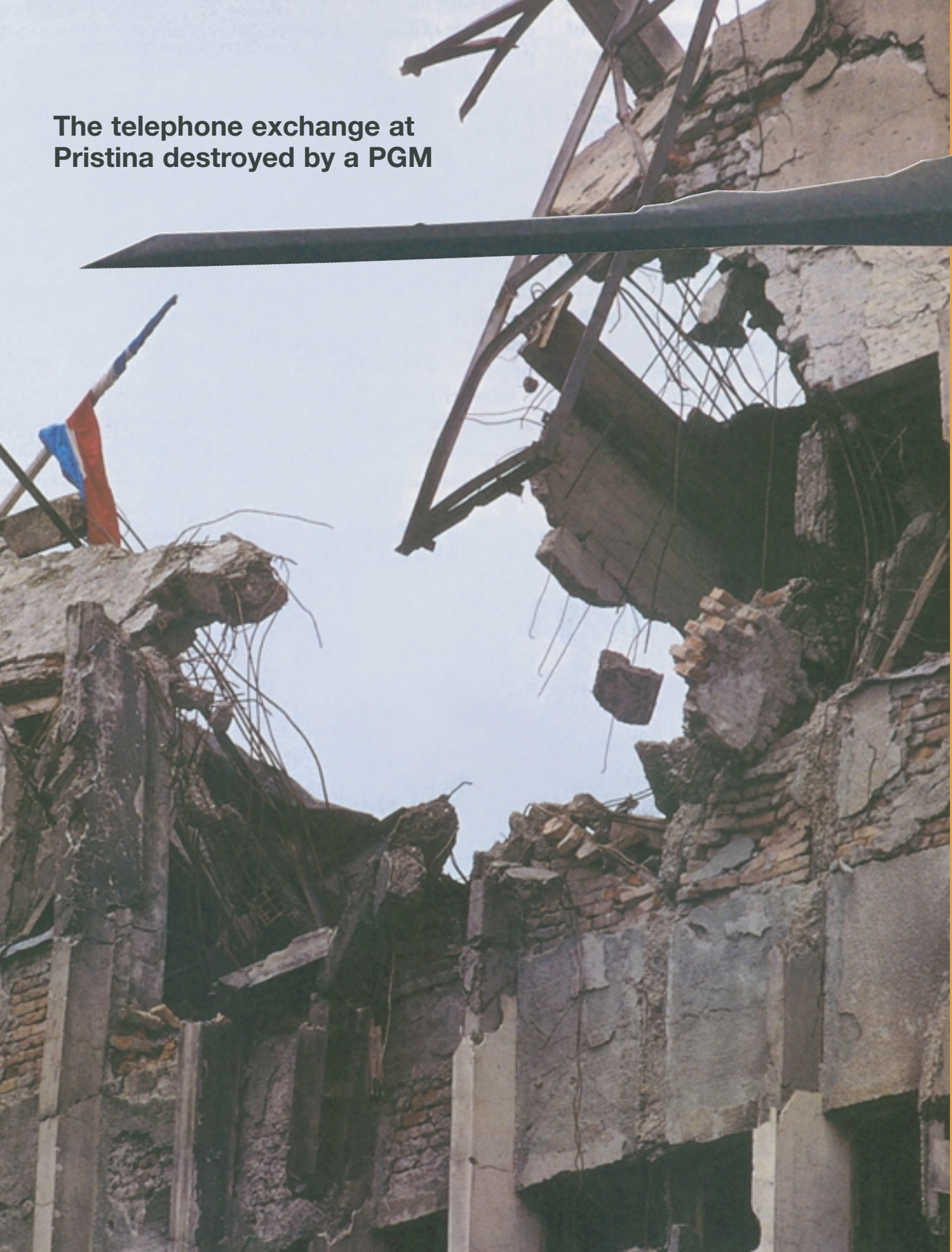
41 Koch interview.

42 Priest, "United NATO Front Was Divided Within," 7.

43 Ibid., 10.

44 James A. Kitfield, "Another Look at the Air War That Was: An Eaker Institute Panel Weighs the Implications of Operation Allied Force," *Air Force Magazine* 82, no. 10 (October 1999): 39.

45 Early Bird, "Ralston Sees Potential for More Wars of Gradual Escalation," *Inside the Pentagon,* 16 September 1999, 1.



The telephone exchange at Pristina destroyed by a PGM

The Broader Implications of the

Increasing use of Precision Weapons

Air power is an unusually seductive form of military strength because, like modern courtship, it appears to offer gratification without commitment

Eliot Cohen[1]

Air power has been the dominant means of employing force for Western nations for the past decade. It is seen as being the deciding factor in the Gulf War, in Bosnia Herzegovina in 1995 and in Kosovo in 1999. However, airpower has also been used in a generally much less publicized role in Iraq throughout that period, and in other lesser operations. But as Eliot Cohen points out, it also appears to be a less brutal form of warfare, at least for those employing it, with an acrimonious debate developing between the proponents of the Revolution in Military Affairs and those who warn of the dangers of a sanitized, or virtual, war.

A key element of air power in these conflicts has been the use of Precision Weapons or PGMs (precision guided munitions) and the object of this article is to examine the broader implications of their use. The article will firstly establish the context against which the utility of PGMs can be considered. This will be achieved through a brief summary of: the pre-Gulf War historical background; the Gulf War; the Balkans air campaign; the punitive or coercive actions in Iraq, Afghanistan and Sudan; and the Kosovo air campaign. Whilst counter to current UK military doctrine the term 'campaign' is defined as 'a series of military operations in a definite area or for a particular objective', in which sense it is used throughout this paper. The conflicts will then be analysed in terms of the technical, doctrinal, legal and ethical factors. Finally, these factors will be examined to see if there are some underlying trends or specific lessons which may better inform the debate.

The use of LGBs dates back to 1972 when they were first used in the Vietnam war, where the key factor to emerge was the 95% reduction in aircraft required to destroy a specific target and the concomitant reduction in aircraft and aircrew losses. Their next use, in the Falklands conflict, again showed their increase in effectiveness over unguided weapons but the limitations of weather on laser designation was also highlighted. LGBs were then used against Libya, in retaliation for a terrorist attack on US servicemen. This operation demonstrated that whilst PGMs significantly reduced the possibility of collateral damage, it could still occur and be immediately reported through the medium of TV journalism. Furthermore, this was the first operation in which concern about collateral damage led to targeting decisions being made at the highest political level.[2]

The Gulf War marked the first use of stealth technology, in the use of cruise missiles and of the complementary capability of the F117 armed with LGBs. In all, the coalition dropped 10,468 LGBs, plus 60 French AS30L laser guided missiles used against bunker type targets,[3] and launched 282 TLAM and 35 CALCM.[4] Whilst these were just under 7% of the total weapons dropped it was 2½ times the number dropped during the Vietnam war. Consequently, PGMs were restricted to key targets or those where the risk of collateral damage was high, but they were still susceptible to weather and other degrading factors. The amount of collateral damage and civilian casualties was remarkably low but was subject to propaganda use by the Iraqis through a controlled media. Coalition loss rates were far below those expected but nearly all air operations were conducted above 15,000 feet, above the ceiling of anti-aircraft artillery and with extensive defence suppression. However, concerns were emerging that this was leading to unrealistic expectations of the future loss-free and omnipotent use of force.

The lack of collateral damage is best illustrated by the lack of media coverage and by Milosevic's subsequent statement that 'only' 25 Serbs had died as a result of the campaign

In comparison, the Bosnia air campaign was very limited in scope, and personally controlled by General Ryan (COMAIRSOUTH) due to an overwhelming concern with the political ramifications of aircrew losses and collateral damage incidents. The lack of collateral damage is best illustrated by the lack of media coverage, particularly when compared with both the Gulf War and the later Kosovo campaign, and by Milosevic's subsequent statement to Ambassador Holbrooke that 'only' 25 Serbs had died as a result of the campaign.[5] PGMs comprised 70% of the weapons used but there was only one use of cruise missiles. This was seen as an unapproved escalation by some NAC members, but had a disproportionate effect in coercing Milosevic into a more acquiescent stance in the parallel, but unlinked, negotiations. During Operation DELIBERATE FORCE only 653 LGBs, 13 cruise missiles and 305 unguided bombs were used.[6] A measure of the effectiveness of PGMs against unguided bombs was that whilst 2.8 PGMs were dropped per DMPI destroyed, the equivalent figure for unguided ones was 6.6. Although part of a broader picture of diplomatic activity and ground operations, airpower, and PGMs in particular, appear to be the underlying reason for the resolution of the situation in Bosnia. However, it also set even higher expectations for its future use.

The post-Gulf War operations in Iraq can best be seen as an unavoidable follow-on that slowly shifted in aim over ten years with no obvious conclusion in sight. As a consequence, there were increasing questions concerning the legality of those operations. There was also an increase in the use of cruise missiles, linked to the US Administration's policy of minimizing losses when national vital interests were not at stake. There was also a further retaliatory operation, but this time using just cruise missiles against 'terrorist related' targets in Afghanistan and Sudan, justified as 'self defence' under Article 51 of the UN Charter.

The most recent use of PGMs was in the Kosovo conflict of 1999, where the potential use of the veto by Russia and China in the Security Council forced a switch from formal legal authority for forceful intervention, to a moral justification. This was met

with a legal challenge in the International Criminal Tribunal for former Yugoslavia rather than in the Security Council. There were significantly differing expectations of success ranging from days, by those who may have misread the lessons from the Bosnian campaign, to months, by those who opposed the policy of gradualism. The result of this was that statements concerning a short campaign and that ground troops would not be used was seen by Milosevic as evidence of a lack of will on behalf of NATO. The campaign was conducted with particular sensitivity to potential losses and collateral damage but that, paradoxically, led to criticisms that reduced military effectiveness led to more collateral damage. In fact there were no aircrew losses and collateral damage transpired to be very low. However, considerable asymmetric use of media, highlighting collateral damage incidents whilst ignoring the ethnic cleansing, obscured those facts. Over 23,000 weapons were dropped during the campaign, of which over 300 were cruise missiles,[7] most of the latter being used in the early stages when, according to General Clark,[8] 'the targets were more suitable'. During the earlier part of the campaign, the weather was also a significant limitation with at least 50% cloud cover for over 70% of the time. In these conditions only the cruise missiles and the new US Joint Direct Attack Munition (JDAM)[9] were certain to be effective and these were limited in number. Whilst no official figures are yet available for the number of PGMs used in Operation ALLIED FORCE, General Jumper (commander of US Air Forces in Europe) stated that 'out of more than 9,400 designated target aim points over 70% were struck by precision munitions'.[10] In other words some 6,600 DMPIs were struck with PGMs and 2,800 with unguided weapons[11] The CSIS analysis estimates that of the approximately 23,000 weapons used 8,050 were PGMs, including 329 cruise missiles. This would give a PGM to DMPI ratio of 1.22:1 with a corresponding unguided weapon to DMPI ratio of 5.3:1.

B-2s used JDAM weapons against infrastructure targets, some within Belgrade city limits. The GBU-31 JDAM (Joint Direct Attack Munition) is a 2,000 lb bomb with an optional penetrating warhead.

One aspect of the air campaign that achieved prominence in the media and in subsequent independent analyses was that of collateral damage, which can also provide a measure of the effectiveness of the campaign as a whole. The Yugoslav government accused all the nations involved in the bombing of the crime of

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Genocide[12] but produced varying estimates of civilian deaths of between 5,700 and 1,200 people,[13] whilst the US view was that 'fewer than 20 incidents of collateral damage occurred.[14] However, both the UK and NATO[15] accept the independent Human Rights Watch report[16] which assessed that there were 90 incidents involving civilian deaths with between 488 and 527 being killed. If this is viewed in terms of the 10,418 strike sorties mounted during the campaign then less than one percent of them involved civilian casualties. The report also assesses[17] that of the 28 incidents where they can identify the weapon used, 21 involved PGMs and the other 7 cluster bombs; a not unreasonable assessment given that 70% of the targets were struck using PGMs. As to the causes of these incidents, Human Rights Watch quotes US Deputy Defence Secretary John Hamre[18] as attributing 10 instances to civilians being present at the target at the time of the attack, 3 to target misidentification by the pilot and 2 to technical malfunction. What he omitted was inaccurate targeting, due perhaps to faulty intelligence, which was acknowledged by the US in the case of the bombing of the Chinese Embassy on the 7th of May.[19] However, the most significant factor in the campaign was the cohesion of the NATO alliance, which both sides recognized as the NATO 'Centre of Gravity'. Consequently, it was a very 'political' campaign with significant national leadership involvement in the tactical details.

…both the UK and NATO accept the independent Human Rights Watch report which assessed that there were 90 incidents involving civilian deaths with between 488 and 527 being killed

Having examined all the conflicts in which PGMs were used, concentrating on those of the last decade, we will now move on to analysing those conflicts in terms of technological, doctrinal, legal and ethical factors. The following technical trends or significant developments can be identified:

- A steady and significant increase in cruise missile accuracy from 50% in the Gulf War to 85% during operation DESERT FOX;
- An apparent decrease in LGB accuracy from 95% in Operation ELDORADO CANYON, through almost 'one bomb equals one target' during the Gulf War, to an 80% success rate in 1995 in Bosnia to 75% in Operation DESERT FOX;
- The continuing limitation of weather on LGB use, particularly if operating altitudes are constrained;
- The development of Enhanced Paveway III[20] and JDAM, plus the use of UAVs for target detection and identification, and designation[21] to overcome this problem;
- The development of a Cruise Missile impact video capability, to match that of LGB designators.

Whilst the first trend appears obvious it obscures the initial claims that it was 85% effective. This gives the first lead as to why the second trend appears counter-intuitive. The initial Department of Defence 'Report on the Conduct of the Gulf War' made claims concerning the effectiveness of LGBs, and in particular the stealth/LGB combination, for what the General Accounting

Office[22] later criticized as procurement driven reasons. In the case of ELDORADO CANYON, 18 aircraft dropping 3 LGBs each is not statistically significant. In the next two measurable events, Operations DELIBERATE FORCE (Bosnia) and DESERT FOX, the success rates are remarkably close at 80% and 75% respectively. However, the DESERT FOX analysis quotes the number of LGBs which hit their intended target whilst the far more detailed DELIBERATE FORCE analysis considered weapon effectiveness in terms of the comparative numbers of PGMs and unguided bombs per DMPI. Furthermore, it considered all PGMs, laser guided, electro optical/infra red and cruise missiles in that calculation. This is the second source of confusion in attempting to compare success rates over the campaigns. Finally, analyses of the Kosovo air campaign imply that the PGM to DMPI ration had halved when compared to the Bosnia campaign four years before. Assuming that each weapon was individually targeted on each DMPI, which is not unreasonable considering the limitations on NATO and particularly US PGM stocks[23] then even the improved PGMs and JDAMs could not achieve a single shot probability of kill of over 82%. Furthermore, only 3% of the PGMs used were cruise missiles. Therefore the only conclusions that can be drawn are that: over the whole spectrum of PGMs between 75% and 85% can be expected to hit the target; and as guidance systems become hybrid, with more reliance upon GPS across the spectrum, LGBs are tending towards the greater previous accuracy of the cruise missile.

The corollary to this is that 15% to 25% of PGMs can still be expected to miss the desired target, through mechanical failures or human error, or fail to achieve the expected level of damage. Thus a PGM that is incorrectly targeted, such as those which hit the Chinese embassy in Belgrade,[24] has a very high chance of hitting the 'wrong' target. Furthermore, one of the small percentage of weapons which may fail to guide to its target may miss by miles rather than feet.[25] All this serves to illustrate what may be called the 'PGM Paradox' which is that as expectations of flawless performance increase so does the outcry when those expectations are not met.

But does this mean that there has been a Revolution in Military Affairs (RMA)? The then USAF Chief of Staff, General Ronald Fogleman writing in 1997 had no doubts when he said that 'The increases in the capabilities of air and space assets as instruments of war have revolutionized our ability to assess and attack adversaries in terms of range, direction and timing. As an instrument of peace, the RMA has created new expectations for access, influence, presence and assistance'.[26] If such an RMA has occurred then it is very much an American occurrence: the availability to a European force of mission critical items, such as space based surveillance, is US-dependent. A more pragmatic line was taken in the UK's Strategic Defence Review of 1998 where it was considered that whether or not an RMA was underway was academic. What mattered was the UK continuing to contribute significantly to multinational operations. However, it went on to warn against the potential effects of 'asymmetric warfare' against a force that was becoming increasingly dependent on high technology.[27] The validity of the warning was brought home during Operation ALLIED FORCE where there were significant target location and identification problems. The US Secretary of Defence and the Chairman of the Joint Chiefs of Staff recognized this in their statement to the Senate Committee on Armed Services when they said that 'Given that the US may confront the use of similar tactics in the future, our limitations in

being able to locate enemy forces under cover are being assessed, with the emphasis on understanding how we can quickly develop and implement approaches to counter such tactics'.[28] The weapons developments outlined above also reinforce David Caddick's view that rather than a revolution we are seeing more an evolution of military capabilities,[29] albeit a very fast one, but one in which both technology and tactics are responding to new threats.

Whilst the above factors all have a doctrinal element, in particular the concepts of precision engagement' and 'information superiority',[30] they are primarily technical in origin. On the other hand there are some developments which, although technically enabled, are primarily doctrinal in concept. In this case the NATO definition of doctrine as the 'fundamental principles by which military forces guide their actions in support of objectives. It is authoritative but requires judgement in application'[31] is used.

Conflict	No of weapons	Cruise Missiles	non-cruise PGMs	Unguided bombs
Gulf War	155,186	0.2%	7%	93%
Deliberate Force	1026	1%	69%	30%
Desert Fox	955	44%	30%	26%
Allied Force	23,000	1%	34%	65%

Table 1: Percentages of weapons used.

Conflict	Cruise Missiles
Gulf War	330
Deliberate Force	13
Punitive operations	>180
Desert Fox	420
Allied Force	329

Table 2: Numbers of cruise missiles used.

The first conclusion to draw from these two tables is that even a relatively small conflict such as that over Kosovo requires a significant number of unguided weapons, in a major regional conflict similar to the Gulf War the percentage will be even higher. The reasons for this are fourfold: firstly, by no means all aircraft are capable of laser designation; secondly, most PGMs are far more expensive with costs ranging from $1.2m for a cruise missile to $73,000 for a Paveway III LGB;[32] thirdly, near-precision capabilities, such as GR7 Harriers dropping unguided weapons on GPS-based coordinates in Kosovo, may be all that is required and; finally, such conflicts are likely to be fought by coalitions and only a few nations in addition to the US possess a PGM capability.

Secondly, the number of cruise missiles used in Operation DESERT FOX is significantly higher than in the equivalent sized DELIBERATE FORCE. One argument for this could be that far deeper penetration was required in Iraq, against a much stronger integrated air defence system. However, when the number of cruise missiles used in the three punitive/coercive attacks on Iraq is considered, an alternative view may be that risk to aircrew is not justified when national interest does not require it.

Lastly, the number of cruise missiles used during Operation DELIBERATE FORCE was remarkably small, especially as some 60 had been used two years previously in two attacks on Iraq. However, the number used against Yugoslavia in 1999 was considerably higher, particularly when the objective appeared to be to coerce Milosevic into accepting the Rambouillet terms with minimum force. Furthermore, the total force applied in the latter operation was also considerably greater.

…near-precision capabilities, such as GR7 Harriers dropping unguided weapons on GPS-based coordinates in Kosovo, may be all that is required…

The RAF's Harrier GR7s flew from Gioia del Colle, one of the closest Italian bases to Kosovo. The Harriers were armed with LGBs.

Two additional factors emerge from the analysis of the campaigns as a whole. Firstly, with the exception of the UK Tornado losses in the opening nights of the Gulf War where they were employing a central region designed weapon which could only be delivered from low level, aircrew losses from then on were between minimal and zero and aircraft losses barely higher. Linked to this is that for all subsequent operations minimum operating altitudes were specified ranging from 15,000 feet during the Gulf War and Kosovo campaign, although during the latter aircraft did operate as low as 6,000 feet in the later stages, to the Bosnia campaign where the limit was 10,000 feet, reducing by exception to 5,000 feet.[33]

The next doctrinal debate concerns the move away from the use of decisive force to a strategy of gradualism. In this case the comparison is between the Gulf War and Operation ALLIED FORCE, the other uses of PGMs being too restricted in time or scale to offer meaningful analysis. Whilst the issues that emerged over Kosovo have been addressed earlier, the relevance of doctrine is a broader issue. At the political/strategic level the 'Weinberger Doctrine' delivered in a 1984 speech concerning the uses of military power was both a response to the loss of 421 Marines in the Beirut bombing of the 23rd of October 1983 and

the earlier gradualist policies in Vietnam of Johnson and McNamara. The six points of his doctrine can be summarized thus:[34] forces should only be committed to intervention if vital to US national interests; there should be an intent to win; there should be clearly defined and achievable political and military objectives; the relationship between forces and objectives should be continually reassessed; there should be the support of the people and of Congress; and committing forces to combat should be a last resort. This was later refined into the 'Powell doctrine' which required that, once committed to using force, that should be done so decisively. In the Gulf War there can be little doubt that Weinberger's tests were met and the conflict was waged with decisive force. However, where Kosovo is concerned arguments can be put to support either side of the debate. It is more difficult to sustain that in the question of decisive force. Both the NATO and UK reports on the conflict make the point that 'enough' force was applied and that the desired end-state was achieved. On the other hand, commentators such as Aubin and Walker are adamant that once the threshold of war is crossed it is both morally and practically right to prosecute it with the maximum of vigour. Perhaps it could be argued, as General Clark did, that 'it wasn't a war, there was no declaration of war, it wasn't legally a war, and we weren't going in there to conquer territory; simply one plank in a diplomatic strategy'.[35] Senator Reed's response to General Short's arguments for the immediate application of decisive force was 'it amazes me that people are shocked that politics and political judgements enter into military strategy ….. it is an integral and inescapable part'[36] backs up Clark's essentially Clausewitzian argument.

…'it wasn't a war, there was no declaration of war, it wasn't legally a war, and we weren't going in there to conquer territory; simply one plank in a diplomatic strategy'

The final doctrinal change which can be observed is that of tactical restrictions being imposed, both during the planning phase and in response to specific incidents, to reduce collateral damage. The imposition of lines of attack that are not optimal in terms of weapon effects goes back to the Gulf War weapon employment. However, whilst the tactical restrictions during that Operation DELIBERATE FORCE were made by the Air Component Commander, General Ryan, in an attempt to forestall political problems those during Operation ALLIED FORCE were imposed from the political level to the extent that General Short considered that they endangered his airmen. Again, this poses a question concerning the obligation of commanders to protect their manpower and equipment for reasons of both morale and military practicality which is not dissimilar to that concerning the use of less than decisive force.

In considering the legal trends over the operations involving PGMs during the last decade this section will first consider those issues of the rules governing the resort to force *(jus ad bellum)* and then those concerning the rules governing international armed conflicts *(jus in bello)*. Occurring as it did so soon after the end of the Cold War the Gulf War appeared to provide a model for the international use of armed force where the UN and in particular the Security Council could at last play the role envisaged for it in the drafting of its Charter. A graduated series of Security Council resolutions legitimized the Coalition's use of

force under Chapter VII of the Charter both in terms of the restoration of international peace and security and Kuwait's inherent right of collective self defence. Operation DELIBERATE FORCE, in Bosnia Herzegovina in 1995, was similarly legitimized by the Security Council but involved three developments beyond the use of force in the Gulf War. Firstly, in UNSCR 770 (13 August 1993) a humanitarian crisis was recognized as constituting a 'threat to international peace and security'; secondly, UNSCR 836 (4 Jun 1993) delegated the management of the crisis to NATO as permitted by Article 53 of the Charter; lastly, rather than specifying 'all necessary measures' the use of airpower was specifically mandated.

The legal justification for the various operations against Iraq following the Gulf War appears more tenuous. Whilst, unlike over Bosnia Herzegovina, the no-fly zones had no specific UN authorization, the operations they supported (Operation PROVIDE COMFORT in the north and protection of the UNSCOM verification flights) did have that in UNSCRs 688 and 687 respectively. Whilst no parallel ground operation to PROVIDE COMFORT existed in the south a similar air exclusion zone was imposed on humanitarian grounds. The January 1993 attack was justified in terms of self defence and of enforcing the terms of UNSCR 687. On the one hand it is argued that the developing doctrine of humanitarian intervention has been abused by the US and the UK to justify what are now a series of self-perpetuating and essentially punitive operations. The counter view is that whilst the no-fly zones were initially set up for humanitarian reasons, the subsequent operations were legally justified because the initial mandate in UNSCR 678, to restore 'international peace and security etc' by the use of force had not been extinguished by UNSCR 687, the cease fire resolution, as the terms of UNSCR 687 had never been fully met. The Security Council's 'reaffirmation' of UNSCR 687 and 'in particular paragraph 2 of resolution 678' (the mandate to use force) in UNSCR 949, on the 15th of October 1994 appears to lend weight to this argument. However, in the debate leading to UNSCR 1154 being passed on the 2nd of March 1998 the US and UK claim that the unilateral use of force in response to further violations was justified was rejected by 11 delegations including China, France and Russia.[37]

Whilst there is a punitive element in the coercive actions against Iraq the reverse appears to be the case in the two entirely US operations against Libya in 1986 and targets purportedly related to the bin Laden terrorist network in 1988. Legally, reprisals are illegal acts committed in retaliation for an earlier illegal act by another State, however reprisals involving the use of force may be legal if resorted to in conformity with the right of self-defence.[38] Both operations were in response to terrorist attacks and both justified as self defence in accordance with Article 51 of the UN Charter. Whilst both operations were subject to international criticism neither were subject to legal challenge nor to Security Council condemnation.

Finally, Operation ALLIED FORCE appeared in legal terms to be the antithesis of the Gulf War. In this case there was no Security Council resolution either authorizing the use of force or empowering a regional organization. The legality of the bombing campaign was challenged in the International Court of Justice a month after it started on the primary grounds that the nations involved had violated the international obligation not to use force against another state and were involved in Genocide against the Yugoslav peoples. Yugoslavia's request for preliminary measures, ie the agreement of the Court that the bombing

was illegal and an order that it be stopped, was not accepted on the grounds of the lack of *prima facie* jurisdiction.[39] However, that did not prevent the Court from considering the merits of the case at a later date.

The case for military intervention, in the absence of specific Security Council authority was spelled out by Marc Weller thus:

> NATO's action was based principally on the doctrine of humanitarian action. It occurred in a context which could no longer be considered an internal affair of the Former Republic of Yugoslavia, as was confirmed by the finding of the Security Council according to Article 39 of the UN Charter.[40] The threat of force was focused on achieving aims which had been spelt out by the Security Council, including a political settlement as a means of terminating an actual or imminent large-scale humanitarian emergency. Whilst not expressly endorsing the use of force, the Council nevertheless endorsed the process which was to be supported by this threat.[41]

This exposes the apparent contradiction of the international legal system in that whilst it comprises 'laws' that are analogous to domestic laws they are not imposed by a universal jurisdiction and its court, the International Court of Justice only has jurisdiction where all parties to a case have, at some stage, agreed to it. As Judge Rosalyn Higgins sees it International Law is a normative system which is not merely the impartial application of rules but an evolutionary decision-making process.[42] Catherine Guicherd takes this further in the case of Kosovo to argue that it should not be seen as an exception but more as proof of serious gaps in International Law in the area of humanitarian intervention. Thus, the embryonic practices of the NATO operations should be consolidated into a strong body of law to allow humanitarian intervention.[43] She therefore appears to be suggesting that a new 'customary' law, which is an accepted source of International Law,[44] of humanitarian intervention is emerging.

…the International Court of Justice only has jurisdiction where all parties to a case have, at some stage, agreed to it

International humanitarian law, the Laws of War, *jus in bello*, or perhaps most accurately the Laws of Armed Conflict regulate the conduct of armed conflict and are found in their current form in the Geneva Conventions of 1949 and in Article 1[45] of their additional protocols (1977). This latter is the most detailed concerning targeting, however neither the US, France or Turkey have ratified it. The "laws of armed conflict" which refer to targeting are summarized thus by Christopher Greenwood:

The modern law of targeting revolves around two central principles:

> (a) attacks should be limited to combatants and other military objectives; the civilian population and civilian 'objects' must not be made the target of attack (the principle of distinction); and
>
> (b) even military objectives should not be attacked if an attack is likely to cause civilian casualties or damage which would be excessive in relation to the concrete and direct military advantage which the attack is expected to produce (the principle of proportionality).[46]

The definition of military objective is found in Article 52(2) of Additional Protocol 1 and states:

> In so far as objects are concerned, military objectives are limited to those objects which by their nature location and purpose or use make an effective contribution to military action and whose total or partial destruction, capture or neutralization, in the circumstances ruling at the time, offers a definite military advantage.

As Greenwood points out, some normally harmless object such as a house may become a military objective through its use or location, and most NATO states party to Additional Protocol 1 have declared that an area of land could be a military objective. He also points out the significance of the phrase 'circumstances ruling at the time', which precludes whole target sets being considered legitimate just because of what they are.[47]

Whilst issues of *jus ad bellum* concerning all the operations considered above have been addressed internationally, usually in the Security Council, *jus in bello* issues have only been addressed once; by the International Criminal Tribunal for the former Yugoslavia (ICTY) and the International Court of Justice (ICJ) in the case of Operation ALLIED FORCE. That is not to say that the issue was previously ignored, with the various official and academic reports on the Gulf War and Operations DELIBERATE FORCE and ALLIED FORCE all concluding that the nations concerned took considerable efforts to observe the principles of distinction and proportionality. However, there have been no official reports on the coercive operations against Iraq and analytical articles in the specialist press whilst critical have not addressed specific *jus in bello* issues.

The *jus in bello* issues upon which the Yugoslav application to the ICJ was based were violation of Additional Protocol 1 with respect to civilians and civilian objects: also cited were Breaches of the Convention on the Prevention and Punishment of the Crime of Genocide, the 1948 convention on free navigation on the Danube, the International Covenant on Civil and Political Rights and the International Covenant on Economic, Social and Cultural Rights of 1966. These were also linked to the *jus ad bellum* charges listed above.[48] Amnesty International's report on the conflict concluded (with respect to attacks that may have involved the use of PGMs) that 'NATO did not always meet its legal obligations in selecting targets and in choosing means and methods of attack ….. also aspects of the Rules of Engagement, specifically the requirement that NATO aircraft fly above 15,000 feet, made full adherence to international humanitarian law virtually impossible.[49] The ICTY Prosecutor had also received allegations that as the resort to force was illegal, all NATO actions were illegal.[50] Given the doctrinal similarities between the Gulf War campaign, Operation ALLIED FORCE and Operation DELIBERATE FORCE, the similar levels and types of collateral damage in the first two, and the common emphasis on avoiding collateral damage, the legal arguments concerning jus in bello in the latter operation would appear to be equally applicable, in general terms, to the all these operations.

The ICTY Committee found,[51] as did both Human Rights Watch and Amnesty International, that there was no evidence to support the charges of crimes against humanity or genocide. Whilst unable to resolve the precise linkage between *jus ad bellum* and *jus in bello* the Committee was clear that whilst a person guilty of a crime against the peace could be criminally responsible

for the activities causing death or destruction during a conflict the ICTY did not have jurisdiction over crimes against peace. On the other hand it did have jurisdiction, with regards to acts committed in Yugoslavia, over violations of the laws of armed conflict and was explicit in separating the two.[52] The Committee also found that whilst there was nothing inherently unlawful in flying above the height of enemy air defences, commanders had a duty to take practicable measures to distinguish military from civilian objects or personnel. However, it accepted that modern technology enabled that obligation to be carried out in the vast majority of cases.[53] Finally, the Committee stated that:

> On the basis of the information received the committee is of the opinion that neither an in-depth investigation related to the bombing campaign as a whole nor investigations related to specific incidents are justified. In all cases, either the law is not sufficiently clear or investigations are unlikely to result in the acquisition of sufficient evidence to substantiate charges against high level accused or lower accused of particularly heinous offences.[54]

It is important to recognize that this was a preliminary examination of the facts, to establish if there was sufficient basis for the Prosecutor to proceed with any further investigations and not a final judgement. However, it analysed the facts available to Amnesty International and Human Rights Watch on the basis of the law of armed conflict and the existence of intention or recklessness, rather than simple negligence, as the *mens rea* (state of mind) for the offence, rather than just the nature of the event.

What overall legal trends, or new factors, can therefore be identified? Firstly, there are two conflicting trends in the area of *jus ad bellum*. On the one hand in the conflicts where military force was being used in response to egregious violations of international law or humanitarian disasters every effort to ensure the legality of the use of force was taken. Both the Gulf War and Operation DELIBERATE FORCE had the authority of the Security Council. Whilst Operation ALLIED FORCE lacked that formal authority, the Security Council had endorsed the process which the operation supported. Furthermore, there was a clearly developing and generally accepted justification for intervention on humanitarian grounds. On the other hand, the solely US punitive operations were justified entirely as self defence; and the coercive operations in Iraq upon the continuing validity of a UNSCR which had arguably been superseded by a further UNSCR imposing a cease fire, supported by humanitarian and self defence arguments.

…'if it is not possible to ascertain whether civilian buses are on bridges, should those bridges be blown? Such a view would entirely reverse the principle of proportionality making the judgement of military advantage, with its much broader ramifications, subordinate to the protection of civilian life

A further development was the use by Yugoslavia of the ICJ, rather than the Security Council, where the US, UK and France had a permanent veto, to firstly try to have the bombing campaign stopped and, if that failed, to have its legality independently examined. Linked to this is the attempt to use human rights law, as well as the laws of armed conflict, to

gain a supportive judgement. The conflict between these is evident in a statement by Mary Robinson, the UN High Commissioner for Human Rights, that 'if it is not possible to ascertain whether civilian buses are on bridges, should those bridges be blown?'[56] Such a view would entirely reverse the principle of proportionality making the judgement of military advantage, with its much broader ramifications, subordinate to the protection of civilian life. However, human rights laws were explicitly excluded from consideration by the ICTY which restricted itself to consideration of the laws of armed conflict.

The first new development in the application of the *jus in bello* was entirely unforeseen. Whilst the ICTY was established to deal primarily with Serbian war criminals after the 1995 conflict in Bosnia Herzegovina it was still extant four years later and had a remit under its Statute to consider all potential violations of both human rights and humanitarian laws in the former Republic of Yugoslavia. As a result the efforts of NATO in 1999, and by inference of the various allies in Bosnia Herzegovina in 1995 and in the Gulf War, to use PGMs in particular in accordance with the principles of proportionality and distinction were vindicated for the first time by a legal process. The ICJ is also in the process of considering these issues in the context of the Yugoslav application to it.

As a result the efforts of NATO in 1999, and by inference of the various allies in Bosnia Herzegovina in 1995 and in the Gulf War, to use PGMs in particular in accordance with the principles of proportionality and distinction were vindicated for the first time by a legal process

Military installations in Serbia before and after an attack by Precision Guided Weapons

The ICTY report also referred to 'high level' accused although it did not specify how high that went, and its clear distinction between *jus ad bellum* and *jus in bello* implies that it did not consider political leaderships to be the subjects of its investigations in this case. However, the command and control arrangements in ALLIED FORCE in particular calls this into question. The UK report on the Kosovo crisis stases that whilst NATO military authorities selected the targets for attack, individual Allies were responsible for approving them and the UK assessed all pre-planned targets against the requirements of international law.[57] When this is considered along with the Secretary Cohen's statement that 'certain sets of

targets 'were reviewed by the allied capitals and by higher political authorities',[58] and the French influence over the targeting process, then it is not unreasonable to conclude that Ministers and senior law officers have become intimately involved in what used to be seen as tactical decisions. Thus, due to technological advances in both communications and weapon accuracy, and the concomitant changing role of airpower, the reach of *jus in bello* has extended far beyond that originally envisaged.

The increasing use of launch-and-leave weapons also poses questions as to the applicability of the laws of targeting outlined above. If the submarine or warship captain, or the captain of a B52 bomber, launches a salvo of cruise missiles at a set of coordinates which may even be pre-programmed and over which he has no control, is he legally responsible for any violations of the laws of armed conflict which may ensue? The ICTY report indicates not, in two respects. Firstly, the report repeatedly distinguishes between the aircrew and their commanders. Secondly, in the case of the bombing of the Chinese Embassy on the 7th of May 1999, which was hit by JDAMs dropped from a B2 bomber, it states that neither the aircrew nor the commanders should be assigned any responsibility as they were provided with the wrong information by another agency. However, as Amnesty International suggests in its report that responsibility did not just lie with the CIA but with all elements of the command chain[59] it may not be so easy for a Joint Force or Air Component Commander, with his own intelligence staff, to argue that he could not discharge his responsibilities under Additional Protocol 1 in that situation.

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Having looked at the relatively finite technical, doctrinal and legal trends the intangible issue of ethics remains. The Oxford English dictionary defines ethics as 'the science of morals in human conduct'. Whilst this would appear to be an oxymoron it goes on to define science and morals as 'the branch of knowledge involving systematized observation and experiment' and 'concerned with the principles of what is right and what is wrong' respectively. Thus it is possible to consider the rights and wrongs of the uses of armed force through theories constructed by that process of observation. This section will firstly use the 'Just War' theory to assess the conflicts considered above and then Michael Ignatiev's contention that developments in technology have led to 'virtual wars'.

Whilst there are differing views as to what constitutes the principles of Just War theory they can be reduced to the *jus ad bellum* criteria of: just cause, right intention (for example to restore the *status quo ante*), legitimate authority, last resort and reasonable prospect of success.[60] To these can be added the principles of formal declaration and proportionality (in terms of the overall aim). The *jus in bello* criteria for targeting, discrimination and proportionality, are also now considered to be a part of the criteria. However, not all are appropriate in analysing the implications of the increasing use of PGMs in any specific conflict. Whilst there have been cases where disproportionate or indiscriminate force, in terms of the *jus in bello* criteria, has occurred in all the conflicts studied the minimal civilian casualties show how effective attempts to minimise collateral damage have been. Thus it can be concluded that in this respect PGMs have had a significant effect on the morality of using force.

In the Gulf War PGMs contributed significantly to the success of the air campaign, a not unexpected result after their previous uses in Vietnam and Libya. However, it could be argued that the war would have been waged without them, and the Coalition's willingness to accept significant casualties, even to the extent of reactivating reserve hospitals as far away as the UK, supports this conjecture

Whilst the moral benefits of using PGMs to minimise casualties appears constant across the conflicts that is not so clear with respect to other *jus ad bellum* criteria. In this area only those criteria which specifically relate to the employment of PGMs and their possible contribution to the decision to resort to force will be examined. Whilst the use of PGMs in Vietnam and the Falklands were incidental to the decision to use force that was not so for Operation ELDORADO CANYON. The emphasis given to the role of LGBs in preventing collateral damage and striking the right targets shows that they were a significant factor in determining the prospect of success for the Operation and were therefore a deciding factor in its execution. In the Gulf War PGMs contributed significantly to the success of the air campaign, a not unexpected result after their previous uses in Vietnam and Libya. However, it could be argued that the war would have been waged without them, and the Coalition's willingness to accept significant casualties, even to the extent of reactivating reserve hospitals as far away as the UK, supports this conjecture. With the success of PGMs in the Gulf War in mind, and PGMs amounting to 70% of the weapons used in Operation DELIBERATE FORCE, they were clearly fundamental to the expectation of success.

It could also be suggested that they contributed to using force before the point of last resort, particularly when the US had proposed on previous occasions to 'lift and strike' using airpower alone. However, the tortuous process leading up to the eventual delegation of the authority to use force to the NATO commanders belies this.

Where the continuing operations against Iraq are concerned, the moral framework is much less clear. Directly after the Gulf War there was undoubtedly both just cause and right reason for protecting the Kurds and the Marsh Arabs from persecution and for enforcing acceptance of the cease fire and the weapons destruction programs including airborne inspections. However, as time goes on any prospect of success seems to be diminishing. With regards to Operation DESERT FOX Thomas Keaney asked how could success be measured when it was no longer possible to determine the aim? He also took the view that the attacks on Iraqi air defences after that appeared to be purely retaliatory and not linked to an identifiable strategy.[61] However, a Rand study into those operations concluded that whilst DESERT FOX had not coerced Saddam Hussein into accepting UNSCOM inspectors back into Iraq the ongoing efforts to reduce his military strength had been successful. It also concluded that the later attacks had been in response to further Iraqi provocation after the failure of DESERT FOX. If the underlying cause for the attacks is shifting from the original ones then it is difficult to see how the original moral authority can still be valid. However, such a shift in aim does tend to restore the prospect of success which was clearly lacking after DESERT FOX.

The cruise missile attacks in 1998 are identical in justification to the Libyan raid 12 years previously. Whilst the Embassy bombings and the subsequent retaliation may have provided a distraction from President Clinton's domestic political problems at the time those problems were not the cause of the retaliation, and cruise missiles did provide the means for a significant display of global power projection. However, whilst they provided a technical assurance of success the subsequent questions over the validity of the Khartoum target cast doubts on the existence of a just cause for that attack.

Of all the conflicts considered the one to alleviate the humanitarian disaster in Kosovo in 1999 would appear to be the one most in harmony with the principles of a just war. The NATO spokesman during the conflict, Jamie Shea, stated afterwards that 'Democracies expect the maximum political results from the minimum use of force. As a result the principles of the Just War ….. are making a comeback'.[62] He then went on to quote just four of them: last resort, proportionality and the two 'targeting' principles. However, in his consideration of proportionality, or that the ends justify the means, he focused on the need to apply decisive force once the decision to use force had been taken.[63] Adam Roberts suggests that the success of Operation DELIBERATE FORCE could not be read directly across to the situation in Kosovo for two reasons: firstly, there was no equivalent ground offensive and, secondly, the bombing was not against Serbia proper.[64] Thus the Allies reliance on PGMs, particularly after the unforeseen effects of the single cruise missile attack on Banja Luka, contributed to an unjustified assessment of the prospect of success, or at least of the time in which it could be achieved. Although St Thomas Aquinas' criterion of sovereign authority has been replaced by concept of legal authority after the introduction of the UN Charter, the Kosovo conflict has taken this a further step on towards a concept of moral authority, the legal aspects of which were discussed above.

Remains of an F117 Stealth from which the pilot ejected safely and was rescued.

However, from the aircrews' perspective they operated in a high threat environment in which two aircraft, including an F117, were shot down

The issue of the reality of war also emerged as a moral issue after Kosovo. After the conflict General Short observed 'I don't wish to be impertinent but I don't think most of our civilian leadership generally understands airpower or how it should be employed. Their exposure to it has been films of the Gulf War which look much like a video game'.[65] His comments highlight a far broader issue concerning how far technology has sanitized war, except for those actually involved in it. The key elements of a virtual war, as Michael Ignatiev describes it[66] can be summarized as: a significant technological superiority which confers a risk free, precision capability; plus a pervasive media. These are combined with a risk averse, legalistic culture with a militarily inexperienced leadership and absolute expectations of success. The result, he contends, is the cessation of moral control leading to the use of armed force to political ends rather than as a last resort.

A prime example of the reality or virtuality of the conflict was the issue of force protection. On the one hand there were critics across the spectrum of the decision to keep aircraft above 15,000 feet because this reduced their military efficiency and/or increased the instances of collateral damage. However, from the aircrews' perspective they operated in a high threat environment in which two aircraft, including an F117, were shot down. The arguments concerning the effect of casualties on NATO cohesion have already been addressed but there was also the issue of national perceptions. As a US official stated, albeit with respect to the protection of US troops in Bosnia, 'if it is not a war of national survival then the policy is to keep casualties to the absolute minimum'.[67]

The US Leadership's perceptions are evident in a comment by Dr John Hillen to the Senate Committee on Armed Service that 'they actually get quite giddy in the White House when our bombs hit their targets, and there is a lot of self congratulation. But

TV by definition requires pictures to which journalists require access and in Kosovo and Serbia, and other conflicts, that access was strictly controlled. Consequently, Milosevic was able to use a grossly distorted coverage, which journalists had no option but to go along with…

He who controls the ground controls the media war, even though he who controls the air controls the military strategy for winning

nobody seems to be asking to what end, to what does this lead'.[68] Henry Kissinger was even more blunt saying, with respect to Kosovo and DESERT FOX, 'the conduct of the operations was undertaken with a reluctance to accept casualties that ultimately conveyed to the American public, and to our adversaries, the absence of any vital interest'.[69] But what shapes such perceptions? Post war analyses play a part but the other factor is the media.

In a speech on the 30th of April 1999, Mary Robinson said that 'In the NATO bombing of the Federal Republic of Yugoslavia a large numbers of civilians had incontestably been killed'.[70] As the Human Rights Watch analysis later showed, that was not the case and the majority of deaths had actually been caused by the Serbs. The question is how can an independent media create such distortions, at least in the short term where the influence or consideration of public opinion is greatest? The first factor is the scale and responsiveness of modern TV coverage. Philip Taylor quotes Boutros Boutros-Ghali as saying that 'today the media do not simply report the news. Television has become a part of the event it covers'.[71] TV by definition requires pictures to which journalists require access and in Kosovo and Serbia, and other conflicts, that access was strictly controlled. Consequently, Milosevic was able to use a grossly distorted coverage, which journalists had no option but to go along with, as a weapon. NATO however was unable to respond, until after five weeks a film was smuggled out of Kosovo showing a Serbian massacre of Kosovar Albanians, leading Jamie Shea to conclude that 'He who controls the ground controls the media war, even though he who controls the air controls the military strategy for winning'.[72]

So is the concept of a virtual war valid and, if so, does it have ethical implications for the conduct of armed conflict? If it does exist then it can only do so as a perception. Physically the US has a significant technological superiority which to date has been seen to confer a risk-free, precision capability. The other NATO nations have differing degrees of precision capabilities and operated in ALLIED FORCE under the umbrella of a primarily US defence suppression capability. As far as the perceptions of the NATO leaderships are concerned Adam Roberts concluded that 'It is hard to avoid the judgement that the campaign began

in an atmosphere of unwarranted official enthusiasm about both the capacity of bombing to reduce the Serb military threat to the Kosovars and the probability that the bombing would stay limited'.[73] The moral link would therefore appear to be to the principle of 'realistic prospect of success' in that unrealistic expectations of the political effectiveness of precision weapons can lead to the application of less than militarily optimum force. This in turn could extend and exacerbate a conflict leading to a point where the operation can not be politically sustained and quite the opposite of the desired effect is achieved. There is also a moral aspect to the conduct of such a conflict where the imperative to avoid casualties amongst one's own forces actually expose them to more risk as the conflict is prosecuted with less than decisive force.

Given all the above Senator Warner's opening comments to the Kosovo 'lessons learned' hearing puts the issue of 'virtual war' into context. He said 'I'm concerned that our citizenry and our elected and appointed officials will grow to expect that a casualty-free conflict could be the future of military operations….. such an outcome is, in my view, potentially very dangerous'.[74]

At present PGMs have between a 75 and 85% chance of achieving the desired level of damage on any one target

How then do these factors relate to each other and are there any broader deductions that can be drawn from them ? The first factor to appear in all four of the categories analysed above is the accuracy of PGMs when compared to unguided weapons. At present PGMs have between a 75 and 85% chance of achieving the desired level of damage on any one target. Furthermore, not only are accuracies still increasing but far more realistic and public assessments of those prospects of success are replacing the 'one bomb – one target' rhetoric of the Gulf War. PGMs have therefore contributed significantly to fulfilling the parallel legal and ethical requirements of proportionality and distinction. Furthermore, their standoff capabilities have significantly reduced aircraft loss rates. On the other hand the potential for 'surgical' use is encouraging the resort to both inadequate force and to reprisal operations. The other side of the accuracy equation is that 15 to 25% of PGMs fail to achieve the desired result. By no means all of these result in collateral damage incidents. However, those that do miss for technical reasons often do so dramatically. As a consequence those collateral damage incidents that do occur, and are often accentuated by a pervasive and asymmetrically controlled media, can have disproportionate effects. These can be tactical restrictions that endanger the aircrews involved and reduce military effectiveness.

Linked to this is the impact of the concept of an RMA which is central to the idea of a 'virtual war'. Whilst the weapons technology to support an RMA is in place the targeting systems, in the broadest sense, are not. This is most clearly demonstrated in the 'convoy' bombings in Kosovo and the restriction weather places on many LGB systems. The very accuracy of PGMs also accentuates the effects of intelligence-based targeting errors, as in the bombing of the Chinese Embassy in Belgrade. Lastly, in ethical terms, the power of the concept of the RMA has led to unrealistic expectations and hence to the use of inadequate force, which runs counter both to military principles and to the just war doctrine of requiring a good expectation of success. The potential outcome of this in a future conflict is the extension of the conflict, enhancing the effects of asymmetric military responses and media manipulation, to a point where it can no longer be politically sustained.

Four of the factors which can be identified above stand alone, and are considerations for future operations. Firstly, in all but the smallest of operations unguided and near-precision weapons have to be used alongside PGMs due simply to cost and availability. Secondly, cruise missiles no longer mark an escalation in the use of force and appear to have lost their 'shock' value in coercive terms. Thirdly, the ICJ and, in the future the International Criminal Court, will provide an alternative route of legal challenge to those nations who have accepted their jurisdiction to a Security Council that can be vetoed by any of the three nations that lead in precision technology. Lastly, there is an emerging conflict between the laws of armed conflict and the growing body of Human Rights law.

…cruise missiles no longer mark an escalation in the use of force and appear to have lost their 'shock' value in coercive terms

The next link is between the doctrinal and legal issues of the levels of war and the linkage between *jus ad bellum* and *jus in bello*. The first problem appeared to be the implication that all acts in an 'illegal' conflict were inherently illegal. However, the ICTY report confirmed the Nuremberg judgement that there was a clear distinction between political decisions and their military implementation.[75] On the other hand, whilst there was no downward spread of the influence of *jus ad bellum*, modern communications and information systems permitted political leaderships to participate in the tactical decision making process. This specific involvement of previously distanced political and legal figures must bring them into the category of 'commanders' and thus vulnerable under *jus in bello* to legal sanction for actions which were previously a solely military responsibility.

The last set of related factors concern the justification for the use of armed force. Whilst the Gulf War and the 1995 Bosnian conflict were specifically authorised under the UN Charter, others were not. The powers of veto of the 'permanent five' appear to permit the unchallenged use of PGMs in a punitive or retaliatory role, and the unlimited extension of the original remit for coercive operations against Iraq. However, if that is viewed from a 'just war' perspective then PGMs could not have been a deciding factor in the decision to use force in the Gulf, Bosnia or Kosovo where there was both just cause and right reason. In the, purely American, retaliatory operations PGMs were fundamental to the use of force; it could not have been applied without them. Lastly, PGMs provided a proportional and discriminatory way of continuing the coercive operations against Iraq, which

had the just cause of limiting both the Iraqi weapons of mass destruction and their military capacity for internal repression, in the face of a declining prospect of success.

With the exception of Operation ELDORADO CANYON and the attacks against Osama bin Laden, where a PGM capability was fundamental to the decision to undertake the operation, it is not possible to isolate PGMs as the driving factor in the decision to use armed force, although only the Gulf War could have been mounted without them. However, one is left with a series of paradoxes concerning the influence of precision weapons on future conflicts:

The first is the PMG paradox, in that the more they succeed, the more their failures are accentuated.

Secondly, the paradox of the RMA is that the more it is relied upon, the greater are the dangers of its failure.

Thirdly, there is the paradox of the increasing emphasis upon Human Rights, in that the unforeseen consequences of actions justified by the protection of those rights are condemned for the same reasons.

Lastly, there is a paradox in the increasing political involvement in what were once purely military decisions when compared with the difficulty experienced by the individual at the tactical level in trying to take account of the political considerations.

In the final analysis however, Precision Weapons are at the forefront of the use of armed force by Western democracies in a post-Cold War world. Thus any lessons which can be drawn from their previous use have to be applied within the constraints of the national and international political realities of that world.

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A unique feature of the F-22 Raptor is its ability to travel at high supersonic speeds without afterburner. Aircraft that utilize afterburner have greatly restricted range.

Can Europe Project Air Power without the Support of the United States?

'NATO cannot go to war in the air against a competent enemy without the United States'[1]

INTRODUCTION

Since the end of the Cold War, both the United Kingdom (UK) and the North Atlantic Treaty Organisation (NATO) have attempted to reconfigure their forces to meet the challenges offered by President Bush's 'new world order'.[2] The defence of this 'new order' will require balanced forces, probably joint or multinational in nature,[3] able to project power in a wide range of scenarios from warfighting to peace support operations. Central to the ability to project force will be air power, of which the United States (US) is the prime exponent. Europe, while possessing limited organic capabilities, has, since the formation of NATO, always looked to the US to provide the vast bulk of air assets, either for regional defence or for out-of-area conflicts. This dependence on US assistance allowed Europe to 'punch above its weight' in the international arena without the financial burden of developing and operating fully balanced forces. However, European complacency and reliance on the US has been challenged by recent operations and by a number of political initiatives, both European and American. There is a movement within Europe to develop independent 'European' armed forces for operations that could, in some circumstances, exclude US participation. This proposal, when coupled with a perceived US discontentment with the European contribution to NATO following recent conflicts, has highlighted the possibility of the US becoming more isolationist and possibly questioning its transatlantic commitment.

Concentrating primarily on the UK, this paper will discuss the implications of reduced US support to Europe and NATO while reviewing European aspirations for an independent military capability. The paper will first determine the nature of air power and its main tenets before providing a short resume on the background to current UK and NATO force structures. The implications of a reduction in capabilities, including the impact of diminishing levels of US support, will be discussed before considering how NATO is moving to configure itself to meet the new strategic environment, including comment on current European initiatives. The paper will then examine shortfalls in European force structures including: political aspects; command and control (C2) issues; equipment deficits; and the technological implications of developing an independent capability before offering suggestions on how any potential imbalance of forces might be best resolved. These discussions will lead to the conclusion that fundamental shortfalls in European defence capabilities currently preclude Europe projecting effective air power without US support.

…fundamental shortfalls in European defence capabilities currently preclude Europe projecting effective air power without US support

BACKGROUND

The accepted British definition of air power is: 'The ability to project military force in air or space by or from a platform or missile operating above the surface of the earth'.[4] Air power operates over a wide environment and is inherently joint, combined and multinational in nature.[5] A broad range of core capabilities are required to meet all potential air power roles; these can be broken down into 7 areas: Information Exploitation; Control of the Air; Strategic Effect; Joint Force Employment; Combat Air Support Operations; Force Protection; and Sustainability.[6] A fully autonomous force must be able to meet all these requirements. Unfortunately, while the UK and its European neighbours are able to meet some of the core capabilities as will be seen, achieving full effectiveness in all areas is, and will almost certainly remain, beyond affordable reach.

The RAF has always acknowledged that it should be structured to undertake the full range of air power roles and the need for a developed force structure has been one of its doctrinal foundations. Up to and including the Cold War, the maintenance of balanced forces fitted well with Britain's NATO policy where, in effect, it tried to take on the appearance of an American force in miniature, boasting that it 'contributed to all NATO regions with all types of capability'.[7] This expansion of roles had the

It was fortunate that the requirement for the UK to meet concurrent NATO and National operational tasks never occurred which might have exposed how thinly Britain's forces were spread

secondary advantage of allowing Britain to meet its NATO commitments while permitting the use of UK NATO assigned forces for national out-of-area contingencies and to support dependent territories and wider treaty commitments.[8] However, in trying to fill such a wide range of roles, the UK was playing a dangerous game by, in effect, 'double counting' its forces and hiding shortfalls. It was fortunate that the requirement for the UK to meet concurrent NATO and National operational tasks never occurred which might have exposed how thinly Britain's forces were spread. Nevertheless, despite the lack of a full capability during the Cold War, Britain could still project power unilaterally. This was demonstrated during the 1982 Falklands campaign which, while successful, provided an early glimpse of problems that would face those nations or alliances which operated with limited air assets. The conflict identified dangerous gaps in Britain's military capabilities such as Airborne Early Warning (AEW)[9] and the vulnerability of the Royal Navy to air attack.[10] Moreover, while the Falklands was ostensibly a national operation, even then it could be argued that its success owed much to US support.[11]

Notwithstanding its capability shortfalls, the UK attempted to maintain a sensible force mix. The converse applied to the majority of other European NATO nations which were content to assume the role of niche providers, perceiving a major NATO conflict as a 'come-as-you-are party' rather than needing to maintain full and current capabilities. Effectively, the burden of providing support fell on the US which, with its massive military machine, backed by its strong economic, industrial and technological base, was the only nation fielding forces capable of meeting all the air power roles. Outside the full NATO structure, but remaining within Europe, France was the only other Western country with comparable capabilities to the UK. With the majority of other Western European nations being only concerned with the defence of their homelands,[12] no consideration was given to operating out-of-area or for the need for forces with wider roles. By 1990, this parochial, but understandable, stance led to the situation where Western Europe had become reliant on the US to plug European capability gaps and had emasculated any vestige of an independent ability to project air power.

…Western Europe had become reliant on the US to plug European capability gaps and had emasculated any vestige of an independent ability to project air power

While there were a number of reasons for the varying mix of forces within NATO, one of the major drivers for the different capability levels was cost. Air power is an expensive commodity and it was beyond the financial means of most NATO nations to be able to compete at the same level as the UK, let alone the US. Therefore, by developing affordable specialist roles within the Alliance, smaller countries were able to justify their contribution to NATO.[13] Unfortunately, the end of the Cold War, and the political expectations of a peace dividend, exacerbated financial concerns for defence planners.

The requirement to spend relatively large sums to provide forces to counter undefined threats appeared less urgent to Western populations,[14] especially while the 'free' US defence umbrella continued to offer protection. This allowed the peace divided to be taken by a number of countries with massive cuts in funding giving 'an imperative to defence officials to structure forces precisely; allocating funding to air power capabilities that they considered their countries needed rather than those their air forces might like'.[15]

CURRENT FORCE STRUCTURES

Following the demise of the Soviet Union, Western airforces have found themselves exposed, both doctrinally and militarily, having to operate with plans and equipment specifically designed for the European theatre. However, while the era of opposing bipolar monolithic forces may have passed, new quarrels have occurred that require many of the air power capabilities originally developed for a major war. The Gulf conflict in 1991 and recent events in the Former Yugoslavia demonstrate that while the chances of inter-state war may have reduced, the risks of intra-state conflict, in which the West may become involved, have increased. This resurgence of potential threats and conflicts has highlighted the collective weakness of European defence, confirming that many European countries were, and are, not fully equipped to meet the challenge of emerging threats and continue to rely on US patronage to underwrite their defence requirements.[16] The UK seemed cognisant of this issue when, following the change of UK Government in 1997, the structure and composition of UK military forces underwent a comprehensive review to 'reshape the UK's Armed Forces to meet the challenges of the 21st Century'.[17] The Strategic Defence Review (SDR) gave a strong commitment to maintaining forces that could be successful in conventional warfighting,[18] with a similar broad range of capabilities to be available for peace support and humanitarian operations.[19] However, it effectively committed the UK to coalition operations in its Supporting Essays when it stated: 'Britain will usually be working as part of a NATO, UN or Western European Union (WEU) force, or an ad hoc 'coalition of the willing'. This means that we [the UK] do not need to hold sufficient national (*their emphasis*) capabilities for every eventuality'.[20]

With the apparent rescinding of the requirement to hold sufficient 'national' capabilities the UK must now look to meet these in coalition with other allies such as the US or other NATO partners. The question that now needs to be answered is: which nations will comprise future coalitions? Should the UK and Europe concentrate on continuing to support traditional alliances

…if Europe does move towards developing an autonomous capability, while reducing the US's burden of support, they may discover that such a move may not be welcomed by the US…

such as NATO or should they move to develop a European capability, possibly using the European Union (EU), the WEU, or the European Air Group (EAG) as a framework? Paradoxically, if Europe does move towards developing an autonomous capability, while reducing the US's burden of support, they may discover that such a move may not be welcomed by the US Government and could be detrimental to Europe's defence interests.

US-EUROPE RELATIONSHIP

The US-Europe relationship is at the heart of NATO with its continued existence as a credible organisation being dependent on US participation. This relationship has its roots in the Cold War when the West looked towards the US for leadership. The US was able to assume a dominant role as 'life was simpler, you knew who friends and enemies were and the weaker allies mostly shut-up and obeyed the major powers'.[21] However, changes in the political make-up of Europe post-1990 have seen a resurgence of a desire to project greater European influence in world affairs and an increase in what might be termed European 'nationalism'. The formation of an independent defence capability is but one facet of this new, self-confident, European identity.

Unfortunately, in seeking to develop its own capability, Europe has again raised the spectre of an independent European force weakening the US links with Europe. This is not a new issue, but one that started to gain prominence following the collapse of the Communist Bloc when European discussions concerning an independent European army, based on the Franco-German Euro-Corps, developed into the European Security and Defence Identity (ESDI). While initially on the periphery of strategic planning, ESDI increased in stature following the 1994 NATO decision to grant, in principle, the ESDI 'access to the Alliance's military capabilities'.[22] Although stalling in the intervening years, further calls, notably from France, for an independent European defence capability and a redefining of the transatlantic relationship, has again brought the ESDI issue to the fore. This has led members of the US political and military establishment to question Europe's commitment to NATO. US worries were exacerbated following the recent operations in the Former Yugoslavia where a perceived reluctance to deploy US forces, on what are seen by some as European missions, began to cause concern. Like all Western nations, the US had instigated massive force cuts at the end of the Cold War but had retained the mantle of 'World Policeman' which led to their forces being stretched by continuous operations. As a result, American politicians have questioned the requirement for the US to bear the brunt of peacekeeping operations and why Europeans 'always look to the US when they want serious military business undertaken on their own continent'.[23] The following statements from the July 1998 US Department of Defense Appropriations Act debate on US involvement in Bosnia demonstrate the depth of feeling: 'There should be a better distribution and sharing of responsibilities among our allies…..This [Bosnia] is a European security issue…..our contribution should be reduced and our allies in NATO

should share more of the burden'.[24] Or more telling: 'Does the Senate wish the US to be led by the reluctance of others? Must the US continue to provide a substantially greater number of troops than any of the other NATO allies…The US cannot continue to pick up the burden of every NATO mission'.[25]

The 1999 Kosovo conflict compounded the problem by reconfirming, both politically and militarily, that European air forces are dependent on US support. As an example, during the air war in Kosovo 85% of the weapons expended by NATO were delivered by US assets[26] leading to feelings within the US that Europe was unable to deliver its promised capabilities.

…'Does the Senate wish the US to be led by the reluctance of others? Must the US continue to provide a substantially greater number of troops than any of the other NATO allies…The US cannot continue to pick up the burden of every NATO mission'.

The lack of financial commitment by Europe to defence was also used by elements in the US to castigate the Europeans. EU countries spend $140 billion a year on defence compared with $290 billion by the US, yet Europe only possesses about 10% of the US capability to deploy and support troops outside of the NATO area.[27] This evident imbalance between the US and other NATO nations is likely to lead to further disillusionment within the US on NATO's ability to provide a commensurate share of military assets in future conflicts or operations.

EU countries spend $140 billion a year on defence compared with $290 billion by the US, yet Europe only possesses about 10% of the US capability to deploy and support troops outside of the NATO area

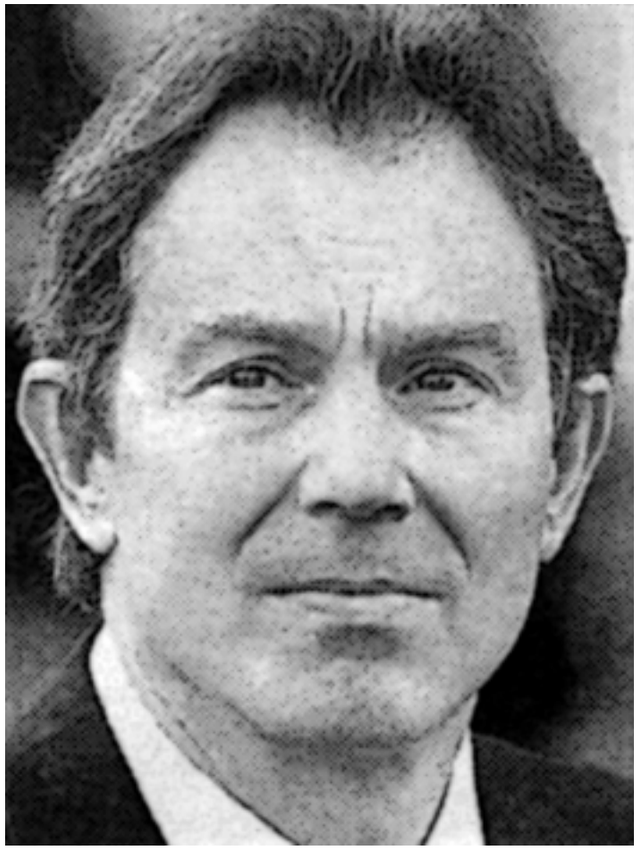
The Clinton Administration, while concerned, seems to be taking a relaxed stance on the issue with the US government continuing to offer its full support to NATO. However, in light of the possible change of US government in 2000 and a 'harder line' on European involvement by a Republican Administration, the sentiments expressed in the US Senate may be the tip of the iceberg. It is not inconceivable that long-term US public opinion may become more isolationist in outlook thereby reducing support for both NATO and Europe or, in the worst case, removing it in its entirety.

EUROPEAN INITIATIVES

While the current discontent within the US does not mean that a US withdrawal from Europe is imminent, NATO's glue could be thinning. Consequently, NATO's European members should consider the potential changes to the political and strategic environments and the implications of reduced US support. There are 2 schools of thought on how Europe should progress such changes. Some analysts perceive ESDI, and NATO's recent moves to reflect the evolving strategic situation through its new Defence Capabilities Initiative (DCI),[28] as having the potential to drive a wedge between the US and NATO. However, there are others who view such moves as long overdue. They suggest that while such initiatives would give Europe a much-needed degree of independence they would also allow it to remain a useful security partner to the US. The NATO Secretary General endorsed this view by stating: 'A Europe capable of coherent military action is a precondition for the Alliance's [NATO] long term health'.[29] Unfortunately, such initiatives, based on ESDI, have every indication of being slow and very long-term and, more importantly, will continue to rely on access to NATO [US] assets which may not be forthcoming if there is any disagreement between US and European objectives. Nevertheless, the fact that NATO is attempting to ensure that it is correctly configured to meet new political and military challenges is a positive step. NATO has woken from its Cold War deterrent posture and is attempting to identify and meet potential roles outside Alliance territory while continuing to retain capabilities to deal with large-scale aggression against one or more members.[30] This is not an easy task as other issues such as the enlargement of NATO from 16 to 19 nations and political changes within Europe continue to detract from defence. However, now that the requirement

for a more robust defence capability has been acknowledged, the issue must be progressed to determine its feasibility.

The recent moves by the EU discussing the possibility of developing an independent defence capability outside of NATO seem to be based on this ideal. Following the 1999 Cologne European Council, the EU published a declaration stating: 'the Union must have the capacity for autonomous action backed up by credible military forces.....and a readiness to do so, in order to respond to international crises without prejudice to actions by NATO'.[31] This declaration, coupled with its Anglo-French predecessor, the St Malo Agreement, in which the British Prime Minister and French President called for 'an EU military capability outside of NATO'[32] clearly indicates that European leaders are considering the possibility of operating with reduced US support. However, the UK position is not clear[33]. A number of aspects, especially capability shortfalls, must be resolved before the prospect of a European defence force becomes viable.



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SHORTFALLS IN EUROPEAN CAPABILITIES

The major shortfalls that Europe needs to redress have been highlighted by the performance of European forces in recent conflicts. They include: political constraints; C^2 and doctrine; equipment shortfalls; and technological issues, all of which must be fully considered if the Europeans wish to operate not just autonomously but even as part of a US led coalition in the future. In isolation, many of these issues do not appear unachievable. However, when evaluated as integral parts of a total force concept, they present massive challenges for European political and military leaders; challenges that must be resolved if a truly independent European capability to project air power is to become a reality and not just a paper tiger.

POLITICAL ASPECTS

The political aspects are pre-eminent, having both national and international implications. The question of how coalition partners define their national interests has the potential to become one of the major stumbling blocks in the formation of a European air capability. If the UK and its European allies agree that an independent European force is required, strong

guarantees will be needed to confirm a nation's commitment and its reliability to provide necessary forces and capabilities. Clausewitz observed that 'the goal of War is a political objective from which military goals are determined'.[34] This is a difficult proposition for a single state, when transposed to encompass coalition operations, experience indicates that there will be disagreement, driven by national interests, on how the political and military objectives should be defined. This sits uneasily with the coalition approach which is only effective if all players turn up to the game, know the rules, and are willing to allow others to use their ball. Recent conflicts in the Gulf and Former Yugoslavia, in which European forces have been involved, have highlighted significant shortfalls in the conduct of coalition operations.

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During the early phases of the 1990-91 Gulf War, France deployed substantial forces into theatre, but insisted on retaining C^2 at a national level rather then delegating it to the Joint Force Commander.[35] As a result, France was marginalised during initial planning and was prevented from participating fully in the alliance until it accepted the extant coalition command structure.[36] This issue is a recurring theme in recent operations and one to which a solution must be found. If 'less capable' nations are required to combine to project air power, a single dissenter can preclude effective operations. Nevertheless, despite problems within the Gulf coalition, strong US leadership prevented national disagreements undermining the cohesion of allied forces and most participating nations were content with the conduct of the operation. Recent Yugoslavian experiences have not been so consensual.

…one NATO member had a direct effect on allied air power capability. Disagreements included basing policy, targeting, and force composition. This resulted in less capable aircraft being utilised on missions to sustain coalition cohesion

Bosnia was NATO's first combat experience as an organisation and, understandably, teething problems were experienced. Despite the appearance of a common objective, nations expressed sentiments that conflicted with stated goals and, on more than one occasion, the differing political objectives of one NATO member had a direct effect on allied air power capability. Disagreements included basing policy, targeting, and force composition. This resulted in less capable aircraft being utilised on missions to sustain coalition cohesion. Moreover, there appeared to be a dual planning and tasking system with, on one hand, NATO attempting to use its organic assets to plan and task missions and, on the other, the US, who provided 65% of the air assets, using national tasking chains.[37] Four years later, during operations over Kosovo, a number of these problems recurred. Although NATO presented a united front, no mean task considering some of the 'collateral' damage incidents, alliance cohesion was severely stretched and came close to breaking. As with the Gulf and Bosnia, the US, as the major force provider, led the coalition and helped unite the alliance. However, they had the advantage in that they possessed

sufficient capabilities to cover the potential withdrawal of any of the other participating nations without detriment to overall political and military aims. If future European alliances consist of 'more equal' partners, each with a specialist capability, the withdrawal or non-participation of a single nation could severely compromise coalition operations by removing a vital piece of any future 'European military jigsaw.'[38]

This implied interdependence on the support of individual European nations' questions if the EU is cohesive enough to be classed as an international actor capable of projecting military force. It also asks if EU countries have enough in common in their national and international defence interests to develop a unified defence policy. The UK Government gave a clear and reasonably coherent outline of its future defence policy in the SDR; other nations have been less lucid. While the NATO DCI outlined a vision for the future, further confirmation from NATO partners is required to ensure that the political will, and more importantly, funding will be provided. If the required capabilities are not met as part of an overarching defence strategy, the UK or other participating nations could find themselves exposed. Nations could address capability shortfalls in their specific area of responsibility or capability but discover that they are not being supported in other areas. Furthermore, the UK, through its 'special relationship' with the US, has potentially more to lose if Europe moves away from US support. The ties between the US and UK are, arguably, stronger than those between the US and other European nations. While it might be suggested that the relationship only remains 'special' while it meets US interests, any weakening or breaking of this link could remove UK access to this invaluable support. Therefore, prior to the UK Government committing itself to any European grouping which might have the potential to weaken UK/US ties it must receive a clear and unambiguous statement on what European alliances will comprise in terms of air power capability and how this might affect transatlantic relations.

COMMAND AND CONTROL AND DOCTRINE

Moving on from the higher political aspects, but remaining within the sphere of the civil/military relationship, the next area of concern is C^2. The ESDI indicates that a European alliance may be able to utilise existing NATO C^2 structures to support future missions.[39] However, operations in both the Gulf and Yugoslavia have been notable for the reliance on US C^2 facilities and the predominance of US personnel in key command positions. During Bosnia, the 3 major commanders were all US generals, with the majority of other key positions also filled by US staffs, causing other European NATO nations to view the operation as a US rather than a NATO mission.[40] From a US perspective, as the major supplier of air power to the campaign, it was only fitting that they should fill key positions. If a European force was involved in similar operations the question of who would fill key command positions has the potential, both at higher governmental level and percolating down to military commanders, to become a controversial and politically sensitive issue. Working on the premise that the major capability supplier, or more experienced nations, would be pre-eminent, then the UK and French Governments and military should be to the fore. However, *realpolitick* may be a driving factor with contributing nations, while content for the US to lead in NATO, being less willing to allow other

European neighbours to have a dominant role in a European coalition. Therefore, along with capability issues, serious consideration must be given to the C^2 aspects of coalition air power and the possibility of more developed nations being required to devolve command of their forces to less capable countries to promote alliance cohesion.

Allied with the respective C^2 issues, the doctrine for European forces also requires further consideration. Although NATO espouses a common doctrine, in reality both the UK and US have developed national doctrine that, while generally in line with that of NATO, has subtle differences, reflecting national interests outside NATO. UK doctrine has changed much over the past decade and is constantly evolving to reflect current UK foreign and defence policy. However, the situation within Europe is less clear. Currently most NATO nations still pay homage to ageing NATO publications and have little national doctrine. Unfortunately, most NATO documentation is Cold War centric,[41] is predicated on US support, and would not be viable if US assets were unavailable. Therefore, along with the C^2 issue, the doctrinal implications of a non-US operation must be considered and new doctrine developed to support European operations. This will not be a swift or easy task as it is a constantly changing and developing field that requires clearly articulated statements of national interests and policy, issues that are not easy to define within Europe.

CAPABILITY SHORTFALLS

While political aspects cover wide-ranging and diverse issues, even if agreement is reached on the political make-up of future alliances, Europe will still be a long way from projecting effective air power. European political aspirations must be supported by a capable and credible military. Unfortunately, years of relying on US support has resulted in numerous deficits in European force structures. Shortfalls are not constrained to one particular facet of operations but encompass the full spectrum including many combat and support roles. Clearly the US has an unassailable lead in areas such as space, where it would be foolish or impossible for NATO to attempt to obtain a fully independent capability. However, there may be scope to complement, rather than compete, by developing limited autonomous capabilities. Nevertheless, there are certain areas where improvements must be made if countries wish to be taken seriously as modern and effective air power providers.

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Kosovo brought capability shortfalls into sharp focus, highlighting the gaping chasms in European force structures.[42] The following paragraphs detail some of the problems. The list is not exhaustive or prioritised, but is used to give an indication of the scale of the challenge facing Europe.

The first issue is one that must be resolved if Europe wishes to project air power in a hostile air environment, namely the procurement of an effective Electronic Warfare (EW) capability. EW is an integral part of air operations in both high-intensity war and peace support operations. Control and use of the electromagnetic spectrum is not the preserve of technologically advanced nations; a modern fighter is just as susceptible to a *mujahadeen* tribesman in Afghanistan holding a man-portable Surface to Air Missile (SAM) as it is to the latest ex-Soviet SAM over Bosnia. The need to dominate the EW battle was emphasised 'in the first hours of DESERT STORM, when Iraqi air defences were blinded, paralysed and decimated by an electronic and firepower offensive unparalleled for scale and intensity in the history of warfare, rendering Baghdad's attempts at counter-EW totally ineffectual'.[43] Fortunately for the allies, the US provided the vast majority of EW expertise with the RAF offering the token European effort of 100 ALARM missiles and a reduced ELINT capability.[44] This European shortfall can be traced to the Cold War, when EW was the 'poor relation' of air power. While time and money was spent procuring new aircraft and weapons systems, EW, despite its acknowledged importance, was under-funded and resourced.[45] Post-Gulf, it seemed that EW would be accorded greater priority. However, 10 years on, the UK still lacks a Stand-off Jamming capability, has no reactive Anti-Radiation Missiles (ARM) and a only a limited ELINT system. Europe is also in a weak position. While there is a Spanish, German and Italian ARM capability, NATO continues to rely on the US to provide sufficient EW assets to ensure adequate force protection. Recent events in the Former Yugoslavia[46] have emphasised that EW supremacy is essential to ensure air superiority. This shortfall in capability is acknowledged at the highest levels,[47] and is clearly articulated in the UK Air Operations Manual

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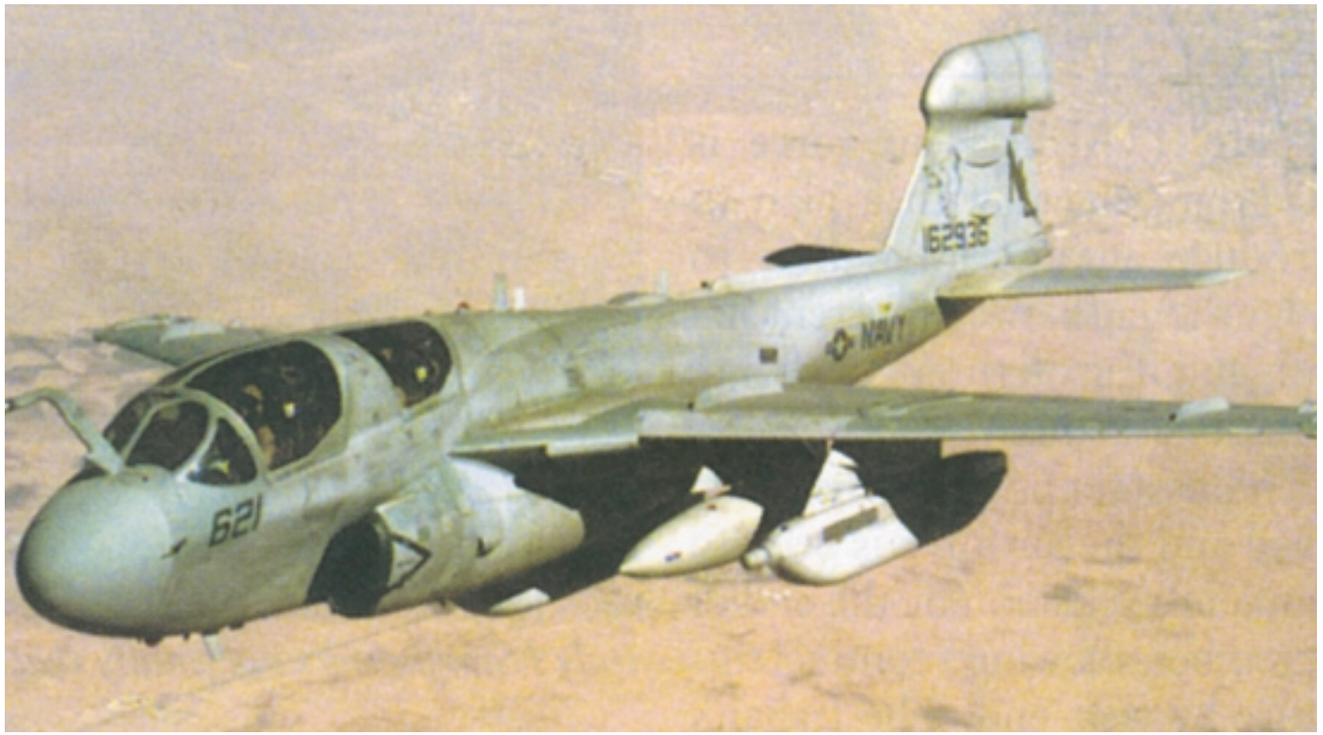

Within NATO, while the requirement has been acknowledged through conceptual programmes such as the Future Large Aircraft Project, nations have yet to commit themselves to acquiring the new capabilities and, again, it seems it will be left to the US to supply the required support

which states: 'The paucity of UK SEAD assets could prove to be a serious deficiency in any unilateral action, or joint action should other partners be similarly ill-equipped'.[48] Nevertheless, there remains a remarkable reluctance by European nations to develop a full EW capability which could leave Europe seriously exposed in the future.

Another valuable lesson from recent conflicts is the need for robust airlift to move personnel and *matériel*.[49] While the UK has a limited tactical and strategic lift capability, the non-availability of platforms such as the US C5, C17 and C141 aircraft highlights the capability gap within Europe. This is a particular problem as the one area where the European military is not short of resources is manpower. However, the lack of suitable airlift precludes Europe's ability to optimise the deployment of troops and equipment. During Kosovo the problem was resolved by the use of specialist charter firms including ex-Soviet heavylift aircraft under contract. While the use of contract has advantages in that countries are not committed to purchasing and supporting specialist aircraft when there is no requirement to deploy forces, problems occur if contractors are reluctant to meet the contract or are restricted by government embargoes. Operating in a threat area, or political constraints such as those placed by Russia and Ukraine on the use of their strategic lift aircraft operators during Kosovo, can preclude the effectiveness of charter aircraft. Both SDR[50] and the NATO DCI[51] acknowledged that there was a need to improve strategic lift capability to meet future deployed operations and to 'project power,'[52] but progress in this area has been slow. Although the UK stated that it would obtain an airborne heavylift capability by 2001, it is not yet certain if it will meet the SDR commitment. Within NATO, while the requirement has been acknowledged through conceptual programmes, such as the Future Large Aircraft Project,[53] nations have yet to commit themselves to acquiring the new capabilities and, again, it seems it will be left to the US to supply the required support.

One capability 'gap' which the US will almost certainly remain responsible for is space. For European defence this really is the 'final frontier' and one that is unlikely to be crossed in the foreseeable future. While the US was an early convert to the potential of space,[54] the UK appears to have had superficial interest. Apart from its Skynet Programme, the UK did little to develop a national space programme, being content for the US to provide relevant space based capabilities. This willingness by the UK to rely on the US seemed to be a sound policy. The US was happy to lead and, in many cases, shared the benefits throughout the world; GPS and satellite photography being 2 examples. Furthermore, this US largesse proved extremely beneficial to the UK which, once again through its 'special relationship' with the US, is a prime beneficiary of space intelligence data. However, the high cost of a space programme may make the US reluctant to continue to provide support unless other nations are willing to contribute.[55] Therefore, European nations, in particular France, took a different approach. The inherent distrust between France and the US, compounded by restricted French access to US space based intelligence and in some cases misleading products, led France to develop its own satellite capability.[56] The SPOT series of satellites provided an initial capability which was followed by the European Helios system used over Bosnia in 1995.[57] If funded and developed correctly, Franco-European satellites could provide Europe with a reduced, but independent, space capability thereby decreasing the reliance on US space products. It is not feasible to suggest that Europe will be able to keep pace with the US in space in the near-to-medium term. However, a well-developed, limited space capability would allow Europe to remain a player in this field with a potential capability that could be progressed further over time.

Finally, the increasing use of air power to resolve conflicts or to project power has occasioned increased enthusiasm for a Combat Search And Rescue (CSAR) capability to ensure the swift recovery of downed aircrew from hostile territory.[58] The UK and Europe, with the possible exception of France, have always lacked an effective CSAR force. Conversely, since pre-Vietnam, the US approach demanded that CSAR must be an integral part of all US operations where aircrew lives may be at risk. AP 3000 acknowledges the CSAR contribution to an air campaign as 'denying the enemy a potential source of intelligence and to promote high morale amongst aircrew'.[59] CSAR offers more than this as demonstrated during recent operations in Bosnia and Kosovo where US CSAR assets rescued the crews of at least 4 downed aircraft. Opponents of CSAR suggest that the cost of providing a not inconsiderable capability[60] – in the rescue of one F-16 pilot 75 aircraft were involved[61] – as well as the risks involved for the CSAR force, outweighs the benefits of rescuing a very small number of personnel. However, with growing political casualty intolerance and, in some cases, over responsiveness to media pressure, this premise is unsound. The recovery of crews helps promote cohesion within an alliance. This is especially true in the current, risk-averse, climate. Captured military aircrew have never been so highly prized by belligerent nations for political leverage and public relations value.[62] If nations are aware that every effort will made to ensure that their personnel are recovered they may be more willing to commit forces. Nevertheless, despite the importance of CSAR, both UK and European CSAR capabilities are still at an embryonic stage and it may be some time before a realistic capability is available. Unfortunately, it appears that, once again, the burden of support will remain with the US until other nations decide on the priority they should place on recovering downed personnel.

The 4 areas listed give only a taste of the current air power shortfalls within Europe. There are other issues, such as the limited number of nations with a PGM capability – a vital requirement if a country wishes to participate in current operations where precision and minimal casualties and collateral damage are demanded by both governments and the media – and missile defence, both strategic and operational, where action is required to rebalance forces. Europe now faces the challenge of updating its airforces commensurate with its desire to participate in future operations. If it can be assumed that a restructuring will occur, the next question will be who will develop the technology to ensure that forces are capable of meeting emerging threats?

TECHNOLOGICAL ISSUES

The technology issue is complex but it is one that could be developed to become a primary driver to apply additional pressure on European governments to improve their air power capabilities. There is much to be gained by developing a robust, and technologically advanced, defence industry. Although costs can appear high, there are many benefits. The British Government has long believed that it is essential to maintain a 'strong indigenous defence industrial base'[63] through maintaining a wide range of military capabilities. By encouraging British industry to compete for respective projects, the UK has tried to retain expertise within national industries. By taking this stance, it has gone some way in helping maintain parity with the widening technological gap between the US and the rest of the world. The importance of this has been recognised for some time. Michael Heseltine, during his tenure as Secretary of State for Defence, stated: 'If we [the UK] want to cut down Britain's industrial capability all we have to do is buy from the United States ...products will be cheaper ...and satisfy most of our demands....however, because of the consequences in the acceleration of the brain drain, the loss of jobs, the destruction of the high technology base and the civil implications this would be wholly unacceptable'.[64]

The Labour Government echoed this view when George Robertson, former Labour Secretary of State for Defence, stated: 'We [the UK] believe that a strong defence industrial base is fundamental to our security.'[65] Therefore, by trying to retain a full range of capabilities, and looking towards national industry to provide them, benefits accrue to both industry and, if the equipment meets their requirements, the military. France also recognises the benefits of a strong industrial base and has developed its air force around its own defence industry. However, France has experienced problems with this approach 'With the French Air Force having to accept Dassault's latest product, aimed at the export market, rather than one that fully meets a military operational requirement'.[66]

Procurement problems are not a French prerogative. Excluding notable exceptions like Tornado and the EFA programme which, after political teething problems,[67] looks like producing a first-rate product, the ability of the British and, indeed, European defence industries to compete as a cohesive industrial grouping with the US in terms of both cost and quality is questionable. This was highlighted by an ex-MoD Director of Contracts who drew attention to the inadequacy of most British

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produced weapon systems when compared to US products. He also questioned the need to preserve a 'British' defence industry which 'serves our Armed Forces so badly when protecting jobs seems to take precedence over the safety of our [UK] troops'.[68] While this may be an extreme view, projects such as the aborted AEW Nimrod aircraft and the political interference during the procurement of the EH 101 helicopter[69] have, on occasion, induced a degree of cynicism within the UK's Armed Forces. Therefore, unless the UK and other European nations realise that it is in their interests to establish a strong and effective defence industry, capable of producing credible products, there is a strong possibility that the US could become a monopoly supplier. The implications of this can be seen from the preponderance of US designed aircraft within NATO. The F-16 aircraft forms the backbone of a number of NATO forces with only Germany, Italy and the UK relying on European designed and built equipment.[70]

European reliance on the US to supply equipment has major implications including the potential to artificially constrain European access to evolving technologies and, in the worst scenario, could prevent access if national polices do not reflect those of the US. There are lessons to be learnt from Iran and Pakistan who procured US systems only to see support being withdrawn when their national policies did not meet with US approval. Therefore, if the UK and Europe wish to remain at the cutting edge of air power, but still retain a degree of independence, they should take heed of one of Meilinger's Propositions Regarding Air Power which states: 'Technology and Air Power are synergistically related'.[71] Meilinger goes on to develop the argument that air power is the result of technology and depends on the most advanced developments in the respective aviation fields to achieve dominance using the size, sophistication and technological lead of US forces as an example. As with many of the capability shortfalls discussed in this paper, failure to develop and maintain credible national and European defence industries could leave the UK and Europe as bit-players in the air power game facing the problems outlined by Air Chief

It is advanced technology which confers a seat at the coalition table

Marshal Sir John Allison: 'It is advanced technology which confers a seat at the coalition table'.[72] Moreover, having an indigenous aerospace industry directly related to a country's force structure allows nations the flexibility to modify equipment at relatively short notice without the problems of protracted discussions with foreign (US?) manufacturers and governments.[73] The advantages of a national industry were evident in the Falklands Conflict when the UK was able modify the Nimrod MPA to carry heat-seeking missiles and update the Vulcan and C130 aircraft with an AAR capability. Therefore, while it may be argued that it is in Europe's interest to continue to rely on US support, over-reliance comes at a cost to national industries in both economical and technological terms that the major European nations might not afford. Every effort should be made to develop and retain an independent technological capability with advantages for both national and alliance operations.

Whichever direction the UK and Europe procurement process decides to travel, when developing technology, the most important factor is interoperability. This issue, when combined with the benefits of joint training, is amongst all others, a force multiplier in coalition operations. Interoperability has been a touchstone of NATO policy for many years. However, with new allies such as France wishing to form coalitions, to be effective all members should strive for common standards. The benefits of interoperability in coalition operations were clearly expressed by the Commander Allied Air Forces Central Europe, General Jumper, who stated post-Kosovo: 'In future conflicts we [NATO] will need to stand together inseparably as an alliance for political solidarity and military expediency as well as for economic burden sharing. Without interoperability we are not an effective alliance – we are no more then a collection of like-minded nations, not a cohesive military force. As an alliance we are only as strong as our weakest link. There has never been a greater need for working together'.[74]

Both the European military and defence industries should heed General Jumper's comments. In particular, industry, while making much play about collaboration and cohesiveness, must ensure that they can produce the required equipment to meet, at least, common European equipment standards. Ideally Europe should aspire to conform to US standards thereby allowing it to maintain or reduce the capability gap and to enable it to operate with the US in the future. This should be seen as the minimum level of requirement to prevent European assets being excluded from future operations or relegated to supporting roles.

POSSIBLE SOLUTIONS

Unfortunately, the general prognosis for European air power is bleak and, until there are stronger moves to develop an independent capability, a supporting role may be the best Europe can hope for. To be effective, both the UK and Europe must address a plethora of deficits before they should even consider operating in a non-permissive air environment without adequate US support. Pooling of capabilities is an obvious way forward. The major European NATO members, or those of an evolving alliance, such as the WEU or EAG, could provide the nucleus of a coalition force and, as well as providing a European capability, could help rebalance European and American roles within NATO. A strong proponent of a European air force is Air Marshal Sir Timothy Garden, an ex Assistant Chief of Defence Staff, who called for the creation of a European air arm.[75] He argues for a force of up to 400 Eurofighters, complemented by up to 5 European aircraft carriers. His proposition is based on the fact that 5 EU nations are buying Eurofighter and each will require the relevant command, logistics and training infrastructure to support individual force elements. Sir Timothy argues that nations will each develop the capabilities in different ways 'so that the ability of the Eurofighter forces to operate together deteriorates.....What is needed is a single headquarters managing a mixed force of perhaps 400 aircraft subject to a common operational doctrine'.[76] This proposal has much to offer and could be expanded to encompass all air power capabilities. The idea of a joint force is not new; such an organisation has been operating within NATO, with much success, for many years. The NATO Airborne Warning and Control (AWAC) force has provided NATO with a AEW capability since the mid-1990's using a common fleet of aircraft crewed and funded by NATO. The joint force principle, based on the NATO AWAC's concept, could be transposed

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to other areas as part of a European capability programme. European nations, either under the auspices of NATO, or, as the way forward for European defence becomes clearer, through other European alliances, could procure specialist capabilities such as strategic lift, air-to-air refuelling, or EW platforms. The requirement to collaborate with other niche providers could help improve international co-operation and strengthen current and future alliances.

From a British viewpoint, becoming a specialist provider within a pool system could permit the UK to rationalise its resources, allowing it to concentrate on roles where it has a developed or an emerging capability. Such areas might include Maritime Patrol Aircraft (MPA), Force Protection, AEW and offensive operations using PGMs. Furthermore, once Eurofighter becomes operational, the list might be expanded to include Air Defence. Becoming a specialist rather than 'jack of all trades' could help to reduce the 'overstretch' problems that currently bedevil the RAF and allow it to rebrigade its forces into more cohesive units. In addition, if forces were rationalised, less training units, aircraft and personnel would be required producing financial savings. These savings could be used to develop existing capabilities and thereby have the potential to make the coalition package more affordable.

However, as indicated earlier, money is the prime driver for many nations' defence policies and any additional costs occasioned by procuring new systems would need a very strong case to obtain the requisite political support. This will be problematical as many nations do not want to 'project power' as they are embroiled in domestic issues, both political and financial, that require resolving. This is especially true of the new NATO members who joined NATO for the promise of collective security rather than the potential to become involved in out-of-area conflicts which pose no direct threat. Therefore, it seems that any European force would comprise a small cadre of the more developed nations with a commensurate increase in costs as the 'pool' of participants is reduced. This questions whether the political and financial support is available to ensure that a credible 'pooled' capability could be developed. If such a system is not feasible or affordable there may be other solutions.

Firstly, from a UK perspective, if European nations are unwilling to provide the additional funding and support that would be required to establish a European force, but are also reluctant to continue to rely on the US, another option for the UK might be to move away from Europe on defence and align itself more closely with the US. This approach would revisit earlier reservations[77] and traditional concerns over the ability of European nations to meet their defence requirements while cementing strong UK ties with the US. The close military links in areas such as intelligence and training would be maintained as would the UK's access to new technology – although this might be at a cost to the UK's own industrial base. The UK would not be able to offer balanced forces but could continue to develop and offer specialist capabilities such as MPA and AEW but, more importantly, would provide the US with political support by making a limited contribution. On the debit side this approach would not be well received by the UK's European partners, especially at a time when the UK Government is trying to enhance its 'European' credentials and take a fuller role within the EU. Moreover, this approach would not solve the long term issue if the US did not wish to participate in operations where the UK or Europe felt that intervention was required.

Alternatively, the *status quo* could be maintained by supporting and developing the current NATO structure and applying leverage on the US to ensure that America remains fully committed to the Alliance. This would require Europe to retreat from its unseemly haste to establish a truly independent European force and accept US military and, possibly, a degree of political domination with the subsequent constraint that US support will only be forthcoming if the operation meets with American national interests. In parallel, European nations could, if an independent capability was still an objective, continue to develop alliances with nations looking to provide niche capabilities as part of a cohesive force. As discussed earlier, notwithstanding military issues, this would require European defence research, development, and procurement to be merged to produce the required systems. Such an approach might also have the additional benefit of integrating the European aerospace industries that could, in the longer-term, result in a collaboration that may eventually challenge the US dominance in this field. Taking this route would still allow a European air power capability to be developed while allowing links to be retained with the US through NATO. If a European capability does mature to become a realistic force then the issue of a fully independent capability can be revisited.

A clear deduction to emerge from the discussion above is that there are 2 kinds of air force: the US, and everyone else.[78] While this fact must not be allowed to engender a defeatist attitude within Europe, resulting in an unwillingness by nations to continue to develop force structures and a total reliance on the US for support, a degree of realism must be applied. There are benefits in procuring a European air power capability. However, if the UK and Europe wish to move towards an independent capability there must be a drastic change in the attitude towards defence, especially military spending by the relevant nations. The Cold War structures must be replaced by new organisations capable of meeting new challenges and emerging threats. NATO's adoption of ESDI, and the recent DCI, indicates that the Alliance is considering the possibility of a more independent Europe. However, such moves are, at this stage, more of an aspiration than a strong commitment to progress the relevant issues. What is now required is the reversal of the trend of reducing defence budgets with additional funding being made available to develop and procure the new technologies required to allow European forces to fully participate in expeditionary operations. The shortcomings highlighted in this paper must be addressed to ensure that a European alliance can either integrate fully with advancing US military technology or, in the event of a European only operation, provide credible forces that can operate in a hostile air environment without US support. As discussed, such a force will not just require new equipment but will necessitate the development of a total force concept to include all aspects of air power from C^2 and doctrine to the procurement of new technologies. Such capabilities can only be achieved through collaboration as no individual European nation has the wherewithal to be able to provide all the requirements of a balanced force. Collective security is cheaper and has benefits but the right partners must be selected. A coalition operation, by its very nature, will require alliance members to work together towards a common goal. Unfortunately, experience indicates that this cannot always be achieved as national interests have often taken precedence over coalition aims. Therefore, Europe will need to ensure that it can agree and sustain common

political objectives in parallel with the development of the military forces needed to support such aims. This is an area that will become increasingly difficult to resolve as the direct threat to European nations fades and is replaced by a desire by some nations to participate in humanitarian intervention operations while others remain solely concerned with their national security.

The question of how can Europe develop a effective capability to project air power without US support will not be easy to resolve as the possible military solutions for Europe are limited. Pooling of forces is an option as is the niche provider approach with individual nations contributing to a composite force. Unfortunately, the perceived lack of cohesiveness within Europe, when coupled with reduced defence spending, indicates that the portents for an effective independent European air power capability are not good. When examining all the actions, both political and military, that will be required to allow the UK and Europe to construct and maintain air forces capable of projecting air power, the possibility of such forces being developed in the short-to-medium term appears extremely remote unless governments are prepared to turn rhetoric into reality. There must be political commitment to develop the desired capabilities or an acceptance by Europe that US dominance of the air will be allowed to remain unchallenged. Politicians cannot afford to linger on this issue as recent conflicts have demonstrated that Europe must restructure its forces if it wishes to take a leading role in future operations. While both the EU and the UK can argue convincingly that they are members of the world's economic vanguard, their aspirations to project power through the use of their air forces are less cogent. Until Europe is able to rationalise its air power requirements, it seems that the US will continue to remain the dominant power both in economic and military terms.

The UK and Europe must now choose which path they wish to follow. Currently, Europe cannot afford to allow the US to become disengaged as it does not have the collective ability to project effective air power without American support. While European nations may balk at the costs of obtaining such capabilities, they must realise that if they wish to have influence though the use of military force, air power will be a vital component of future coalition operations. If doubt still remains in the minds of European leaders on the need to develop the required air power capabilities, they should perhaps consider the words of General Kenney, the US Air Commander in the South Pacific during World War 2 who stated:

'Having a second-best air force is like having the second-best poker hand fine for bluffing but no good at the call'.[79]

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1 General Short. Joint Force Air Component Commander Kosovo. *The Times* 27 Jan 00.
2 President Bush, Jan 91. 'We are ready to use force to defend a new order emerging among the nations of the world, a world of sovereign nations living in peace.'
3 JWP 0-10 *United Kingdom Doctrine for Joint and Multinational Operations* pv.
4 *AP 3000* p1.2.1.
5 *Ibid.* p2.2.
6 *Ibid.* p1.2.16.
7 Freedman, L. *The Politics of British Defence 1979-98*. (London: Macmillian Press, 1999), p49.
8 *Ibid*. p14.
9 Hastings, M and Jenkins, S. *The Battle for the Falklands*. (London: Michael Joseph Ltd, 1983), p142.

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11 US supplied weapons, logistic and intelligence support to the UK during the conflict.

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25 Senator for West Virginia. *Ibid* ps9366.

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30 *NATO Review* Summer 1999, pD16

31 *European Council Declaration of Cologne*, Annex III. Jun 99.

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38 Bailes, A. *European Defence: What are the convergence criteria*. RUSI Journal. Jun 99, P61

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The two contenders for the Joint Strike Fighter (JSF) project: Lockheed Martin's X-35A and, below, Boeing's X-32A.

An Analysis of the Provision of Future Cost-Effective Combat Air Power for the United Kingdom

INTRODUCTION

The past 10 years have seen a variety of conflicts where Combat Air Power has been used to shape a battlespace for surface forces or to determine the outcome of a conflict in its own right. The efficacy of Combat Air Power is well proven by the results it has achieved, ranging from the aerial onslaught against the Iraqi forces before a ground invasion in 1991, to the ejection of Serbian troops from Kosovo in 1999. The wide range of capabilities that Air Power can provide, from air surveillance to the attack of surface targets, coupled with its reach and responsiveness, is unique. Current UK doctrine recognises these capabilities and that "air power is frequently the favoured option of first recourse in crisis management".[1]

Since the publication of the Strategic Defence Review (SDR) in 1998, there has been a clear focus on the need to provide defence capabilities within an ever dwindling budget and to strive for cost-effective solutions to military problems. Because of the increasing involvement and development of technology, Air Power is an inherently expensive commodity and is therefore likely to be particularly sensitive to any budgetary constraints. An initial, or superficial, approach to the problem suggests that the solution is to simply buy cheaper equipment and make it work. However, a deeper analysis of what is an extremely

complicated issue shows that there is no easy solution to the problem: indeed, it is questionable as to what constitutes cost-effectiveness, depending upon the observer's perspective to the relevant issues.

This Paper will examine the possibilities for the cost-effective provision of Combat Air Power for the UK over the next 20 years, by firstly discussing the UK's security environment. The many factors that affect the provision of Combat Air Power, including the economic situation and the procurement processes, will then identify the requirements and constraints upon the operational use and development of Combat Air Power. This will contribute towards an understanding of the various views of cost-effectiveness.

British Air Power Doctrine defines Air Power capability as having 3 component parts:[2] physical, conceptual and moral. The physical component of Air Power is pivotal in the future cost-effective provision of Combat Air Power capability. Therefore, in-service and future equipment will be briefly examined to assess their suitability for the operational task before discussing the supporting doctrine. Several shortcomings of the current UK doctrine regarding the use of Combat Air Power will be identified. The examination of both the equipment and doctrinal issues raised here will lead to conclusions regarding the future provision of cost-effective Combat Air Power. Finally, the moral component, including those leadership and core values that do not rely upon equipment or doctrinal issues, will not be discussed in this Paper.

For clarity this Paper will focus upon the air/land battlespace, and will not consider the sea/air battlespace or littoral warfare. It must be noted that future operations are likely to take place in a joint battlespace with significantly reduced boundaries between the land, sea and air environments and this Paper's conclusions will be focused upon this future battlespace. Finally, personnel and training issues, and the provision of targeting and intelligence using ISTAR assets, will be common to all future possible Combat Air Power platforms so will not be discussed in any detail.

THE UNITED KINGDOM'S SECURITY ENVIRONMENT

The 1998 SDR clearly articulated the current and expected security environment that is likely to surround the United Kingdom during the next 15 years. It recognised that although there is little direct threat to our national survival, "today's security environment is not benign".[3] Given this instability, and the United Kingdom's desire to play a prominent role in international affairs,[4] British forces can expect to be operating in a wide variety of locations within many different scenarios. British Defence Policy has stated[5] that military forces can expect to be used in combat, ranging from high intensity warfare through intervention and counter-insurgency operations: as a deterrent; provide support to diplomacy; peacekeeping and peace enforcement or in support of the civil powers.

It has also been recognised that British forces can expect to operate as part of a coalition framework, within either NATO or a wider coalition, in any major operation[6] in the future. Additionally, there will be an increasing role for the military in support of peace support and humanitarian operations as part of a "force for good".[7] This theme echoes the Foreign Office view,[8] expressed by Mr Derek Fatchett MP (Foreign Office Minister) who said recently, that "in seeking to achieve the basic objective of security…….the nature of war is changing". As potentially hostile developed countries' military capability increases unconventional attacks may become more likely. Many current military forces have limited, if any, capability to counter these unconventional threats. This is the dichotomy facing future security posture: whilst military forces may be expected to fight in a conventional war, they may also be used in an asymmetric conflict, where their utility may be limited. The proliferation of military hardware around the world, in concert with this possible asymmetric warfare, will ensure that the future battlespace is increasingly complex. This will demand complex systems operating across land, sea and air as a single battlespace. The House of Commons Research Paper 98/91, published as part of the SDR, defined the future of Air Power as:

…there will be an increasing role for the military in support of peace support and humanitarian operations as part of a "force for good"

> *"….seen by the SDR as complementing ground and maritime operations but also having an offensive role in its own right. This will be further enhanced by the acquisition of further precision air-delivered weapons. Air Power will also have a role in non-war fighting missions, such as the enforcement of no fly zones and the provision of humanitarian aid. The SDR concludes that a balanced force, similar to the present forces structure, is required to meet these contingencies."*[9]

INTERNAL FACTORS AFFECTING THE UNITED KINGDOM'S SECURITY ENVIRONMENT

In recent years it has become clear that budgetary pressure, focused by the Treasury, will continue to increase on the Defence Budget. The Ministry of Defence (MOD) Budget is in direct competition with all other Government spending departments for resources. In 1998-99 the Defence Budget of about £22 Billion was approximately 7% of the Government's overall expenditure, accounting for approximately 2.7% of the British GDP . In the next 3 years, this figure is projected to rise slightly in cash terms, although in real terms this will reflect a fall to approximately 2.4% of the GDP.[10] Remembering that Air Power is intimately linked with technology and thus particularly influenced by this ongoing increase in costs, this decrease in funding will be a significant factor for the future provision of Combat Air Power. This focus will be exacerbated by the continually rising costs in this sector. Each major new aircraft costs approximately twice its predecessor.[11] This is because of the increased costs of production and also due to the increasing demands upon the combat platforms in a more complex joint battlespace.

The purely economic costs of defence procurement and operations are difficult to define. The MOD spends approximately £9 Billion each year on equipment alone, within the overall Defence Budget of some £22 Billion. The SDR stated that the procurement budget should be reduced by £2 Billion. Although it is relatively easy to determine how much the defence budget is, in cash terms, it is more difficult to determine the true cost since it must include the unknown opportunity costs of not spending that money on defence.[12]

The SDR recognised that the British Defence Industry is viewed as a strategic asset, providing jobs for over 400,000 people and annually earning the country some £5 Billion in exports.[13] Furthermore, the Government plans to support the UK's Defence Industrial Base (DIB)[14] whenever it can do so. This policy is to ensure that the UK retains an indigenous military technology capability and the capability to continue its trade within the extremely competitive world-wide export market. Procurement decisions, both national and workshares from collaborative projects, have repeatedly shown that this policy will continue to be endorsed – whichever Government is in place. In short, the political view of "cost-effectiveness" relies upon supporting the UK DIB to maintain technical competence and provide both employment and export opportunities for it.[15] This political constraint may conflict with a purely military recommendation for procurement options for particular equipment.

The current rate of technological change will have a significant effect upon future military equipment.[16] The very pace and breadth of technological change make it impossible for the military to fully embrace all its aspects at all times.[17] This is especially true with regard to Air Power as noted by Professor Tony Mason as a "product of 20th Century technology".[18] The continual increase in Air Power capabilities seen over the past 100 years is set to continue in the future with ever-increasing accuracies of precision guided munitions (PGMs). The increase in precise weapons effects can allow smaller more efficient forces to be used and reduce collateral damage against previously untargetable areas. This capability fully supports the military requirement to achieve an end-state with minimum casualties and loss of equipment. It is also clear that this capability is particularly sensitive

The current rate of technological change will have a significant effect upon future military equipment. The very pace and breadth of technological change make it impossible for the military to fully embrace all its aspects at all times

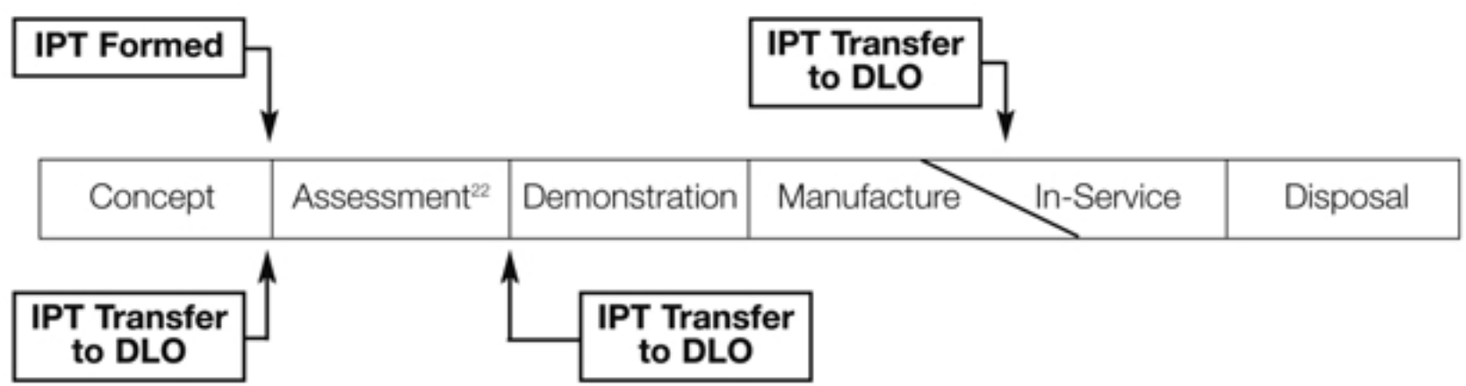
to technological change, so the choice of future Air Power platforms and sensors must be chosen with care and vision to capitalise upon technology rather than be a slave to it.

Additionally, technology has enabled world-wide, real time distribution of news, ensuring that all future operations are likely to take place in full view of the international media. This “CNN effect” and public sensitivity to its images will further focus this need for military operations with little, or nil, casualties and collateral damage. Therefore a concept of Precision Attack in future operations will be developed in attempts to ensure that a casualty-sensitive Government and public remain supportive of those operations.[19]

In sum, internal pressures upon UK Combat Air Power are a combination of the economic need for reducing costs; the political need to support the UK DIB; the military need complete the mission with minimum casualties and collateral damage under an over-arching need to ensure widespread public support by ensuring favourable media coverage, reflecting these aims, at all times.

THE PROVISION OF UK COMBAT AIR POWER

Having identified that Combat Air Power is required for current and future military operations, the next question that should be considered is how to provide the capability needed to do so? The procurement process has been repeatedly criticised in the past. The McKinsey report into Defence Procurement clearly identified the major failings: an average of 41 months' delay to delivery dates; an average increase of 10.7% in costs; significant in-service reliability and maintainability problems and constantly changing acceptance criteria to compound the problem.[20] In light of the budgetary pressure noted above, this situation could not continue. One of the key elements of the SDR is that of Smart Procurement[21] firmly based upon the McKinsey report findings. Smart Procurement seeks to realign the procurement process to reduce the unacceptable delays, and consequent increasing costs, currently experienced in defence procurement. In general terms the procurement process has been changed to reduce bureaucracy and the Equipment Approvals Committee submission requirements at the initial and main gates have been reduced to the minimum. Furthermore, Smart Procurement has adopted a through-life approach to defence procurement and increased the links with industry by both Partnership and Competition. This strategy is aimed at providing the widest possible ownership of the procurement process, with an incremental approach for new equipment and clear technical upgrade opportunities. Finally, Smart Procurement seeks to provide improved in-service support by the use of Integrated Project Teams (IPTs) and, with the creation of a joint Defence Logistics Organisation, streamline logistical support for all 3 Services. The new procurement cycle's phases and procedures are:

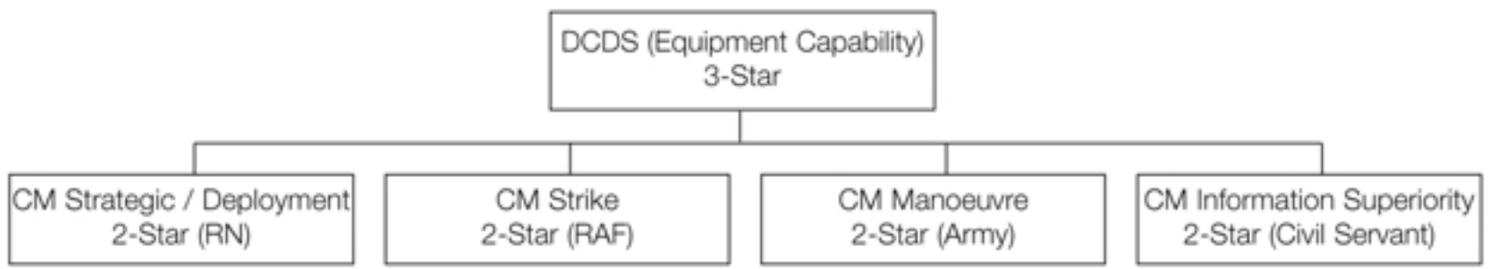


(Source: MOD Investment Strategy: Section 3)

The stated aim of Smart Procurement is to provide "faster, cheaper and better procurement with improved in-service support and savings in through-life costs".[23] This should allow full access to modern, and continuous technology insertion, within the expected financial constraints. Despite these aspirations, it remains to be seen whether the savings that the Smart Procurement

seeks will materialise, but any improvement to the procurement system should be welcomed and provide significant savings in the process.

In association with the Smart Procurement Initiative (SPI), a reorganisation of the MOD Central Staff was recommended by McKinsey,[24] as a means of permitting a wider view of defence capabilities. In the past, the Central Staffs have been organised along strict Land, Sea and Air boundaries with little interaction between them. Within the newly identified security environment, this structure would be a poor basis for force development and sustainment. Accordingly, McKinsey recommended that the MOD Central Staffs should be reorganised along functional pillars to allow a broad view to be taken in any particular capability. The reorganisation has been completed by the MOD Central Staffs and the new joint approach has been warmly embraced. The revised Central Staff structure is:



Each capability pillar is headed by a Capability Manager (CM)[25] who may drawn from any of the Services, or may be a Civil Servant as shown, with a joint staff covering a variety of component parts. For instance, CM Manoeuvre's pillar contains Direct Battlefield Engagement, Indirect Battlefield Engagement, Tactical Mobility, Manoeuvre Support amongst others. Most importantly, Manoeuvre also includes Army assets, and Strike includes Naval TLAM capabilities. Since each pillar is functionally based, rather than Service orientated, the capabilities of all component parts will be able to complement each other, hopefully with reduced inter-Service rivalry. The focus of the revitalised staffs will be concentrated upon providing the best possible blend of systems to enable a capability rather than a particular weapon system.[26] Additionally, DCDS (Equipment Capability) has a responsibility to "develop, manage and own a balanced, coherent and affordable equipment programme". This new drive for balance and cohesion should allow synergy to develop between the Services to provide the optimum operational capability.

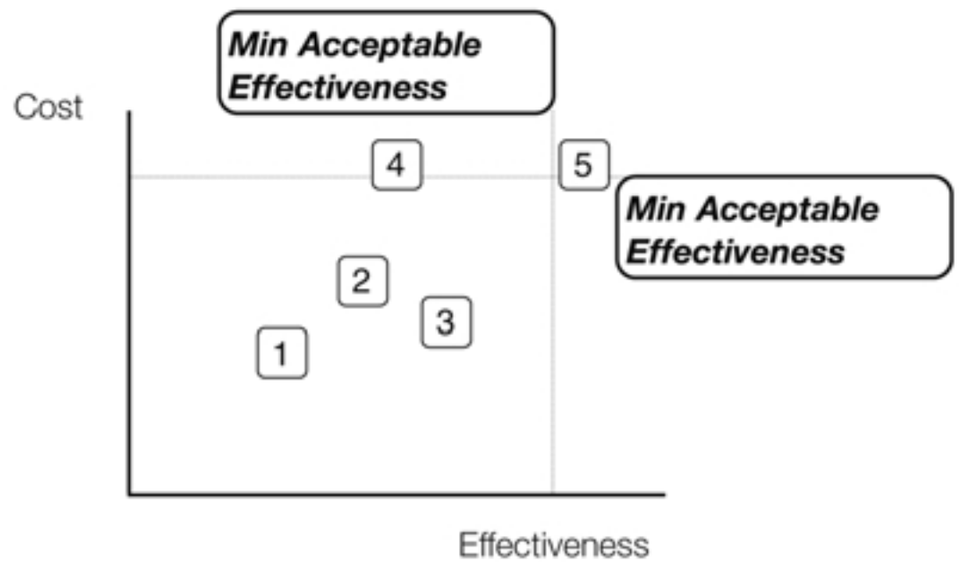
As well as aiding lateral approaches to military capability, the reorganisation of the MOD Central Staffs will also provide a focus for the procurement process. For the first time a clear customer can be identified for equipment needed for military use. The Central Customer, or Customer 1, is able to provide and receive strategic planning for military procurement. The front-line commands, known as Customer 2, hold an interest in the early stages of procurement and become the focal point when the system is in service.

For several years a vital part of the procurement process has been that of assessing the potential operational effectiveness of a new weapon system. The system in use is that of the Combined Operational Effectiveness and Investment Appraisal (COIEA).

The COIEA seeks to support the decision-making process not replace it. Within the COIEA several options are considered against each other and against the overall capability requirement, using Operational Analysis (OA) and Investment Appraisal (IA) techniques. The following options must be considered in every COIEA:[27]

- Do nothing.
- Do minimum.
- Refurbish current equipment.
- Replace with the same equipment.
- Buy follow-on.
- Buy off-the-shelf.
- Develop and procure new.

The COIEA attempts to compare all options within a common framework. The options, set as a comparison of Cost against Effectiveness, are then represented as:



(Reproduced from Choose Your Weapon, David Kirkpatrick. pp38-9)

The graph shows how a COIEA can also provide a means to identify what options may available at a particular cost, or indicate how the available options perform with respect to a distinct cost and what trade-offs may be needed to resolve the choice.

Whilst the COIEA strives for objectivity at all stages, there is scope for error or interpretation. The OA relies upon statistical analysis of the effectiveness of the equipment under consideration. The metrics are based upon numerical results,[28] such as how many tanks will be destroyed, with a limited capability to assess the wider effectiveness within a system of systems. These do not sit well with the concept of applying the manoeuvrist approach to warfare, in accordance with British Defence Doctrine,[29] as "…shatter the enemy's overall cohesion and will to fight, rather than his material…..". Furthermore, the IA allows for a variety of costs but must, almost by definition, have limited boundaries to where the costs are placed. The IA will seek to ignore costs that are common to all options and only consider costs that will be directly attributable to the each option under consideration. The IA does not, however, allow for any peaks and troughs in an option's expenditure within the Government's overall annual expenditure. It also has problems allowing for residual value of equipment, especially while it is still in service, and can only estimate the disposal value and plans at the end of its service life.[30] Thus the COIEA could not be really described as objective in all respects.

It has been shown that the COIEA process is a subjective tool; at the higher level there may be insufficiently articulated measurements of effectiveness, whilst lower level studies are unable to consider overall systematic effectiveness. Thus the context and results of a COIEA must be understood, interpreted and applied intelligently.

A further consideration for future procurement is the design and production strategy choice. The main procurement choices with the major advantages and disadvantages of each option, detailed by the National Audit Office in 1994 as being:[31]

Procurement Route	Advantages	Disadvantages
Individual National Development	• Control over specifications. • Control over time scale. • Ability to impose UK contractual practices. • Possibility of export sales.	• Costs likely to be very high for major platforms. • Developing a weapon from scratch as opposed to buying off-the-shelf carries greater programme and cost risk. • Can lead to a lack of commonality with NATO allies.
Individual National off-the-shelf	• Usually considered cheaper than funding development. • Equipment is proven when purchased. • Control over timescale. • Can impose UK contractual practices.	• Equipment may not meet requirement; leading to • Costly customisation of equipment.
Collaborative off-the-shelf	• Owing to economies of scale usually cheaper than national off-the-shelf. • Can enhance interoperability if equipment is used by allies. • Can lead to net inflow of technology from overseas. • Owing to economies of scale, usually cheaper than national development. • Usually cheaper than development.	• Risk of compromising on specifications. • Risk of project delays as a result of problems in partner countries. • Difficulties in imposing UK contractual practices. • Equipment may not meet requirement; leading to • Costly customisation of equipment.
Collaborative Development	• Commonality with equipment used by NATO allies. • Economies on in-Service support. • Can lead to net inflow of technology from overseas. • Owing to economies of scale, usually cheaper than national development.	• Risk of compromising on specifications. • Risk of project delays as a result of problems in partner countries. • Difficulties in imposing UK contractual practices. • Imposition of workshare between partners can inflate costs. • May result in a net outflow from UK to other industrial partners.

There has been much discussion regarding the "best" procurement strategy. Escalating costs within the aerospace industry suggest that both of the independent, national options may be unachievable for the UK in the future.[32] Conversely, collaboration procurement is generally held to be both economically and politically desirable.[33] However, there is evidence to suggest that the inefficiencies of collaborative programmes can increase development and production times. With expected increase in costs of approximately 8-10% per annum, any delay will produce an increase in the overall cost of a programme, but it is still considered that the national cost of a collaborative programme would be less than a purely national one.

In line with its parallel intention to maintain the UK DIB, development rather than off-the-shelf purchasing is likely to be the UK's choice. Additionally, despite the listed disadvantages for collaborative developmental procurement, in the 1998 SDR the UK Government clearly stated its intention to use international collaboration to achieve economies of scale.[34] The Government must also be expected to attempt to support UK companies to the maximum possible extent within this international collaborative framework.

In addition to Smart Procurement, a significant effort to change the MOD accounting system that supports all its expenditure has been implemented recently. Previously the MOD used cash-based financial methods, in accordance with the Government's need to maintain tight fiscal control, on an annual basis.[35] However, cash-based accounting does not allow for the value of stock, assets, or their depreciation.[36] Nor can cash-based accounting spread capital expenditure since liabilities and capital disposal are only accounted for when the purchase or disposal occurs. Therefore, it is difficult to appreciate the full, true costs involved in running the MOD. Project CAPITAL seeks to replace the old cash-based system with one based upon Resource Accounting and Budgeting (RAB) by 2001/2.[37] RAB uses accruals accounting methods,[38] supported by the concept of matching objectives and outputs, with a clear audit trail of cost communications[39] and measurable analysis of military outputs. Most importantly, RAB will spread the cost of an asset over its life, whilst levying an annual depreciation charge on that asset.[40]

Theoretically, RAB will provide a clear view of the true cost of ownership of military capability by providing the means to recognise procurement and ownership costs, with due allowance for the depreciation of capital assets, in public annual accounts. However, it must be noted that "[RAB] is not just an accounting system: it will fundamentally change the way MOD manages its resources and operations"[41] and management structures and procedures must change to embrace it. Whilst RAB has many obvious benefits, there are many concerns that once full through life costs of military equipment are seen, and available for public audit, the focus of examination will not be to ensure efficient procurement and operation, but may simply seek to reduce the total of the annual balance sheet.

UK COMBAT AIR POWER WITHIN THE "NEW" SECURITY ENVIRONMENT

Within the generic heading of Combat Air Power there are several major operational capabilities. These have been defined in AP3000 (Air Power Doctrine, 3rd Ed)[42] as:

1. Control of the air, using defensive fighter aircraft and surface to air missiles.
2. Operations for strategic effect.
3. Anti-surface force operations including air interdiction and close air support.

AP3000 provides a wide ranging discussion on the many factors that are needed for, or act as constraints upon, Combat Air Power operations. The major factors may be summarised as:

Key Attributes/Requirements	General Constraints
Reach Responsiveness Flexible Interoperable (each other & coalition) Survivable Sustainable Information Exploitation Precision Attack (day/night, all weather, air-air & air-ground)	Low Collateral Damage Low (Nil?) Casualties Legal Use of Force Restrictive Rules of Engagement

AP3000 also discusses the tactical roles that Combat Air Power must fulfil. These roles are a combination of some that are independent and ones that support land operations. In brief these roles are:

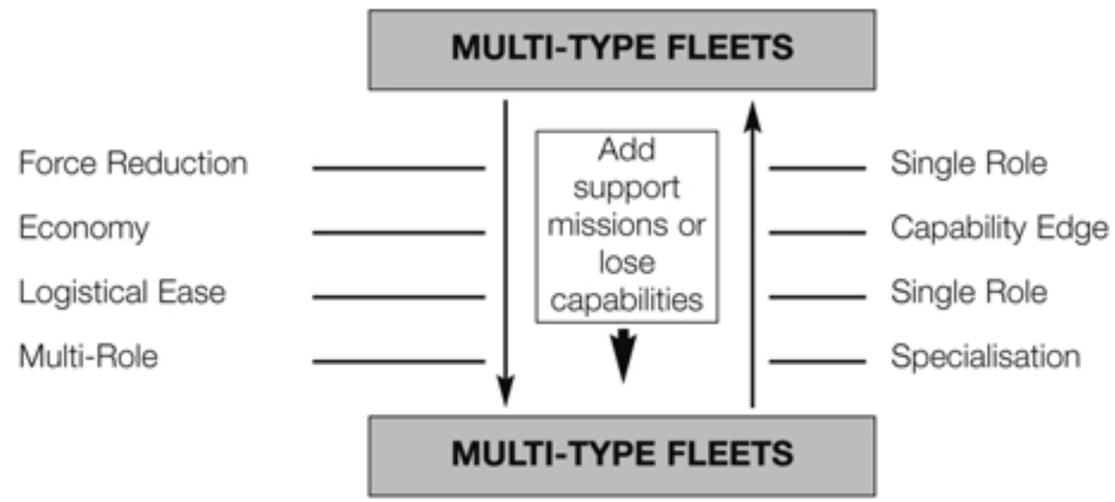
Ship-launched cruise missiles heading to Baghdad during the Gulf War.

Role	Comments
Control of the Air Offensive Counter Air (Airfield Attack) Fighter Sweep/Escort SEAD Defensive Counter Air	Air action against enemy air power assets. Offensive air action against enemy fighters. Air action to neutralise or destroy enemy SAM systems. Fighter and SAM defences against enemy air assets.
Operations for Strategic Effect	Air action against strategic targets.
Anti-Surface Force Operations Air Interdiction Close Air Support	Air action against enemy forces before they can attack friendly forces. Air action against hostile targets in close proximity to friendly forces.

It has already been noted that military, and hence Combat Air Power, assets can expect to be involved in a wide range of operations in the future. This range of operations, and the increasingly complicated joint battlespace, suggest that the current delineation of roles may not be adequate for future operations. Recalling the Kosovo air campaign, many Combat Air assets including the RAF Harrier GR7s were employed in a role reminiscent of CAS – yet there was no close contact battle in progress.[43] Similarly, the distinction between strategic effect targets and tactical targets is becoming increasingly blurred. For instance, despite being a nominally strategic weapon the RN TLAM may be the ideal weapon to use against a traditional tactical target. To ensure optimum target-weapon system matching in the future a re-examination of the interaction of Combat Air Power roles is needed to include a full appraisal of the joint battlespace.

…despite being a nominally strategic weapon the RN TLAM may be the ideal weapon to use against a traditional tactical target

The RAF has, in the recent past, tended to procure single role capable aircraft. Typical of this genre is the Tornado GR1 bomber, designed to penetrate enemy airspace at low level and in poor weather, possessing little self-defence capability that demands other fighters' protection against any competent Integrated Air Defence System. To compound the problems of the RAF procuring aircraft that are essentially single role, or providing a single capability, these aircraft are based and operated within type boundaries to ease logistical costs and requirements. This basing and operating policy severely limits any development opportunities for synergistic operations. Furthermore, the absence of any true multi-role aircraft has required, and will continue to do so, the deployment of different aircraft types to provide any particular blend of operational capabilities. This approach could never be argued to be cost-effective, either financially or operationally. The interaction between single and multi-type fleet of aircraft may be expressed as:



In the future, however, there is no doubt that logistical ease and associated economies will drive the choice towards multi-role aircraft, such as EFA. This will then present the operators with a training burden to ensure that crews are sufficiently practised in all roles, or adopt a common aircraft type with different squadron role specialisations.

Additionally, all current RAF aircraft were designed and built as standalone systems and were not considered as part of a linked system. The nearest contender for consideration as a "system" platform is the Tornado F3 fitted with the JTIDS/Link16 datalink.[44] The use of a secure, real-time datalink cannot be overstated. It allows formations of fighters to operate together with much greater tactical effectiveness than was previously available, and can provide system-wide sensor information. In short, the JTIDS/Link16 allows a dramatic reduction in "sensor-shooter" time scales. The Link16 datalink is becoming the standard for future operations and costly upgrade programmes are underway in the USA to fit it to all tactical aircraft. Regrettably, the UK MOD has not funded such a programme for its combat aircraft: indeed it is almost certain that EFA will enter service without its version of Link16. Much has been written about the significance of datalinks in future operations, and in 1998 it was suggested that "datalinks will provide the biggest gains for fighter effectiveness early in the next century".[45] The addition of datalinks, as part of upgrade programmes, must be considered as vital to any systematic increase in capability for current and near-future combat aircraft.

DOCTRINAL ISSUES

Current RAF doctrine, as discussed in AP3000, articulates the requirements for the various roles but fails to explore the possibilities of alternative means of fulfilling those roles, for instance by the use of non-RAF assets. Indeed, AP3000 goes so far as saying:[46]

> *"Both the Royal Navy and the British Army operate rotary and fixed-wing air vehicles which offer highly capable specialist and organic support to their environment. Single-Service doctrine to explain the specialist requirements of the maritime and land environment is contained in British Maritime Doctrine and British Military Doctrine."*

RN doctrine for the use of organic RN air assets, defined in BR 1806: British Maritime Doctrine,[47] only discusses the use of fixed wing RN aircraft in the roles of counter air, anti-surface operations and combat support air operations in direct support of the carrier task group. The RN doctrine suggests that RN air assets should be integrated with land-based air assets and it is recognised that RN air assets should be co-ordinated by the Joint Force Air Component Commander (JFACC). However, no detailed guidance on the doctrinal resolution to the operational problems associated with a complex, joint battlespace expected in the future is given. Furthermore, the TLAM is used in a purely strategic role and would not be under the command of the JFACC, but directly from the UK MOD.

There is a vast amount of doctrine available for the use of air assets by the Army.[48] However, the doctrine only concentrates upon the use of Army air assets as support to the close and deep contact battles. Similarly, RAF assets are seen in a purely supporting

role. Whilst it is recognised that "Air Power has a vital role to play in modern warfare and will have a decisive influence on the outcome of any conflict"[49] there are no details on how the Army and RAF assets may be used to complement each other, and no articulation of how these Army assets may be used to fulfil the SDR aspirations of "[Air Power] having an offensive role in its own right" discussed above. In the near future, AH64 will offer a much deeper strike option for the Army and, more importantly, for any Joint Force Commander than has been previously available. The AH64, sharing many capabilities with the Harrier, must be a fully joint asset rather than simply providing battlefield support to the Army. Doctrine and training for its crews must follow these principles from its inception and develop appropriate doctrine to fully integrate all air assets into a joint battlespace to ensure effective use of the AH64.

The AH64, sharing many capabilities with the Harrier, must be a fully joint asset rather than simply providing battlefield support to the Army

The "stove-pipe" doctrinal approach seen here advocates joint, synergistic operations in the Combat Air Power arena but relegates RN and Army assets to a strictly supporting role within their respective environments rather than expound how they may be integrated into a recognised Combat Air Power role. Given that Air Power may be a combat-winning capability in its own right and with ever-decreasing resources, this failing cannot be allowed to continue. Effective application of Combat Air Power requires that a holistic view must be taken of all possible contributors in the future.

The creation of JF2000, as detailed in the SDR,[50] will effectively combine the RAF GR7 and the RN FA2 into deployable carrier air wings with reasonable air-ground and air-air capabilities, and overcome previous inter-Service rivalry and boundaries that have tended to reduce operational interaction between aircraft types. Similarly, the creation of the Joint Helicopter Force (JHF) should allow integration of the new AH64 into the mainstream of air power, although it has many more characteristics in common with the Harrier force rather than with its rotary-wing companions.

Emerging doctrine, in documents such as JWP 3-00 (1st Study Draft), does seek to integrate all Combat Air Power assets to a limited degree. Concepts such as Joint Fires within the battlespaces explored, and the relationship between the various elements of command, but the focus of this emerging doctrine remains at the tactical level in direct support of surface operations. In the future this doctrine must be expanded to encompass all aspects of Combat Air Power, including those where it is a combat activity in its own right, rather than a supporting capability, using all available assets to achieve optimum effectiveness. Additionally, revised doctrine must focus all efforts at seeing Combat Air Power over the entire joint battlespace with more flexible boundaries between the land, sea and air environments.

FUTURE POSSIBILITIES

The key question for future Combat Air Power is: how can the need be met, within acceptable cost and performance boundaries? There are many possibilities ranging from a continued investment in manned aircraft to the use of unmanned aircraft or other systems. A brief examination of the key contenders for future procurement will identify potential candidate systems for the UK. The future joint battlespace will mean that no individual platform will be able to provide a suitable operational capability in all arenas, or be able to do so as a "standalone" item: it is clear that the supporting systems must be fully integrated and considered with any future aerospace weapons options.

In the near future, EFA has been ordered to fulfil both the air superiority and ground attack roles within the RAF, replacing the Tornado F3 and Jaguar by 2010. EFA is expected to provide a quantum leap forward in capability, particularly in the air-air role, and will be the core aircraft for the RAF for some time. The approximate cost of the EFA programme will be £14.5 billion[51] for a total of 232 aircraft. When Integrated Logistic Support (ILS) and development costs are considered, the unit cost for each EFA will be £40.2 million.[52] The EFA programme is not without problems: it is late and costs are increasing. Some of these problems are caused by the technology involved, but the majority are a direct result of the collaborative nature of the programme.[53]

EFA is expected to provide a quantum leap forward in capability, particularly in the air-air role, and will be the core aircraft for the RAF for some time

Future Offensive Air System (FOAS)

The second major Combat Air Power project currently under development is the collaborative Joint Strike Fighter (JSF) planned to replace the Harrier and Sea Harrier in the UK in the 2010-2012 period. JSF will be built by a US/UK joint venture, although the winning companies have not yet been confirmed. Costs of the JSF are expected to be half that of EFA, and is likely to provide a relatively cheap fighter option, although not as capable as EFA. JSF is a primary contender for the Future Carrier Borne Aircraft (FCBA), and since the FCBA is likely to replace both the Harrier and Sea Harrier will aid the convergence of doctrine and operation discussed earlier in this Paper.
By the end of the next decade the Tornado GR4 will be replaced by the Future Offensive Air System (FOAS).

Procuring a new combat aircraft is an expensive business. An alternative option may be to upgrade those aircraft already in service. Key aspects that should be considered for such updates include the weapons system; the propulsion and flying characteristics and the provision of an increased self defence capability. Many aerospace companies, such as BAE Systems and Lockheed-Martin amongst others, are actively pursuing a market for upgrading in-service combat aircraft. For instance, Lockheed-Martin are about to complete the upgrade of European nations' F16 fighters at a cost of more than £5 million per aircraft.[54] Whilst an upgrade programme may seem to be an attractive option, the associated costs are often not instantly obvious, or may be difficult to estimate,[55] and may produce significant effects upon the deployable fleet operational capability.[56] These extra costs must include funding for long-term maintenance, which will become increasingly difficult as those aircraft become older and need more work and spares to maintain their serviceability. The UK has a history of using aircraft and weapon upgrade programmes, of greater or lesser significance, to provide an operationally essential capability that was not available during design and development phases. Thus, future UK aircraft development must include the growth potential for in-service upgrades promised by Smart Procurement.

…under development is the collaborative Joint Strike Fighter (JSF) planned to replace the Harrier and Sea Harrier in the UK in the 2010-2012 period. The Tornado GR4 will be replaced by the Future Offensive Air System (FOAS)

Another option to consider is that of increasing the capability of the weapons that may be used rather than the host platform. PGMs have steadily increased their dominance over simple "dumb" bombs, especially since they may be dropped from higher altitudes and provide a measure of stand-off for the delivery aircraft[57] with a high degree of accuracy using either laser guidance or

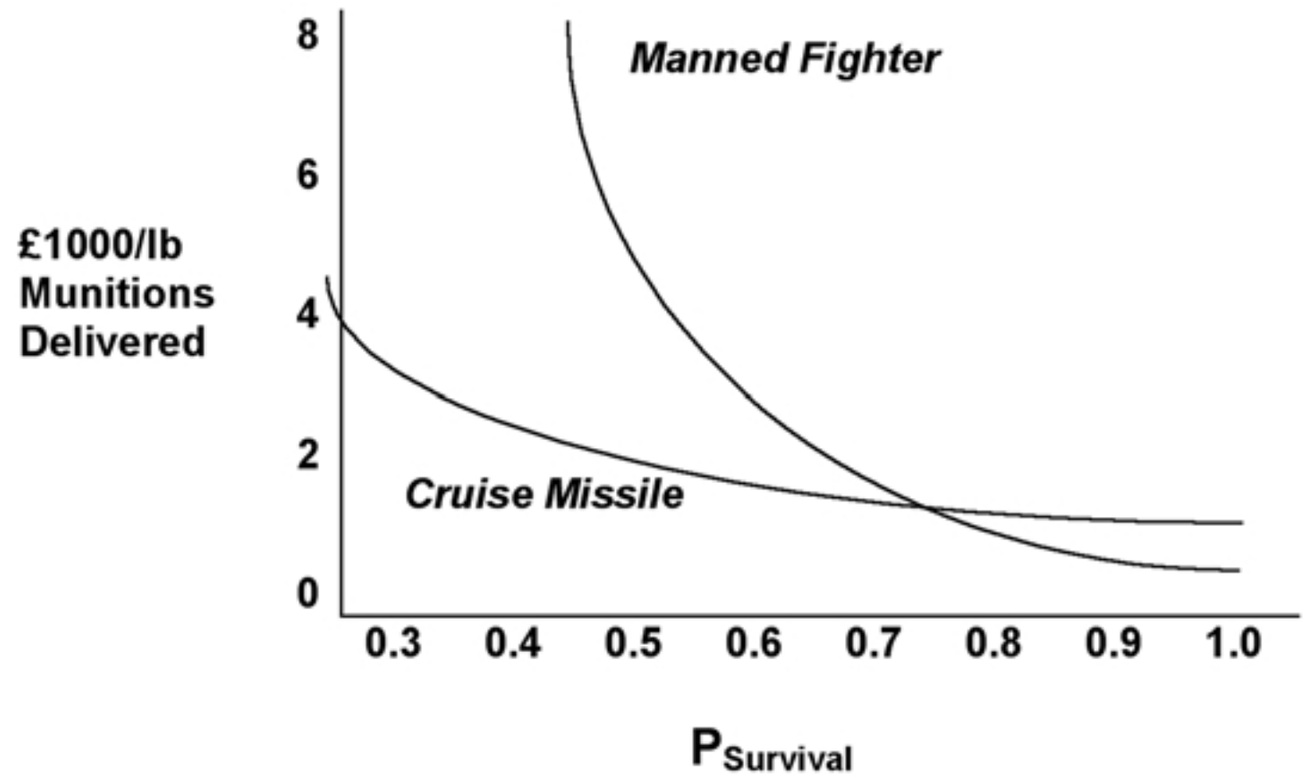
GPS tracking, but at an increased cost over their unguided counterparts. Accordingly, smart weapons should be seen as a complement to, not a substitute for, conventional "dumb" bombs. In the future it is probable that increasingly smart weapons will complement smart aircraft. Typical of these systems is the recently ordered Brimstone anti-armour weapon[58] with an advanced millimetric radar, used to detect armour targets, before detonating at the appropriate position to ensure optimum lethality with minimum chance of collateral damage. The RAF plans to acquire the Matra BAe Dynamics Storm Shadow missile to provide a stand-off capability for the EFA, Tornado and Harrier aircraft of approximately 400nms.[59] Furthermore, Storm Shadow will have a warhead that will be extremely effective against hardened targets.

Possibly the most sophisticated stand-off weapon currently in UK service is the Tomahawk Land Attack Missile (TLAM) fitted to the RN Trafalgar class of submarines, and Astute class in due course, used in the Kosovo campaign. TLAM has a range of approximately 1,000nms and a conventional warhead of approximately 1,000lbs.[60] TLAM is an ideal weapon to attacking deep strategic targets that may be difficult to attack with manned aircraft, but has little capability against hardened targets. The procurement costs of the submarines, of the order of £270 million each, plus the refit costs involved with fitting the submarines for TLAM, together with the cost of the missiles (£850,000+[61]), could lead to the conclusion that TLAM is a very expensive single use weapon compared with the cost of a simple general purpose 1,000lb bomb – £25,000 each.[62] These figures are used only for illustration. The RN TLAM capability is only one of the many roles of the RN Submarine force. The figures do, however, serve to show that much of the cost of development and production involved with smart weapons is only used once and lost when the missile hits the target.

Possibly the most sophisticated stand-off weapon currently in UK service is the Tomahawk Land Attack Missile (TLAM) fitted to the RN Trafalgar class submarines…

Brimstone, Storm Shadow and TLAM demonstrate the trend for increasingly sophisticated stand-off weapons

that allow the firing platform to enter a hostile environment for the minimum time. All 3 systems have different combat applications, and they should be seen as complementary rather competitive. The relative cost of these weapon systems is difficult to quantify, since one can draw different boundaries for each capability. However, Lockheed Martin Tactical Aircraft Systems have suggested that it is possible to draw a simple comparison. In general terms, on the basis of cost/pound of payload delivered, using a cruise missile will be "two orders of magnitude" more expensive than using a fighter launched PGM.[63] BAE Systems contend that the cost differential may be expressed as:[64]



(Reproduced from BAE Systems Visit Notes: 2 Dec 99)

Whilst these costs are notional ones they serve to emphasise that costs and effectiveness can only be compared or considered within specific constraints or scenarios. The graph can be used to determine, for a given $P_{survival}$, whether a manned or unmanned vehicle may be the best option. For instance, if the $P_{survival}$ is greater than 0.75 then a manned solution is a relatively cheaper option, whereas for $P_{survival}$ less than 0.75, then a cruise missile would be the cheaper option. Thus, as already noted, TLAM is the ideal choice for attacking deep well-defended strategic, but unhardened, targets to complement manned aircraft attacks. Conversely, manned aircraft attacks, using PGMs or conventional weapons, would be ideal in situations demanding more flexibility or with ROE difficulties.

In addition to the smart weapons discussed above, increased range and capability for the Army MLRS is available. A development of the MLRS munitions is the Army Tactical Missile System (ATACMS) and ATACMS II system now in service with the US Army and under consideration for future procurement for the UK. ATACMS I and II can attack targets such as air defence systems, C^2 sites and the like at a range well in excess of 100nms, with further development possible to include anti-armour capability.[65] This enhanced potential capability of the MLRS must, therefore, be considered as a joint asset and able to contribute to the provision of Combat Air Power.

The UK is currently exploring options to replace the Tornado GR4 strike aircraft in approximately 2015/7 with the Future Offensive Air System (FOAS). Some £35 million has been invested since 1997 to evaluate the wide range of options that should be considered for the FOAS.[66] One of the primary options under examination is the development of Unmanned Combat Air Vehicles (UCAVs) derived, in principle, from current from Unmanned Air Vehicles (UAVs). UAV systems such as Pheonix, have been in service with the British Army for several years in the reconnaissance role for some years.

UAVs can provide an extremely effective surveillance capability, and have recently been used in limited combat roles such as defence suppression

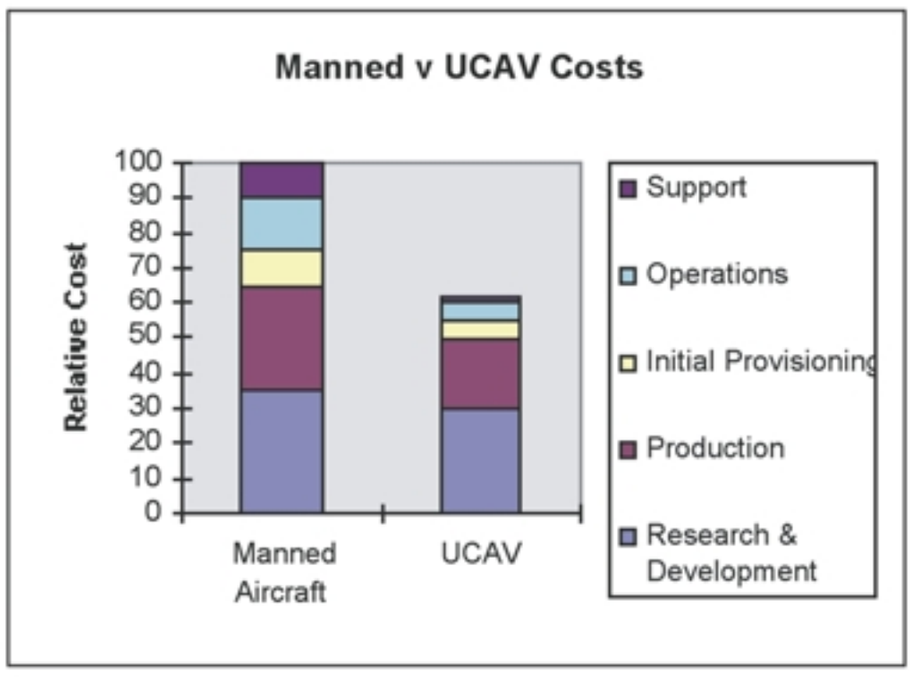
UAVs can provide an extremely effective surveillance capability, and have recently been used in limited combat roles such as defence suppression. All current UAVs are either directly or indirectly controlled from a human operator at a ground station. Research is currently underway to investigate the feasibility of removing this need for human control by the automation of all decisions required to fulfil a mission, or to develop artificial intelligence to the point where autonomous combat operations for UAVs, or rather UCAVs, could be a reality.

On first examination, UCAVs may be appear to be a simple and cheap option for future operations. They may have many advantages over manned aircraft, especially when political constraints on reducing risk to aircrews exist. Furthermore, many studies into UCAV possibilities have agreed that the "absence of a crew, a cockpit and life support systems allows vehicles that are smaller, less detectable, and more manoeuvrable [than manned aircraft]" and a UCAV may "be lighter and better streamlined [than manned aircraft]".[67] With appropriate development, UAVs and UCAVs appear to be capable of fulfilling operational missions such as reconnaissance, electronic warfare and SEAD.

Further examination, however, shows that UCAVs suffer from a range of technical limitations when compared with manned aircraft.[68] Firstly, more complex vehicles require sophisticated control systems with highly trained support and operational

personnel. Therefore, UCAVs will need artificial intelligence capability or fail-safe remote control systems. Both of these problems present major technical challenges and may severely limit the opportunities to employ UCAVs in operations involving the use of lethal force, particularly in those operations involving problematic ROE.

Many exponents of the replacement of manned aircraft with UCAVs claim that the cost for a UCAV is of orders of magnitude below that of manned systems. The BAE Systems' studies into FOAS options suggest that the overall cost of development and ownership of a UCAV system could be expected to be some 60% of the cost of a manned system. An approximate comparison of these relative costs is:



(Reproduced from BAE Systems Visit Notes: 2 Dec 99)

BAE Systems' comparison has assumed that non-recurring, that is research and development, costs for both manned and unmanned systems are broadly comparable. It has already been seen that current technology UAVs are remotely piloted, with little autonomy, so this simple derivation of research and development costs may be extremely optimistic for the introduction of UCAVs as the sole system to fulfil the FOAS role. In the longer term, particularly with the current rate of electronics and computer development, Artificial Intelligence systems will undoubtedly have this capability and may be an ideal candidate for technology insertion to provide an upgrade route to the "son of FOAS". Moreover, ROE restrictions suggest that it is likely there will be a political requirement to retain a "man in the loop" for most lethal systems, so any UCAV must have a robust, secure and covert communications systems. This requirement presents yet another technical challenge: to provide a high data rate two-way datalink that is uninterrupted , since any interruption at a vital moment could be catastrophic. This need will bring a further cost penalty, and may also restrict operating boundaries for UCAV systems. Finally, in a battlespace involving tens, or even hundreds, of UCAVs communications bandwidth will be a serious problem, even with the use of satellite relay systems.[69] This communications link could also be a fatal weakness in any UCAV system, susceptible to enemy interference or jamming that may render the UCAV capability useless with relatively simple electronic counter measures.

Low operating and support costs are seen to be one of the major benefits, in full life-cycle terms, for the development and introduction of UCAVs. This would be possible by extensive use of synthetic training facilities – feasible since crew training would be in systems operations, rather than the mechanical skills needed to actually fly an aircraft. Up to 95% of the procured UCAV fleet could be held in reserve until required for operations, or even held in readiness by the manufacturer. The remaining 5% of the UCAV fleet would be flown continually, to train and exercise the complete weapons system, and effectively be disposed of at the end of their fatigue or flying life. Unfortunately, current civilian Air Traffic Control systems will not allow widespread UAV/UCAV operation in close proximity to passenger and freight carrying aircraft: this would significantly reduce training opportunities in peacetime, which would in turn affect operational capability of the system itself.

The advantages and disadvantages discussed above have concentrated upon the technical benefits and problems with the development of UCAVs for future operational use. The utility, or otherwise, of UCAVs must also be considered from the benefits of having a human crew, or the limitations that exist for a UCAV without a human pilot or crew. The Operational Analysis Department at BAE Systems (Warton) working on options for FOAS have suggested that aircrew have both strengths and weaknesses that must be considered when evaluating the use of UCAVs in the future. These may be summarised as:[70]

Aircrew Strengths	Aircrew Weaknesses
Decision Making Ability	Size & Shape
Tacit Knowledge & Experience	Durability
Situational Awareness Appreciation	Vulnerability
Learning Ability	Psychological Limitations
Delegation of Responsibility	Physiological Limitations
Unpredictability	Sensor/Computational Limitations
Flexibility	Cost of Training and Employment
Non Pre-programmed Communications	Social/Political Propaganda
Social/Political Propaganda & Restrictions	

This table shows that the human operator has much to offer and may be difficult to replace. This is particularly true in a dynamic combat situation that does not have a clear set of options and which cannot be reduced to a simplistic set of rules, but requires the operator to exercise judgement based upon their experience and decision making ability. Humans have been shown to be good at "intuitively picking a reasonable course of action when the information they receive is confused and incomplete".[71] Furthermore, current technology cannot reproduce the heuristic information that a pilot will have acquired throughout his/her training and experience. The unique qualities of the human mind are, for the time being, likely to remain beyond any UCAV autonomous control system. Accordingly, it follows that UCAVs may prove to be ideal for many combat applications, with manned aircraft being used in those situations requiring human judgement.

Finally, the "Social/Political Propaganda" noted above as both a strength and weakness follow from the demonstration of intent that manned aircraft can convey. The use of a manned aircraft system demonstrates clear commitment from the Government. This may help in "sending a message" to a potential adversary. Alternatively, the use of UCAVs may suggest that the

Government is not fully committed to an operation. In any deterrent or coercive operation, this false impression may serve to simply exacerbate the situation rather than contain it. The weakness of a crew is, of course, the possibility of casualties or prisoners of war: it has already been noted that this would not be welcome in the modern environment.

UCAVs offer many opportunities for radical new approaches to the provision of Combat Air Power, but do not offer a cost-free option. The factors discussed here suggest that, for the foreseeable future, UCAVs would be best used for "simple" missions to supplement, rather than replace, manned aircraft in combat roles.

In recapitulating the major themes that have emerged through this Paper, it is clear that the provision of Combat Air Power is a complicated process with a wide variety of considerations. Furthermore, "cost effective" clearly means different things to different people. Combat Air Power, within a wider military organisation, will be required for many years to come despite the end of the Cold War. The unstable international situation, with a plethora of threats including both conventional and asymmetric threats, demands that British forces are capable of providing capabilities ranging from full combat operations to peacekeeping policing actions. These operations could take place around the world, probably within a coalition framework.

Many would contend that all that is needed to provide cost-effective Combat Air Power is to reduce procurement and operating costs. However, detailed analysis shows that the problem is more involved than that. Firstly from an economic perspective, cost-effective is seen as essentially pursuing the cheapest solution to reduce the total value of the balance sheet. Politically, cost-effectiveness is bounded by the need to support the UK DIB within collaborative development programmes. Furthermore, the Government and the military hopes to use Combat Air Power when necessary but with no collateral damage or casualties, probably within a deployed coalition framework. Thus, interoperability with potential allies is vital to ensure effective use of Combat Air Power assets.

The COIEA process that is used to support all major procurement can provide a limited comparison of options, but has significant problems establishing the metrics by which operational effectiveness can be measured or compared. The metrics in use do not relate well to the tenets of manoeuvre warfare that British Defence Doctrine seeks to use. Furthermore, the modelling used by a COIEA may be limited depending upon the system in focus. It is vital that the COIEA is understood and applied intelligently by its users in the decision making process. However, it is clear that the Government's political need to support the UK DIB may be the final arbiter in most procurement decision despite a contrary military recommendation. The provision of British Combat Air Power has recently been revitalised by the adoption of Smart Procurement, which seeks to provide "faster, cheaper and better" military equipment and has already made significant steps towards this aspiration. The benefits of Smart Procurement have not materialised yet, but they are expected to provide significant savings in defence expenditure.

The reorganisation of the MOD Central Staffs should allow fully joint development of future capabilities between all 3 Services' air assets rather than the old single Service "stove pipes". This synergy should provide the means to fully integrate all UK air

assets in future operations. These assets will include multi-role RAF/RN fixed wing manned aircraft equipped with smart weapons such as Storm Shadow, Brimstone, LGBs *et al*, Army attack helicopters and advanced MLRS systems. Additionally, RN TLAMs should be used to complement these assets, when appropriate. Finally, the use of UCAVs should be developed to provide a complementary capability, particularly in situations where friendly casualties are deemed unacceptable and when ROE allows the use of UCAVs, to supplement the use of manned aircraft. There is still a definite need for manned aircraft to be used in particularly difficult missions when ROE and interpretation of incomplete data is necessary.

However, all of these advances in cost-effectiveness will not provide the best possible military capability unless the underpinning doctrine, both for the roles involved and the assets used, is changed to reflect the need to integrate all of the assets to best effect within an increasingly complex battlespace. Rather than use current platforms, almost in isolation, a systematic approach must be taken and the optimum weapon system for a particular task must be procured and subsequently used. A good example of this would be the use of MLRS in a SEAD role, rather than in direct support of ground operations, replacing the need for fixed wing missions against enemy SAM systems. The conceptual basis for this integration, with positive encouragement on the lateral use of weapon systems and associated training, must be encouraged at all times. There is no doubt that future military operations will be joint, and probably expeditionary within a coalition, and unless the Combat Air Power assets are fully integrated at all levels then the huge amounts of money spent on their procurement will only provide a sub-optimal capability, and could not be claimed to be “cost effective” in the final analysis.

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BOOK REVIEW BY GROUP CAPTAIN PETER W GRAY DIRECTOR OF DEFENCE STUDIES (RAF)

GOERING

RICHARD OVERY,
Phoenix Press, London 2000
(Originally published by Routledge 1984)
ISBN 1 84212 048 4

The popular image of Hermann Goering is of a corrupt, indolent individual who owed his high position to his sycophancy to Hitler. Goering is often portrayed as a bumbling character whose taste for high living, fancy uniforms and exotic medals and paraphernalia were at odds with the stereotypical Nazi.

In this welcome reissue, of what was originally a controversial biography, Richard Overy takes the reader far beyond these images. He shows us a ruthless, energetic and ambitious man whose tactics and techniques for the acquisition and expansion of power were on a par with those of his colleagues, Himmler and Goebbels. Although as Professor Overy points out, Goering's public face was very carefully cultivated and he enjoyed far more popularity than his character and track record indicate that he deserved.

Although Goering is best remembered as head of the Luftwaffe, he was also responsible for the creation and running of large sections of the German industry that subsequently became the engine room of Germany's war machine. To the casual reader, Germany in World War II could be perceived as being an extreme dictatorship with the vast bulk of society on a regimented war footing with the tentacles of the police state ever present. Whilst this was undoubtedly true, it did not happen overnight. The process by which Hitler, and his supporters, gradually infiltrated all sections of German society, industry and the military makes fascinating reading. The setting up of parallel economic instructions, the bullying of officials in other ministries only to deal with Goering's machine and the ruthless exploitation of real and fictional personal failings took time, vision and machiavellian energy to bring about. Goering evidently revelled in it all especially when the vendettas got personal. When he replaced Schacht as temporary Economics Minister, Goering's first act was to telephone his out-manoeuvred and discredited predecessor to crow over his victory. There is also an enduring image of Goering being less extreme and less anti-semitic than many of his contemporises. His opposition to 'Kristallnacht' in November 1938 is a classic example. Overy quickly shatters this myth, pointing out that part of Goering's 'distress' was due to his non-involvement. Furthermore, he did not approve of the random and wanton destruction of property that in time would be expropriated anyway. In reality, Goering was at the forefront of the passage of anti-Jewish legislation and the 'organisation' of industry.

For students of air power, the Chapter on the Luftwaffe makes excellent reading. Goering's personality traits, foibles and failings again come to the fore. He saw himself as a latter-day Charlemagne, Napoleon or Frederick the Great. His relish of the title of Reichsmarschall typified his wish to be seen as a man who embraced the complete spectrum of public life. Part of the reason for the Luftwaffe's ultimate failure lay in the German military's conservative failure to challenge Goering. Part of this was due to his intolerance of criticism or challenge, part was also due to deference to his rank and previous gallantry. Goering's incompetence, however, was a major factor. He had difficulty in grasping technical matters and was unwilling to defer to those that did.

Although Goering was not oblivious to strategy, his loyalty to Hitler ensured that he mirrored his leader's every move inevitably to the chagrin of the more enlightened subordinates whose advancement was deliberately

blocked. Crucial to this process was Hitler's contempt for defence. The blend of incompetence and an unwillingness to accept a realistic assessment of Allied capabilities, resulted in the Luftwaffe failing to reach its potential. Goering's stock began to fall as a result – although his replacement by Speer as economics supremo was more evident in the public view.

As Goering's credibility with Hilter waned, his competitors sought to bypass and marginalize his power and influence using tactics that Goering himself had championed. A combination between this gradualism and Hitler's unwillingness to sack outright an old comrade ensured that Goering was there to the bitter end.

This book is worth serious consideration for a number of reasons. Dispelling the myth of Goering as a moderate is one of these. The insight into the realities of the Nazi war economy is another. The chapter on the Luftwaffe stands as an excellent introduction to the inter related problems of technology, aircraft supply and warfare. Perhaps the most important and enduring theme was Goering's failure to translate impressionistic views into operational reality – in air power warfare and in economics. In essence, this was a failure in command.

AIR DEFENCE OF GREAT BRITAIN: VOLUME II, GROWTH OF FIGHTER COMMAND

T C G JAMES WITH AN INTRODUCTION BY SEBASTIAN COX
Whitehall History Publishing,
Frank Cass & Co
ISBN 0-7146-5123-0

Even the most superficial glance around the shelves of a military library, or indeed the displays of one's local bookstore, reveal many works on a given campaign. Some of these works will be based on the increasingly popular use of oral evidence. Others make extensive use of photographic archives. More detailed works in turn examine twists in policy, personality clashes or even attempt to describe the operation in full. The histiography of the Battle of Britain is no exception with copious quantities of material from 'spotters' books of colour schemes through to serious monographs. The vast majority of these books have one thing in common – they have drawn on the original official history as their starting point for research.

This book represents the Second volume of the Narrative commissioned by the Air Historical Branch while the War was still in progress. The first volume is due to be published next year and covers the period immediately prior to the outbreak of war. The work has been declassified, and thanks to Frank Cass (and more particularly, Mr Seb Cox as Head of the AHB and Series Editor), it is now widely available.

Volume II covers the Battle of Britain and its publication has, inevitably, been timed to coincide with the 60th Anniversary of the Battle. The first part covers the effect of the German occupation of Europe on the air defence of the UK. This makes the work a natural starting point for any review of the battle of air superiority (or parity) over Dunkirk as well as setting the scene for the exploits of 'The Few'. James then covers the now familiar five phases before concluding with a survey of the Battle.

This book does not purport to be the ultimate work on the Battle – it could not possibly be so having been written whilst the war was still underway. But its wide availability should now ensure that the potential author of even the shortest essay on the Battle of Britain has no excuse not to start with original source material. This book therefore is of serious relevance to any scholar and contains so much interesting material that it is worthy of a place on any bookshelf.

THE HAWKER HURRICANE

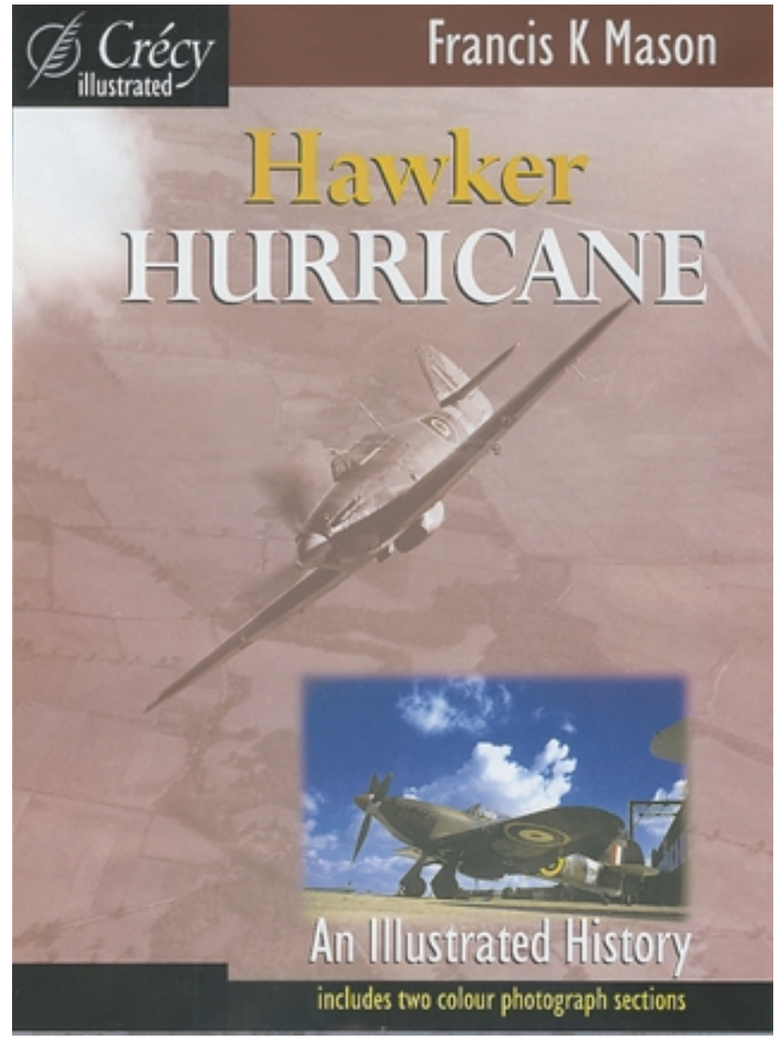
Francis K Mason

Although its reputation was never that of the Spitfire, the Hawker Hurricane matched the best aircraft of Britain's enemies at just the moment of her greatest crisis. It was on the Hurricane that the greatest burden of responsibility rested to withstand the onslaughts by Germany, Italy and Japan and to buy time for survival while the arsenals of the West could forge the weapons of victory.

The miracle of the Hurricane was that it was a match for the enemy while still employing a somewhat outmoded form of construction. That form of construction was adopted so as to get the Hurricane into massive production when it was wanted most – when Britain had to halt the Luftwaffe in 1940-41. Indeed, the Hurricane went on to fight in more campaigns, on more fronts and in more theatres and countries than any other aeroplane in the 2nd World War – more than the Spitfire, Beaufighter, Mosquito, Lancaster and, of course, the Great American aircraft such as the P-40, P-51 and B-17.

Francis K. Mason is a leading British aviation writer and historian. He flew Mosquito and Vampire night fighters in the RAF and later joined the Hawker Project Design team working directly under Sir Sydney Camm. He is author of over fifty hardback titles and fifteen paperbacks and often contributes to television and radio. *Hawker Hurricane* represents the culmination of his vast Hawker experience and research has become the standard, authoritative work on this famous fighter aircraft.

Hawker Hurricane is fully illustrated with over 200 photographs, maps, diagrams and comes with comprehensive appendices of Hurricane test flights, production and service as well as a new Foreword by the author. It is now available in *Crécy illustrated* paperback format.



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ISBN: 0 947554 86 6

BEYOND THE PPL

Nigel Everett

At last there is a book for every pilot who has obtained their Private Pilot's Licence and then thought "What now?" Written in a friendly and accessible style by an established aviation author and experienced pilot, this book fulfils the need for a book to take pilots beyond their basic training and into the 'real world' of flying. There are many textbooks about learning to fly and the prospective pilot is never short of advice and information from all quarters. And yet, once qualified, the holder of a Private Pilot's Licence (PPL) is largely on his or her own, with little guidance about how to get the best out of their flying and maintain and develop their flying skills.

Beyond the PPL is filled with practical advice and constructive suggestions for enjoyable, safe flying. It describes in detail many of the challenges awaiting a new pilot such as radio navigation, farm strips, dealing with ATC etc. It also deals honestly with the many pleasures and pitfalls of flying for fun including aircraft ownership, groups, aircraft hire and sharing flights with other pilots.

Nigel Everett learned to fly when he was only 17, he flew in the RAF and trained on Piston Provosts and Vampires (FB5s and T11s). Having gained his wings, he concluded an undistinguished military career (his description!) by crashing a Chipmunk. Since then he has continued flying as a private pilot for recreation and on business. He is not a flying instructor and looks at private flying from the private pilot's point of view. This means dealing with difficulties caused by flying relatively few hours a year and the ever-present problem of the cost of flying if you have to pay for it out of your own pocket. Nigel Everett is the Editor of *NETWORK*, the journal of the PPL/IR Network for Europe, and is also a contributor to flying magazines. His previous books include *Attitude – A Guide to Advanced Flying Training and Tests* (jointly with Hugh John) and *Everett's Guide to Flying Training in the UK.*

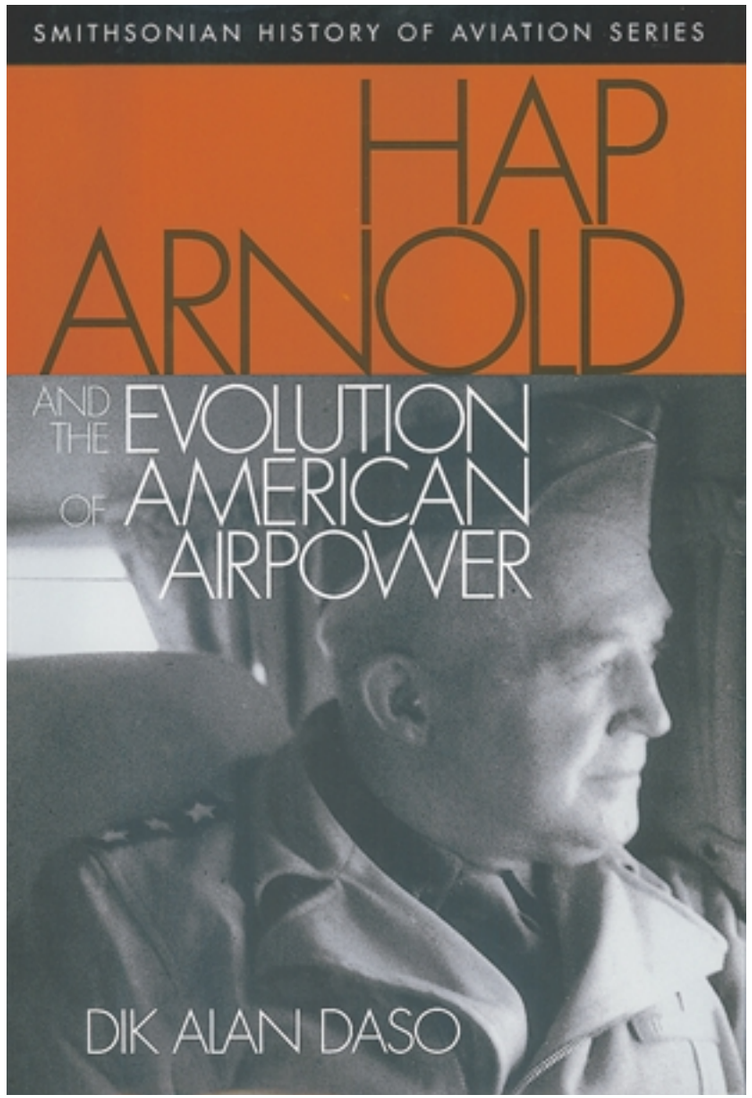
A must for every qualified or prospective pilot, this book will become the standard guide to life and flight after flying school. With over 3,000 new pilots qualifying annually, and the number of new pilots growing each year, there will be a ready market for this the only book of its type in general circulation.

Crécy Publishing Ltd £14.95
Publication: Spring 2001
ISBN: 1 874783 26 8

BOOK REVIEW BY SEBASTIAN COX

HAP ARNOLD AND THE EVOLUTION OF AMERICAN AIR POWER

Dik Alan Daso



General Henry Harley "Hap" Arnold's name is not as well known outside the United States as it deserves to be. Arnold was the commanding general of the United States Army Air Corps, later the United States Army Air Forces, throughout the Second World War. He oversaw the transition from a Corps of some 26,000 officers and men with just 23 B-17s in September 1939 to a wartime peak of 2.4 million men and 80,000 aircraft. Arnold was a convinced and determined advocate of strategic air power, but he did not serve long enough to see through the final logical organizational transition from Army Air Forces to United States Air Force, which came about in 1947, two years after he retired, his health severely compromised by the unstinting effort he had devoted to his service and his country through the long war years.

It is strange that until now Arnold has lacked a proper biography, whilst other American airmen of his era such as Carl Spaatz and Claire Chennault have been the subjects of full-length studies. Dik Daso, a USAF fighter pilot who holds a PhD in history, has set out to rectify that omission. He follows Arnold's career from the excessively dangerous early days before the First World War, when a pilot's survival owed just as much to luck as it did to skill. Arnold was a true pioneer. He was one of the first two qualified pilots in the US Army, and learned to fly at Wilbur and Orville Wright's School at Dayton, where he received ground instruction from the Wrights themselves. Orville Wright himself became a lifelong friend, one of many friendships Arnold forged in the aviation community which were to stand him in good stead later in his career.

Daso's biography is particularly strong on the early influences, triumphs and tribulations of Arnold's career and marriage. By the end of the First World War Arnold had reached the rank of Colonel and had been posted to Washington DC as the executive officer in the Army Department's Air Division. Arnold never held a combat command, and the nearest he came to the war itself was a visit to Europe when his arrival at the front coincided exactly with the Armistice. Arnold's duties in Washington had involved him in both materiel production and training, and the experience, though far from happy, gave him invaluable insights into the problems of producing sufficient aircraft and personnel, which would again prove of

inestimable value twenty-five years later. His career stagnated for a period as a result of his outspoken support for General Billy Mitchell at the latter's infamous Court Martial, but by the eve of the Second World War Arnold stood just one rung below the top of the Air Corps ladder. The death of the Commander of the Air Corps, General Westover, in a flying accident, catapaulted Arnold into the prime seat in 1938, just as the aircraft and technology available to the airmen began to show signs of fulfilling their more extravagant claims.

Daso excels at drawing out Arnold's farsighted insistence on establishing a close and enduring relationship, not only with industry and industrialists, but also with scientists and the universities, particularly Robert Millikan and the Hungarian born Theodore von Karman. Arnold developed and nurtured a sophisticated and effective research and development organization through his establishment of formal links and personal relationships with von Karman and others, to the inestimable long-term advantage of the US Air Force. Anyone who doubts the fundamental link between effective military power and a strong research and industrial base would benefit from reading this book.

Unfortunately, Daso is less surefooted regarding Arnold's crucial relationships within Washington DC. In particular the pivotal understandings between on the one hand Arnold, crucially supported by Army Chief of Staff General George C Marshall, and on the other President Roosevelt and his special adviser Harry Hopkins. It was this axis that allowed the wholesale and successful expansion of US air power and turned it into a war winning military tool of unprecedented power. One will search this book in vain for a detailed explanation of exactly how Arnold achieved his goal of creating a massive modern air force. There is little, for example, on Arnold's part in the crucial meeting of September 1938, shortly after his appointment as Commanding General, when President Roosevelt ordered the first of several massive expansion programmes into effect. Daso seems content merely to highlight Arnold's extraordinary vision in propounding an air force with tens of thousands of aircraft at a time when lesser men in the Air Corps and Government were thinking at best in four figure numbers, without explaining fully how it was that he put the vision into effect.

Daso also fails properly to explore Arnold's relationship with the British, particularly British airmen such as John Slessor and Arthur Harris (both of whom spent extended periods in wartime Washington) or Arnold's opposite number Sir Charles Portal. The RAF/USAAF relationship was a complex, occasionally fraught, but essentially symbiotic one, and its depiction here is rather one-dimensional. For example, Daso appears not to comprehend that the early large scale British and French orders to US aircraft companies laid the foundation for their later expansion to meet the vast wartime demands of the USAAF and makes no comment on Arnold's shortsighted view that US-built aircraft should be reserved for the USAAF. Daso also makes much of Arnold's resistance to Churchill's attempts to persuade the USAAF to switch from day to night bombing, but fails to understand that there were some RAF officers who were engaged in the same task, notably Slessor. There are also one or two minor errors, such as characterizing Slessor as "British Air Minister", Portal as "overall commander" of the combined bomber offensive, and, following Arnold's own idiosyncratic style, referring to "Bert" Harris as "Bertie", thus improbably making the latter appear like some ineffectual refugee from P G Wodehouse. Here it would seem that Daso fell victim

to the narrowness of his sources. His three primary historical resources were the papers of Arnold and other US airmen, oral interviews with leading figures, and an almost exclusively American literature base. A wider reading of the air power literature would have enabled him to write a better book, but that may be a counsel of perfection when we remember that Daso combines his historical research with a full time career as a USAF pilot.

Whilst these faults perhaps mean that Arnold still lacks that definitive biography, this is still a very interesting, entertaining and valuable study of one of the world's pioneer airmen: a man who never saw combat, but who built and commanded the largest air force ever to go to war. Those who profess an interest in air power and the complex interrelationships between science, industry, government, and the military should read this book.

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Book review by Mr Sebastian Cox

INSIDE HITLER'S HIGH COMMAND

Geoffrey P Megargee

In writing this book Geoffrey Megargee had a very singular purpose in mind – the debunking of a myth. The myth in question is the popular view that the German Army and the German General Staff were the most professional and competent military forces in the world for much of the Second World War, and that it was only the crassness and folly of Adolf Hitler, aided and abetted by some in the Nazi leadership, and a very few weak-willed senior generals, which conspired to undermine the Third Reich and bring it to its knees.

As Megargee admits in his Preface, there is a kernel of truth to the myth, but only a kernel. What Megargee sets out to show is that the German generals were as much the architects of their own misfortune as Hitler. This is as efficient and ruthless a myth-demolition as you are ever likely to read. It is not, however, one of those books so determined on achieving its goal that it risks creating a new myth in its place, but is instead a cool well-researched appraisal of the evidence. And the evidence which Megargee places before the reader is fairly damning. He shows that the flaws within the German High Command were not simply the result of over-weening ambition which fell victim to Hitlerian manipulation, though this undoubtedly played its part. Instead many of the weaknesses could be traced back to the increasing divorce of Army and State which had been present to a dangerous degree even in Wilhelmine Germany. Thus Moltke the Elder departed from Clauzewitz in believing that, once a war had started, all decision making on how it was to be managed should rest with the military. It was this atmosphere which allowed Schlieffen to propose a war plan which inevitably brought Germany into simultaneous conflict with three major European powers in 1914 without any serious challenge from three civilian chancellors in the pre-war period.

Such ideas found even more fertile ground in the Weimar Republic. Intellectually and emotionally divorced from much of what Weimar stood for, the Officer Corps was inward-looking and conservative, but bound by some degree of loyalty and emotion to the ageing President Paul von Hindenburg. As Weimar descended into chaos the officers continued to share a common view. As Megargee says "They retained a desire to see

Germany become a world power, and they regarded the army as a key to fulfilling that desire, even if they sometimes disagreed on how the army would carry out is role." They believed that post-Versailles another war was inevitable, and in some senses or situations desirable, and these ideas found formal expression in internal Defence Ministry documents. To retain this view they had to cleave to the "stab in the back myth", both because it allowed the General Staff to claim that it had not lost the war, and further because this allowed them to avoid questioning the strategic assumptions on which they had fought and lost the First World War. This in turn allowed them to fight the Second World War on almost exactly the same strategic grounds, making many of the same mistakes, notably underestimating all Germany's principal adversaries, except perhaps France. Thus Germany again manoeuvred into confrontation with Britain, launched a war against Russia which she could not win, and adopted policies which brought the industrial might of the United States into the war on the Allied side.

Megargee's summing up of this attitude is brutally frank. "Thus Germany's military leaders missed the opportunity to learn the true lessons of the Great War, lessons that might have saved their nation untold misery in the decades ahead. They gained no understanding of global strategy or the relation of ends to means. Instead, the military embraced war as the sole solution and set about finding ways to do it better next time.
"It was precisely this narrowness of strategic vision that lead them knowingly to embrace Hitler as a leader who would unshackle them from the constraints of democratic government and give them a proper influence over policy. Megargee shows convincingly the extent to which the generals linked arms with Hitler and marched willingly down the road to war.

He shows too, that even those few generals such as Ludwig von Beck, who opposed Hitler's plans at the time of the Czechoslovak invasion, did so not from principled opposition to the Fuhrer's long term strategic aims or war plans, but simply from opposition to the timing. The waging of aggressive war occasioned few qualms in the hearts of the German generals and such attitudes were inherent within the German military system before the rise of Hitler.

The fact that Hitler frequently outmanoeuvred the generals politically, as he sought to gain and then maintain the maximum degree of political control over his armed forces, should not obscure the fact that their basic aims differed but little from his. Hitler's creation of the *Oberkommado der Wehrmacht* or Armed Forces High Command coincided with his manipulation of the largely manufactured scandals surrounding two very senior generals, von Fritsch and von Blomberg. He thus took direct control of the military at the same time as he forced a surprised General Staff onto the back foot by implying that the scandals gave him good reason for a loss of faith in their collective leadership. Hitler subsequently

exploited the inevitable bureaucratic rivalry between the OKW and the *Oberkommando der Heeres* [Army High Command] to strengthen his own position as the ultimate arbiter. The extent to which the General Staff were willing victims varied, but an officer whose qualities have long been admired in Western historiography, Erich von Manstein, argued before the war that Hitler should have command of both the OKW and the OKH, because this would eliminate the conflicts between the two and give greater power to the Army Chief of the General Staff. Where officers of the influence and ability of Manstein could argue thus, the opposition of some, such as Beck, to Hitler's bureaucratic manipulation was doomed to fail. Megargee concludes of Beck that he "was neither a saint nor a genius. He sympathized with Hitler's goals and exhibited many of the General Staff's intellectual weaknesses. But he did rise above Manstein's level, and that of most other officers, if only too late." If such recognition came to Beck "too late", then the scales fell from the eyes of others very late indeed, and long after their own actions had compromised their ability to oppose Hitler. The skill with which Hitler played such bureaucratic game is nicely illustrated in the book, and it is indicative that General Halder, Chief of the General Staff in succession to Beck, was reduced to holding meetings with others in the Third Reich's convoluted bureaucracy in an attempt to gather intelligence on *German* intentions.

The generals' post-war attempts to distance themselves from many of the ensuing strategic errors on the grounds that Hitler was in overall command and overrode them cut little ice with Megargee, who demonstrates the extent of their own culpability and folly. There are lessons here for modern democracies on the wisdom of allowing the military to become too far detached from the society it defends, and on the dangers of a purely operational focus, however brilliantly and efficiently accomplished, whilst pursuing policies which are based on strategic chimeras.

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AIRFIELDS & AIRMEN YPRES BATTLEGROUND SERIES

Mike O'Connor

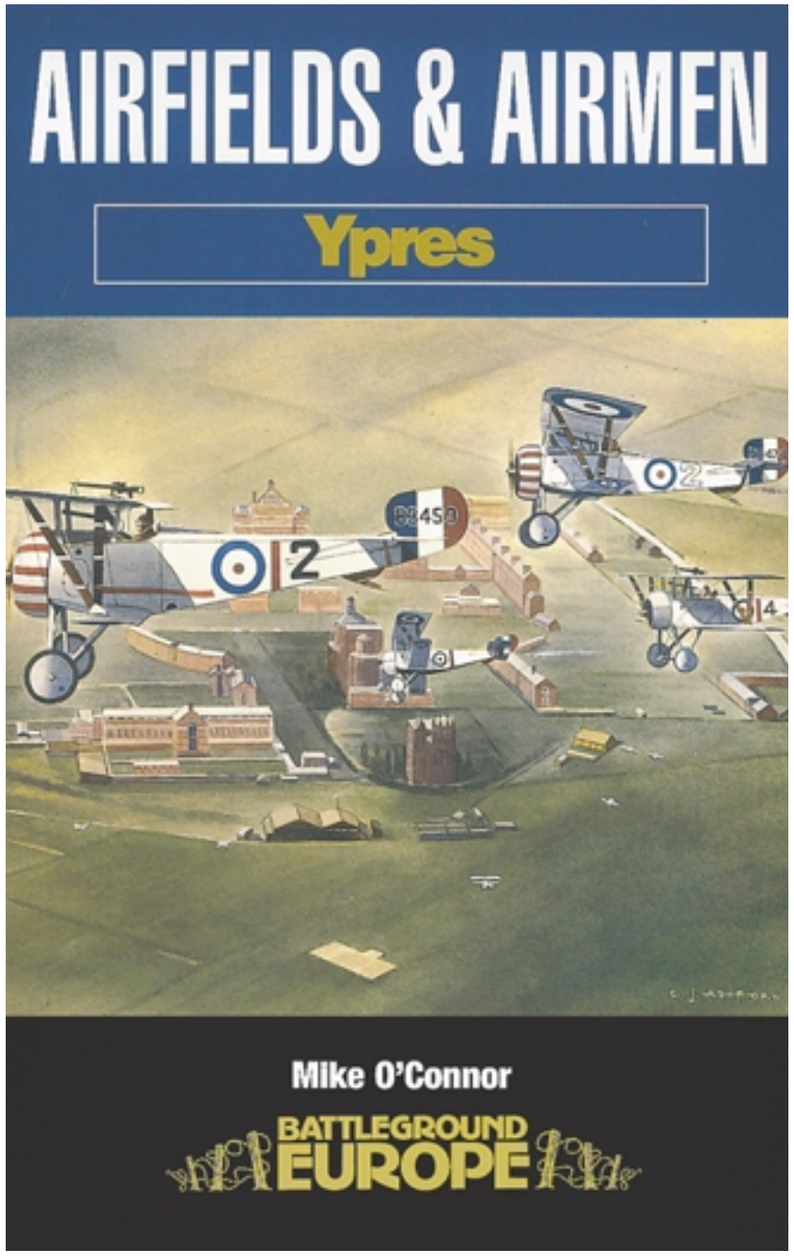
This is the first book in the Battleground Series discovering the airfields and airmen of the Great War. It is sometimes forgotten that the Wright Brothers' first flight took place in only 1903; yet fifteen years later the Royal Air Force had over 20,000 aircraft of all types including night bombers.

This book takes the reader to the sites of the airfields used by the Royal Flying Corps in the vicinity of Ypres Salient. These fields were basic in the extreme compared with airbases of WW2 and today; flattish ground hitherto used for agriculture purposes tramped down by men and vehicles. It was here that the primitive aircraft were based, surrounded by a tented camp and temporary buildings. Yet out of such places the great legendary air aces of the war operated.

The book also reveals the locations of many killed whilst engaged in combat flying. Pilots from other countries such as Germany and France are also covered.

Readers will be fascinated not only by the stories of aerial combats, but also with the technology that first succeeded in the twentieth century so rapidly being turned into an instrument of war that developed with bewildering speed from flimsy aircraft, poorly armed, into well equipped well armed machines, performing astounding manoeuvres with bombing capabilities that became quite significant by the end of the war.

Leo Cooper,
Pen & Sword Books Ltd £9.95
Publication February 2001



JOHN A. WARDEN III AND LELAND A. RUSSELL, WINNING IN FAST TIME: IGNITING THE FUTURE OF YOUR ORGANIZATION

Dr. John Andreas Olsen

John A. Warden III has co-authored a new book, *Winning in Fast Time*, where he translates his ideas on military strategy into the world of business. This review essay will trace the genesis of Warden's ideas, develop a synopsis of the presented thesis, and finally provide a brief assessment of the book.[1]

Part One:
The Genesis of *Winning in Fast Time*

In response to the Iraqi invasion of Kuwait on 2 August 1990, a small group of air power advocates in the Pentagon, the so-called "Checkmate" office, proposed a conventional strategic air campaign to liberate Kuwait. The group, which was under the direction of Colonel John Ashley Warden III, had one clear purpose in mind: to force Iraq's army out of Kuwait by applying air power in a strategic offensive directly against the sources of Iraqi national power. The stated objectives were to "isolate Saddam; eliminate Iraq's offensive and defensive capability; incapacitate the national leadership; reduce the threat to friendly nations; and minimize the damage to enhance rebuilding".[2] Warden termed the concept "Instant Thunder", and as he suggested that air power through stealth and precision could be a distinct war winning instrument, which if successful would relegate armies and navies to secondary roles, it could be nothing other than controversial both within and outside the American military establishments. "Instant Thunder", as presented to the United States' military and political leadership between 9 and 20 August 1990,

was bold, imaginative and innovative, but not in accord with then current military doctrine and what was politically acceptable. Despite bureaucratic obstacles and conceptual opposition the "Checkmate" team prevailed through personal and collective dedication to the task, and an unrelenting persistence to see through a change of focus in military planning. Rather than accepting that air power should be a subordinate of the ground commander's "scheme of manoeuvre", as suggested in the "AirLand Battle" doctrine at the time, Warden's team

READING NEW READING NEW READING NEW

Winning in Fast Time: Igniting the Future of Your Organization, he sets out to explain a mindset and a method of rapid and decisive strategic action. Drawing on examples from the planning and execution of "Operation Desert Storm", vied with stories of companies that have already adopted the so-called "Prometheus Process", Warden and Leland A. Russell provide a new approach to business strategy in today's world that is worth serious consideration. They discuss principles and concepts that they believe are the key to successful operations in any kind of competitive environment, and the fundamental assumption is that one cannot merely react to change, or adjust through incremental improvements: one needs to act offensively and decisively by creating the future through outthinking the competitors. "Instant Thunder" is Warden's basic formula for winning: "think strategically, focus sharply and move quickly". The following paragraphs will take a closer look at the core of *Winning in Fast Time*. The structure and essence is represented in *Figure 1*, where the "Prometheus Touchstones" is at the heart of the four-phased "Prometheus Process".

Figure 1: The "Prometheus Process"

The key to success, according to the authors, is to think like a winner. For such a mindset to materialise, they suggest basic principles – the so-called "Prometheus Touchstones": create a vision and implement it systematically:

> In today's warp-speed world, a new approach that accelerates strategic thinking and action is essential. To win, you must decide what you want your tomorrow to be, and then make it happen faster than the rate of change in your competitive environment. This is winning in Fast Time. The Prometheus Process is a systematic and proven method for designing winning strategies that is simple enough for everyone to grasp, yet sophisticated enough to plan, execute and complete projects of any scope and complexity. Prometheus includes a common strategic vocabulary that is shared across the organization. It is also fractal, which means that the same process pattern can be repeated over and over at an ever-smaller scale.

The approach is clearly derived from "Instant Thunder": what was "fast, precise and parallel operations" in the military world is translated into "think strategically, focus sharply and move quickly" in the world of business. This will next enable a *change of game*, that is, one has to create one's own rules with a winning mentality, as the strategy, organisation and force structure of yesterday may not apply. In order to change the terms of references one needs a comprehensive understanding of the environment in which one is working, and therefore one must think of competitors and customers as strategic entities, or systems. It is a question of getting the upper hand, and in that process one needs to focus on the system's centres of gravity and next act on them rapidly and decisively. In order to change the overall system to your own advantage the authors have developed the Promethic Laws:

> Every action affects the future; Specific actions create a specific future; Everything and every action happens in a system; All systems have inertia and resist to change; All systems have Centers of Gravity; Systems change when their Centers of Gravity change; The extent and probability of system change is directly proportional to the number of centers of gravity affected and the speed of which they are affected; All known systems and things have a beginning and an end; and Specific actions produce specific ends.

This is the theoretical linchpin from which the four imperatives derive: *Design the Future, Target for Success*, *Campaign to Win* and *Finish with Finesse*.

Imperative One: Design the Future

The first imperative, *design the future*, depends on four steps. First one needs to assess the environment in which one is operating, that is, one needs to understand the broad technological, economic and political context of the market. The authors use the term "scoping the environment": although one cannot predict the future, one can identify the direction of change, question dubious assumptions, and therein acknowledge the opportunities and potential obstacles. It is about developing strategic awareness in order to be able to exploit the opportunities of chance, friction and fog, rather than being passive and defensive about inevitable changes. Having scoped the environment, the next step is to paint the *future picture*, that is, a clear and compelling description of where one wants to be at some point in the future. The future position should be a "constant beacon toward which everyone in the organization can steer", and as such it is the most important step in planning the grand strategy. The authors stress that an "architectural" rather than a "bricklayer's" view is an important point of departure. Based on "Key Descriptors", every company is advised to develop brief statements about the prospects of the future, emphasising high-level outcomes in an optimistic, creative and specific way. "Open planning" is recommended since the key to steering in the right direction is that as many as possible feel that they are part of defining the strategy, that is, they get the perception of purpose through active participation and ownership. When the destination is identified the third step is to engrave the *guidance precepts*. These are "behavioural touchstones", that is, short statements about permissible behaviour as employees work at meeting the firm's stated objectives. On the one hand issues of philosophical and operational importance should be stated, and on the other differentiation should be sought. The authors distinguish between prime directives and rules of engagement. The former is of a higher order, while the latter are to a large degree subject to change over time and new circumstances. The fourth and final step within the first imperative of the "Prometheus Process" is establishing *measures of merit*. While measures for tactical success may be easy to identify, the key is to measure the less tangible strategic effect. To win a battle or a campaign is one thing, to win the actual war is another, and finally to win the peace for which the war is fought is yet another challenge. The authors use the term "Go to Rome", reflecting on the fact that while Hannibal was quite successful at the "Battle of Cannae", he never exploited the advantage of that success and marched to Rome, something which would have given him the ultimate victory. The suggested approach to measure merits is to evaluate the results against the ends as defined by the "Key Descriptors" identified in the second step. Creating an integrated measuring system is part of the motivation for having a strategy, and it links the day-to-day performance to the Big Picture.

Imperative Two: Target for Success

The theoretical foundation for "Instant Thunder" is the "Five Rings". The model is founded on the belief that the enemy can be treated as a system, and within that system there are several key targets ("centres of gravity"). By identifying these, one can either remove or add energy to the system in order to maximise the desired effect. In bombing a building one reduces the energy level by applying *negative energy*, while maintaining a Coalition is referred to as *positive energy*. As one attacks selected "centres of gravity" one can manipulate the situation, and in this process the "Five Rings" is a convenient planning tool. The model is a simplification of the real world that helps provide an overall impression of what needs to be affected in order to arrive at the future previously

defined. By looking at the competitors and customers as a whole, as a system, one acknowledges that interrelationships, rather than linear cause-effect chains, have practical utility, and one must consider the process of change rather than static snap-shots of the situation. Systems have enormous resilience, but by exceeding the system's "elastic limits" one can achieve permanent change. The significance of such an exercise resides in the fact that if one does not get the strategic targets right it becomes difficult to alter the system. It is not so much about doing "things right" as doing the "right things". Having identified the centres of gravity, the task is to determine "which action will result in the greatest probability of having a real effect". Having understood the concept of effect-based targeting, the next step is to develop an action plan for each centre of gravity, ensuring the strategic linkage, that is, the connection between desired effects and the realisation of the *future picture*. The authors recommend six steps in creating this plan: define the desired effect, clarify the measure of merit, decide the timeframe, gather meaningful and reliable information, develop high-level directions and estimate the resource requirements.

Imperative Three: Campaigning to Win

Having defined the desired effects and developed an action plan, the next challenge is to apply resources as effectively as possible to achieve them. Rather than approach the targets serially, the authors suggest *parallel campaigns*, that is, multiple centres of gravity should be attacked through multiple and simultaneous operations. It is not about relying on one decisive blow, it is about approaching several avenues that may lead to the desired change, and as such one does not depend on any single success, but the degradation of the overall system. It is essential that one accounts for the "time value of action", that is, the impact on those "centres of gravity" depend on the "velocity" of operations, where "velocity" is defined as "speed in the right direction". In such a context the management needs only concern itself with orchestrating the campaign and timing, as opposed to the tactical and technical details. In order to ensure commitment throughout the organisation the authors recommend the "Three-Echelon Rule": have three organisational echelons present during planning. It reduces confusion and strengthens morale. Through multiplicity and simultaneity the orchestrator must focus on momentum, as the overall orientation is strategic, and as such he would need to take instant decisions without reference to higher authority. In order not to let enthusiasm overtake objective judgement, the authors recommend a "Red Team", that is, a team tasked with contesting the firm's assumptions and raising potential problems in advance. Another challenge in this context is the overall organisational structure. According to the authors one has to *organise for success*. New situations require new structures, and in order to maintain strategic flexibility one needs a dynamic organisation that accounts for new technologies. It is about being able to exploit the information faster than the competitors, and therein three pieces of advise are provided: "have an open attitude about information, if the hierarchy slows you down, go around it; and avoid serial information dissemination".

Imperative Four: Finish with Finesse

While most firms and organisations stop the planning-loop at the stage of having implemented an idea or a strategy successfully, the "Prometheus Process" argues that one needs to consider termination, the *end game*. In accepting that every campaign, project or product must end at some point, the authors suggest that one does it properly and orderly – one should finish with finesse rather than leaving it to chance. It is about exiting on top with style, and as such one needs to define "exit points". The following criteria are suggested: maximise (and retain) financial gains; minimise losses by "failing fast"; and end the game while strong.

Part Three:
An Assessment of *Winning in Fast Time*

Winning in Fast Time culminates with the twelve *Cardinal Rules* of "Prometheus": Think Like an Architect, Execute Good Enough Plans, Be on the Offensive, Impose Your Plan, Do Not Underestimate What It Takes to Win, Choose Enemies and Friends, Use an Indirect Approach, Stay out of the Balkans, Exploit Your Key Force, Maintain and Use Reserves, Focus on the Future and Bypass Obstacles. These rules are quite symptomatic for the book, which provides the reader with a set of guidelines and procedures for the road to success. It is seductive in its simplicity and it is elegantly written. It is in many ways Jominian, as is Warden's previous work, in the sense that it provides a recipe for success. *Winning in Fast Time* will surely be criticised on that basis, as one can argue that there are few universal truths on how to succeed in war and business. But one should be careful not to dismiss it on such a basis, as the work is really more about a mindset and an orientation to problem solving than it is a checklist. It is about how to think strategically rather than tactically, it is about how to deal with the problem rather than the symptoms, and it is about thinking positively rather than complain about self-imposed restrictions. The challenge is to ensure that guidelines do not become straightjackets, and when entwined with creativity and foresight they are surely worthwhile having. Models simplify the real world, and in that process one might well lose some important aspects, but if used sensibly they enable you to think clearly, they provide a common basis for discussing important issues, and in the end they provide a tool that encourages further studies. The "enemy as a system" is an interesting perspective that invites two final comments. While some firms tend to focus on its "competitors" as the "enemy", the Warden-Leland suggestion is to look beyond that and use the customers and their future requirements as measurement criteria for progress. Importantly, when the firm starts to focus solely on the "competitors" it might already be losing. Moreover, if the bureaucratic system within a firm has problems complying with "Fast Time", one may be able to work around the system initially, but in a wider sense, this might be the right time to "exit": it is an indication of necessary change on both the individual and organisational level.

Woven into the "Prometheus Process" is a rather comprehensive lexicon for communicating strategic issues throughout the organisation. "Open Planning", "Scoping the Environment", "Go to Rome", "Stay Out of the Balkans", "Velocity", "Centres of Gravity", "Instant Thunder" and "the Five Rings" are useful terms as they have explanatory value. *Winning in Fast Time* is motivating reading and impressively coherent: the deductive logic is progressively applied throughout the work. The reader does not lose track of the strategic concept, as the book is well structured and consistent (see Figure I). As such the "Prometheus Process" contributes to strategic awareness and strategic thought at a conceptual level, and next the common language and concrete action plans are sufficient for implementation. It is a business philosophy worth consideration, and as it accounts for the complete planning cycle it is rather comprehensive and holistic. It does not provide all the answers when it comes down to implementation, but it does ask many of the right questions. The defence establishment in Britain, Norway and other nations have applied a manoeuvre approach to warfare on the operational level of war. Such a philosophy needs a strategic orientation, and the "Prometheus Process" might very well contribute in providing the required framework.

1 I would like to thank Dr. H. P. Willmott at the British MoD and lecturers Nils Naastad, Øystein Espenes and Anne-Marie Gorset at the Royal Norwegian Air Force (RNoAF) Academy for comments on this review essay.

2 Colonel John A. Warden, briefing to General Norman Schwarzkopf, 17 August 1990, «Iraq Air Campaign Instant Thunder», p. 5.

3 Colin Powell with Joseph E. Persico, *My American Journey*, (New York: Ballantine

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4 Colonel John A. Warden, *The Air Campaign: Planning for Combat*, (Washington D.C.: Pergamon-Brassey's, 1988).

5 Richard P. Hallion, *Storm over Iraq: Air Power and the Gulf War*, (Washington D.C.: Smithsonian Institute Press, 1992), pp. 115-116; and Dennis Drew, "Vietnam, 'Wars of the Third Kind' and Air Force Doctrine", p. 15 (http://www.ttu.edu/~vietnam/96papers/vietsymp.htm).

6 For a condemnation of *The Air Campaign*, see Niklas Zetterling, "John Warden, The Air Campaign – en kritisk granskning", *Kungl krigsvetenskapsakademiens handlingar ock tidsskrift*, No. 1, 1998, pp. 107-130. (The text is in Swedish).

7 Colonel John A. Warden III, "Centers of Gravity: the Key to Success in War", unpublished memorandum, March 1990.

8 Colonel John A. Warden III, "The Enemy As a System", *Airpower Journal*, Spring 1995, pp. 40-55.

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10 Warden's thinking has influenced air power doctrines all over the Western world – for example the American, Australian, British and Norwegian. More specifically, Denmark has explicitly endorsed Warden's five air superiority cases and the Five Rings Model.

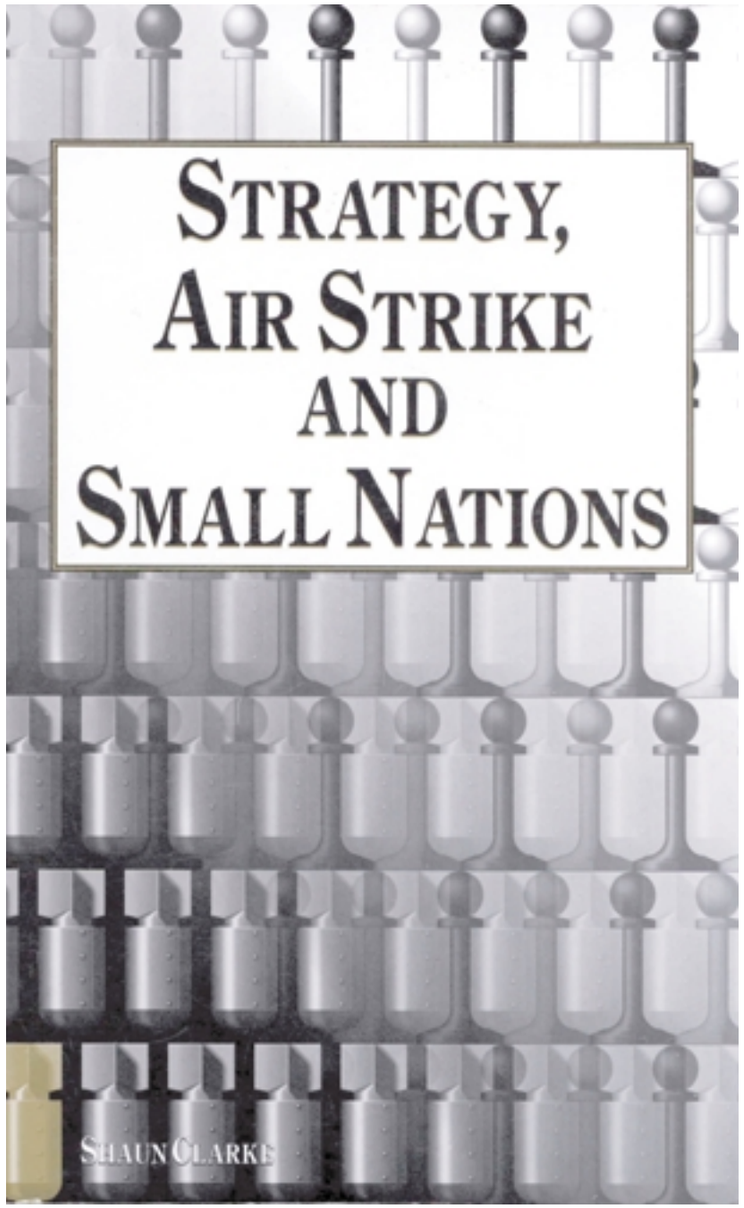
SHAUN CLARKE (RNZAF), STRATEGY, AIR STRIKE AND SMALL NATIONS

Dr. John Andreas Olsen

Wing Commander Shaun Clark is the author of *Strategy, Air Strike and Small Nations*, where he examines the fundamentals of air power strategy and explores the potential of offensive air power in the context of small-to-medium-sized defence forces. This review essay will present the current air power debate on strategic bombing, discuss Clarke's thesis, and finally provide a brief assessment of the author's contribution to the existing literature.[1]

Part One: The Current Air Power Debate

Air power has in the last decade increasingly become the profound instrument of choice for American and European policy-makers in dealing with recalcitrant regimes. It was the principal means of military force in "Operation Desert Storm" (1991) and the only one in "Deliberate Force" (1995), "Desert Fox" (1998) and "Allied Force" (1999).[2] Russia used air power extensively against Chechnya (1994-1996) and no-fly zones have been implemented against Bosnia and Iraq throughout the 1990s.[3] Political leaders and military commanders around the world seem to find air power an unusually tempting instrument of force, as "it appears to offer the pleasures of gratification without the burdens of commitment".[4] Air power



seems not only to offer the prospect of decisive action without accompanying risk of unacceptably heavy casualties, but also has the additional attraction of being relatively easy to control in terms of application and degree of intensity. As a result, political and military commanders now consider air power as a central component to complex international problems. Despite air power's augmented role in crisis-management, its employment has been shrouded in controversy and certain analysts contend that air power is not widely understood even among professional military officers.[5] The remoteness associated with air power may be one factor, but the difficulty in measuring the erosion of an adversary's political resolve seems to discourage qualitative diversity within the air power debate.

The current debate is, nevertheless, in reasonable shape, as two contemporary air power theorists define their concepts in clear terms.[6] Colonel John Ashley Warden III had the unique opportunity of articulating an air power concept that witnessed execution. He was the main architect of the strategic air campaign against Iraq in 1991, and through subsequent articles he argues consistently that air power is best applied directly against the enemy regime's political leadership. Warden argues that one should attempt to paralyse the enemy's ability to wage war by concentrating attacks on key targets vital to the regime's survival. Robert Anthony Pape has seriously challenged the whole notion of strategic attacks, favouring short-range theatre air attacks that seek to thwart the enemy's military strategy in the theatre of operations. He argues that interdicting supplies to, disrupting the movement and communication of, and destroying forces in the field rather than attacking an opponent's political centres is the key to winning wars.

While Warden argues that incapacitating the political leadership is essential in an air campaign, Pape argues that one should focus on the enemy's ground forces on the battlefield. Both use "Operation Desert Storm" to argue their case, since that campaign included both a strategic and a tactical dimension. These two views are extremes on a clearly defined spectrum, and they tend to be the starting point for discussions on whether air power can or cannot do the job alone. While that question may well be relevant for the United States, it is not necessarily so for the rest of the world. The Americans can confidently expect to possess relatively large and technologically sophisticated forces in the near future, but for most of the world there are restraints, commitments and vulnerabilities that have to be taken into consideration. Importantly, as one moves from war to conflict, or from "High Intensity Conflict" to "Low Intensity Conflict", the very nature of the confrontation itself may change.[7] As such, it is hardly possible to simply adopt a miniature version of an

American strategy. Thus, smaller nations have to look for solutions outside the American context, and moreover, no single air power strategy is feasible in all circumstances. Although discussions on air power theory, strategy and doctrine for small nations do take place in seminars at air power centres all over the world, it is still rare to find comprehensive analyses. Wing Commander Shaun Clarke, currently director of the RNZAF Air Power Development Centre, is one such exception with his timely study *Strategy, Air Strike and Small Nations*.[8] This review essay aims at presenting his ideas, and discussing them in the wider context of the current air power debate dominated by Warden and Pape.

Part Two: A Discussion of *Strategy, Air Strike and Small Nations*

Clarke argues that nations with relatively small air forces, that is air forces with less than approximately one hundred strike aircraft, should consider strategic air operations as one of their functions.[9] His thesis is founded on a discussion of the nature of strategic air strike, using samples from history to verify his point, and defining the concept of strategic bombing beyond the traditional terms of reference. The refined concept is applied to a discussion on coercion, resulting in a paradigm for small nation air strike strategy termed "Strategic Persuasion Oriented Targeting (SPOT)". Thus, in extracting maximum value from modest means, "small nation strategic strike", he argues, may not be the oxymoron it first appears to be.[10] The author contends that strategic air strike is not defined by aircraft, weapons, mass or scale, or by the distance covered, or necessarily by the nature of the target, but by the objective of the mission. As such, it is better defined by its effect at the strategic level of war, but more accurately he argues that one should define strategic air strike by the intended outcome. Strategic air strike is defined as "the direct pursuit of primary or ultimate political objectives through air power", and therein "high strategic order" focuses on the resolve of the enemy's supreme decision-making body, while "low strategic order" settles for more immediate military prospects confined to the battlefield. Clarke has a point when he argues that strategic effects can occur on different levels of war and, as such, "intention" is a better criterion for planning than "effect", but at the end of a successful day "intentions" and "effects" are two sides of the same coin. The difficulty resides in the problem of transferring physical destruction into the aspired political endgame, but detaching strategic air strike from the correlation of mass and scale is valid. In providing a synopsis of several campaigns throughout the century that includes strategic operations, three stand out as qualified within the means of small nations. "Operation Babylon", the Israeli attack against an Iraqi nuclear reactor in Baghdad in June 1981; "Operation Eldorado Canyon", the combined American attack on Colonel Muanmmar al-Qaddafi in April 1986; and "Operation Deliberate Force", the NATO attack on the Bosnian Serb Army in the autumn of 1995. Nevertheless, the validity of strategic coercion for small nations does not reside in these historical examples, but in our way of thinking. Clarke suggests three propositions that partly change the terms of reference on the traditional perception of strategic air power applicability.

The first proposition states that "In limited war, small nations need not aspire to unconditional surrender or the collapse of the enemy regime". Clarke acknowledges that wars have limited utility, or as Carl von Clausewitz states, "in war the result is never final".[11] Studies of the many wars since the Napoleonic era of "decisive battle" suggest that military victories do not themselves determine the outcome of wars, they merely provide political opportunities, and even those opportunities are severely limited by political constraints and restraints.[12] Not even in "Desert Storm" and "Allied Force" did the Coalitions declare unconditional surrender or the collapse of the enemy regime as their objective. Annihilation, capitulation or strategic paralysis is then, according to Clarke, not a prerequisite for

conducting strategic air strikes. Rather than disrupting the enemy leadership's means, one should persuade him to make concessions. As such, Clarke brings in the coercive element to a larger extent than Warden does. Rather than incapacitate or isolate the enemy leadership with the intention of a coup or revolt that will in turn overthrow the leader, Clarke argues that one should be less ambitious, and offer the belligerent state a way out of the predicament. Thus, Clarke is in favour of a dialogue with the enemy, while Warden would prefer that the outcome did not rely on the enemy. Warden argues that one cannot plan military operations that are dependent on the enemy leader's resolve, but according to Clarke small nations cannot aspire to strategic paralysis whether they prefer to or not. "Strategic Paralysis" is about removing the actual capability of maintaining the offending policy, and as such it is just as much "brute force" as it is "coercion". Small nations, Clarke argues, have to seek the art of the possible, they have to look less ideally and more practically at the challenge, and as such it is about influencing the enemy and at best removing his resolve. In essence Clarke offers a model where hesitation/reduction and concessions/negotiations are the desired outcomes, and therein strategic air strike will give the politicians the diplomatic leverage necessary to achieve the objectives. While strategic bombing has been used to destroy or "paralyse" the enemy leadership in the past, Clarke argues that one should "persuade" by allowing for less ambitious incentives.

The second proposition states that "The ultimate subject of war is the supreme decision- making body". The argument is that the Iraqi troops occupying Kuwait, or the Serb forces stationed in Kosovo, were the manifestation, or the symptom, of the real problem, namely the Iraqi and Serbian political leaderships. It is at the end of the day the politicians who decide if and when to start and end a war. The political leadership is therefore the nucleus of a conflict, and although a cultural and historical legacy complicates such simplicity, the war-making decisions rest with the selected few. One may take the logic one step further: if the enemy regime represents the national resolve, then it might not be a question of breaking its resolve, but merely making it irrelevant. In either case, all efforts should be directed against the enemy leadership. Although Pape agrees that war is about coercing the decision-making apparatus, he argues that only when regimes are convinced of the certainty of defeat on the battlefield will they comply with the demands made of them. Pape categorically states that no strategic bombing campaign has ever yielded decisive results, nor were any significant opportunities missed.[13] Although one aspect of that debate is whether air power's utility lies in the tactical or strategic realm, there is a more philosophical aspect to it. Warden suggests victory on the battlefield is irrelevant to winning the peace for which the war is waged, while Pape argues victory on the battlefield is a condition for victory and the necessary means to fulfil national security objectives. Warden's thesis is therefore diametrically opposed to Pape's only as far as "means" are concerned, and not the ultimate "objective". Clarke does not go into this debate, but settles for the fact that all military operations should be directed to have the maximum impact on the decision-making apparatus.

The third proposition states that "The large nation issue of air power primacy is a distraction to the true root of air power success – joint strategy". One of the problems of strategic bombing is that advocates have often argued that air power can do the job alone. While seductive in its own right, it may easily confuse a "war" for a "campaign", and ultimately, by excluding a comprehensive and integrated military campaign, it cannot guarantee victory. Professors William S. Lind and Robert A. Pape argue that the problem with strategic air operations is that they are executed separately from ground engagements, and thus,

even though the enemy finds himself partly paralysed or in shock for a short period of time, he will soon adapt to the new circumstances.[14] Consequently, only by going after the enemy ground forces in the occupied land can one prevail. While one has sympathy for Warden's argument, that strategic air campaigns have always been compromised for parochial and political reasons, and thus never really been given the chance to show their full potential, Clarke makes a strong case when he suggests that strategic air strikes add to a range of pressures that should be applied simultaneously against the enemy. It is, ultimately, the accumulated product of pressures on the supreme decision-making body that results in change of policy. While joint strategy is normally associated with combining all military services, there is something to be said for combining the military aspect with diplomacy. Strategic air strikes, more than any other air power mission, provide direct diplomatic leverage. The combination of "bullets and words" is often underestimated in the actual execution of an air campaign: the diplomatic game does not end when military action starts, as seen recently in "Deliberate Force" and "Allied Force".[15] Moreover, the very existence of a strategic air fleet may well have a deterrent effect on the opponent. As a "force in being", strategic air power capability has a role both in preventing war and in the conduct of operations. While "war is a continuation of politics by other means", many air power advocates would seem to strip the concept of strategic bombing of its political context. The unprecedented accuracy and destructiveness of air power today means that every bomb is a potential political bomb, and therefore air power needs to be considered in terms of both political and diplomatic perspectives. While Warden argues that air power can be decisive when applied in the strategic realm, and Pape argues that all such applications have proved irrelevant in the past, Clarke argues that strategic air power should at least be an option.

Having established these three propositions, Clarke next discusses the strategic air strike methodology in its relation to small nations, by building on Pape's taxonomy of four coercive strategies. Clarke discusses whether small nations should adopt a "punishment" or "risk" strategy, which tries to push a society beyond its economic and psychological comprehension, a "decapitation" strategy, which neutralises or isolates an adversary's leadership, national communications, or other high value centres, or a "denial" strategy, which attempts to neutralise an adversary's military ability to wage war. Pape essentially argues that coercive mechanisms provide a better basis upon which to categorise air strategies than targets do,[16] but as the argument develops Pape starts to equate each category with a common set of targets. Moreover, as his deductive reasoning progresses he excludes one option after the other, concluding that there is strong evidence in support of "denial" applied at the tactical level as the superior coercive strategy. Clarke considers all four mechanisms at the three levels of war, but in the context of small nations, and without suggesting that one is always preferable. He acknowledges that the four coercive strategies are easily distinguished on paper for analytical purposes, but that in reality they overlap. By stressing that leadership-centred rather than military-centred approaches provide small nations with new leverage, he merges the strategic focus of Warden with the coercive focus of Pape. After a discussion of various targeting theories and the caveats therein, Clarke explores the possibilities of a paradigm termed "SPOT bombing". It emphasises targeting the belligerent leadership, but it does not aspire to overwhelm, paralyse or even generate dominant tempo, as that is beyond the means of small nations. It is about persuasion and "high impact", that is, discrete operations optimising the combination of shock, visibility and damage.[17] The author offers an orientation, or mentality, rather than a force structure, and since it merely adds a new dimension to air power options, Clarke

argues that his thesis can be implemented without substantial changes in the current structure of most air force organisations.

Clarke has developed a convincing and comprehensive argument for small nations to consider strategic operations as a central part of their military doctrine. There are, nevertheless, a few issues that deserve further attention. First, for small nations to buy bombers in addition to fighters is expensive, and it might well be difficult within the allocated budgets, but "swing" and "multi" role functions might bridge that gap. Second, air strikes against high-value targets are likely to provoke retaliation, and thus an unintended escalation may well be the result. The whole of the argument pre-supposes that the state in question can control the terms of reference, set the agenda and act in exactly the way it wants. If a small nation is fighting a large nation it may not have the means to follow-up such attacks, and the whole endeavour might be counterproductive. In this context it would also be interesting to explore one's own vulnerability to the described operation. Or, just as importantly, discuss how small nations can contribute to Coalition warfare: how likely is it to have circumstances in which a state with less than one hundred strike-aircraft might seek to act offensively alone? Third, there are problems within international law when it comes to non-military targets, and one has to assume that future belligerents will mix high-value targets with sensitive elements of the overall society. Fourth, any given country has to assess its likely enemy? If it is a revolutionary guerrilla movement, a civil war scenario or a country without considerable high-value targets, then the utility of strategic air operations decreases. Moreover, sometimes one does not want to negotiate with the enemy; one needs to eliminate his means of threat. This is often the case with nuclear, biological and chemical production centres, and herein Clarke provides an opening by acknowledging that "fait accompli" has its role in modern conflicts. Finally, even if it is a "classical war", would it be politically acceptable to execute a strategic offensive? Lieutenant General Michael C. Short was prevented from using air power in the suggested fashion for political rather than military reasons in 1999.[18] Still, Clarke's thesis might be more acceptable for politicians than going "for the head of the snake [Milosevic] on the first night".[19] These reservations are fair, but Clarke does not argue that one is obliged to use the strategic air strike option. Indeed, if the risk assessment concludes that the chance for retaliation is huge, that it might breach international law or that it is not politically acceptable, then strategic air strikes should not be preferred over the "traditional" air power roles. Clarke makes his case about the feasibility and implications of a "SPOT bombing" approach based on deductive reasoning combined with a solid theoretical framework, and as such it adds to the list of air power options that should be included in military doctrines. "SPOT bombing" is an important tool as the erosion of leadership resolve is based on influence rather than elimination, but it does not do away with the problem of assessing the enemy's political power structure and the traditional difficulties related to human intelligence.

Part Three: Overall Assessment

In conclusion with reference to the Warden-Pape air power paradigm, Clarke sides with Warden in the fundamental belief that strategic air power can make a difference. But by accounting for small-scale operations, he differs from Warden in that he does not believe strategic air power can make the whole difference. Clarke sides with Pape on his analysis of the rationale and mechanisms behind aerial coercion, but he differs from Pape in believing that there is not a sole strategy with universal applicability. Clarke argues that one might search in vain if looking for a single-handed decisiveness in air power, as it is really about improving probabilities of gaining some concessions. While Pape seeks a

single solution within the choices of coercive strategies (denial) and Warden seeks a selection of prioritised target-sets (the Five Rings), Clarke concludes that at the end of the day the only sure thing is that "every man has his price". Thus, one needs to understand the cost-benefit calculus of the enemy, subsequently search for what actually constitutes his "price", and determine whether one is willing to exceed that price by using military power. If there is political commitment to such a task, then strategic air power will add significantly to the required leverage. Strategy is all about creating the circumstances in which the enemy leader will change his behaviour, and as such removing the enemy leader from power is not as important as having him comply with declared objectives. There is importantly no aspiration to paralyse the enemy in "SPOT bombing", only irritate, cause personal sacrifice and ultimately weaken the leadership's resolve for offensive action.[20]

Strategy, Air Strike and Small Nations is overall an important book on air power doctrine, strategy and theory within the context of small nations, as it examines the essence of strategic bombing. It is not an exhaustive analysis of air power or doctrine, as it only deals with one aspect within a range of air power functions, but it is an essential contribution to strategic acumen, professional mastery and the overall defence debate. In brief, Clarke argues that the key to "high strategic order" air strike lies in understanding the mechanism of coercing the political leadership, the advantages of joint strategy, and acknowledging that limited wars are fought for limited objectives. Herein one must sensitively comprehend cause and effect relationships in a field of the non-linear and intangible, which necessitates intelligence that accounts for cultural, social and psychological aspects combined with the art of military strategy. In the end, the utility of air power has more to do with imaginative and innovative thinking than with high technology and aircraft, and countries like Norway, Denmark and the Netherlands, all involved in revising their air power doctrines, would therefore do well in thinking through Clarke's findings – in terms of both offence and defence. Rather than suggest one strategy that is most likely to work in all cases, Clarke suggests a coherent and holistic view within the reality of small nations. His thoughts are aligned with Warden's, in focusing directly on the political realm of war, but there is a big difference between targeting for paralysis and targeting for persuasion. The logical and deductive thesis is, in conclusion, educational as it encourages lateral, creative and independent thinking, and one can only agree with Colonel Phillip S. Meilinger that it is currently "one of the freshest and most original books on airpower theory".[21]

1 The book is available, free of charge, at the Aerospace Centre, RAAF Base, Fairbairn ACT 2600, Australia (apsc@dynamite.com.au). I would like to thank Dr. H. P. Willmott at the British MoD and lecturers Nils Naastad, Øystein Espenes and Patricia Aresvik at the Royal Norwegian Air Force (RNoAF) Academy for comments on this review essay.

2 "Deliberate Force" was a 42 day air campaign conducted by NATO against the Bosnian Serb Army between 30 August and 20 September 1995, involving 3,500 sorties against 56 target complexes, particularly supply dumps, with the result that the Serbs returned to the negotiation table (Dayton Peace Accords); "Desert Fox" was a 70 hour air campaign against the Iraqi regime between 15 and 18 December 1998 encompassing 650 sorties against 99 targets with the mission to strike military and security targets in Iraq that contribute to Iraq's ability to produce, store, maintain and deliver weapons of mass destruction; and "Allied Force" was a 78 day air campaign conducted by the 19-member NATO Alliance against Yugoslavian President Slobodan Milosevic's forces occupying Kosovo and Serbia proper between 24 March and 10 June 1999 with the objectives of stopping the Serb offensive in Kosovo; forcing a withdrawal of Serb troops from Kosovo; establishing democratic self-government in Kosovo; allowing a NATO-led international peacekeeping force into Kosovo; and allowing the safe and peaceful return of Kosovar Albanian refugees. On *Allied Force*, see particularly General Wesley K. Clark, "The United States and NATO: The Way Ahead", *Parameters* XXIX, No. 4, (Winter 1999-2000), pp. 2-14, and on objectives particularly, see William Clinton, "Statement of Objectives", 24 March 1999, quoted in *Air Force Magazine* 82, No. 8, (August 1999), p. 66.

READING NEW READING NEW READING NEW

The Royal International Air Tattoo
Airshow Celebrates 30th Birthday

The Royal International Air Tattoo 2001 (RIAT), to be staged at RAF Cottesmore, Rutland, on the weekend of 28/29 July, marks 30 years for Europe's biggest airshow. RIAT 2001 is set to welcome 50 air arms representing over 30 nations – and the flying display will be a non-stop, eight-hour spectacle for aviation fans of all ages. One of the highlights will be the appearance of veteran Hunter pilot Rod Dean, now retired from the RAF who, as a young Pilot Officer, won the first-ever Tattoo flying trophy in 1972.

When the Tattoo began, the RAF was operating Lightnings and Phantoms. Since then it has been the showcase for many advances in aviation technology, including the introduction of fly-by-wire and stealth aircraft.

Over 350 aircraft, including the RAF Red Arrows and other superstar aerobatic teams, are expected to fly into RAF Cottesmore for The Royal International Air Tattoo 2001. The event is held in support of the RAF Benevolent Fund and its charitable welfare work.

Duxford Announces Dates for 2001 Air Show Season

Planning for the 2001 air show season is well under way; the four shows, scheduled for May, July, September and October, are expected to attract over 100,000 visitors from as far afield as Europe and the United States.

The year will get off to a flying start with the Spring Air Display on Sunday May 6. The show will trace the development of British fighter aircraft from historic biplanes through to the supersonic fighters in service today.

The Flying Legends Air Show, now in its eighth year, is firmly established as the premier 'warbird' show in Europe and will take place on Saturday 7 and Sunday 8 July.

Saturday 8 and Sunday 9 September is the weekend set for the Duxford 2001 Air Show. Vintage fighters and bombers, modern combat aircraft, helicopters, transport aircraft and aerobatics will combine to make this aviation action an event for the whole family.

Duxford's Autumn Air Show on Sunday 14 October will be the UK's last major air show of the year. With all the usual Duxford air show favourites this is sure to be a spectacular end to the season.

Discounted advance tickets go on sale from 1 January in the Museum shop and on the Duxford Air Show credit card booking line on **01233 499353**. The whole 85 acre museum complex will be open to the public throughout the shows and Duxford's FREE courtesy bus will be operating from Cambridge Railway station and the city centre. Park and ride facilities will be available at Junction 13 on the M11 for all shows.

For the latest information about Duxford's air shows check the website at www.iwm.org.uk or call the Air Show Hotline on 01223 499301.

No 72 Squadron Reunion – 21 April 2001

No 72 Sqn Reunion, Saturday 21 April 2001, at 'The Squadron', North Weald Aerodrome

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Every year a few lucky RAF officers are sponsored to undertake a period of higher level defence studies (HLDS) at a British university. The opportunities available are set out in DCI GEN 183/00 and include the following:

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Places on the courses/fellowships listed above are normally open to squadron leaders and above aged between 35 and 45; but these are guidelines – junior officers with suitable experience are encouraged to apply. A first degree is not essential provided that candidates can satisfy the university that they are academically capable of undertaking post-graduate study. As the full-time courses/fellowships are residential, successful candidates are effectively "posted" to the university and can be accompanied by their families. RAF Uxbridge is administratively responsible for students.

Places on all courses/fellowships is by competition; a selection board meets to decide places in December for courses/fellowships commencing the following autumn. Candidates will be expected to gain support of higher authority, provide the Board with details of their area of study and will be called forward to the Board for interview. If successful, attendance of the courses/fellowships attracts an amortisation period of 3 years (Service Fellowship 2 years).

The deadline for applications for the 2002/2003 academic year for all HLDS courses/fellowships is 31 Oct 01. Personnel considering applying for any of these opportunities are advised to contact SO2 Defence Studies (RAF), JDCC Shrivenham, Swindon, Wiltshire SN6 8RF
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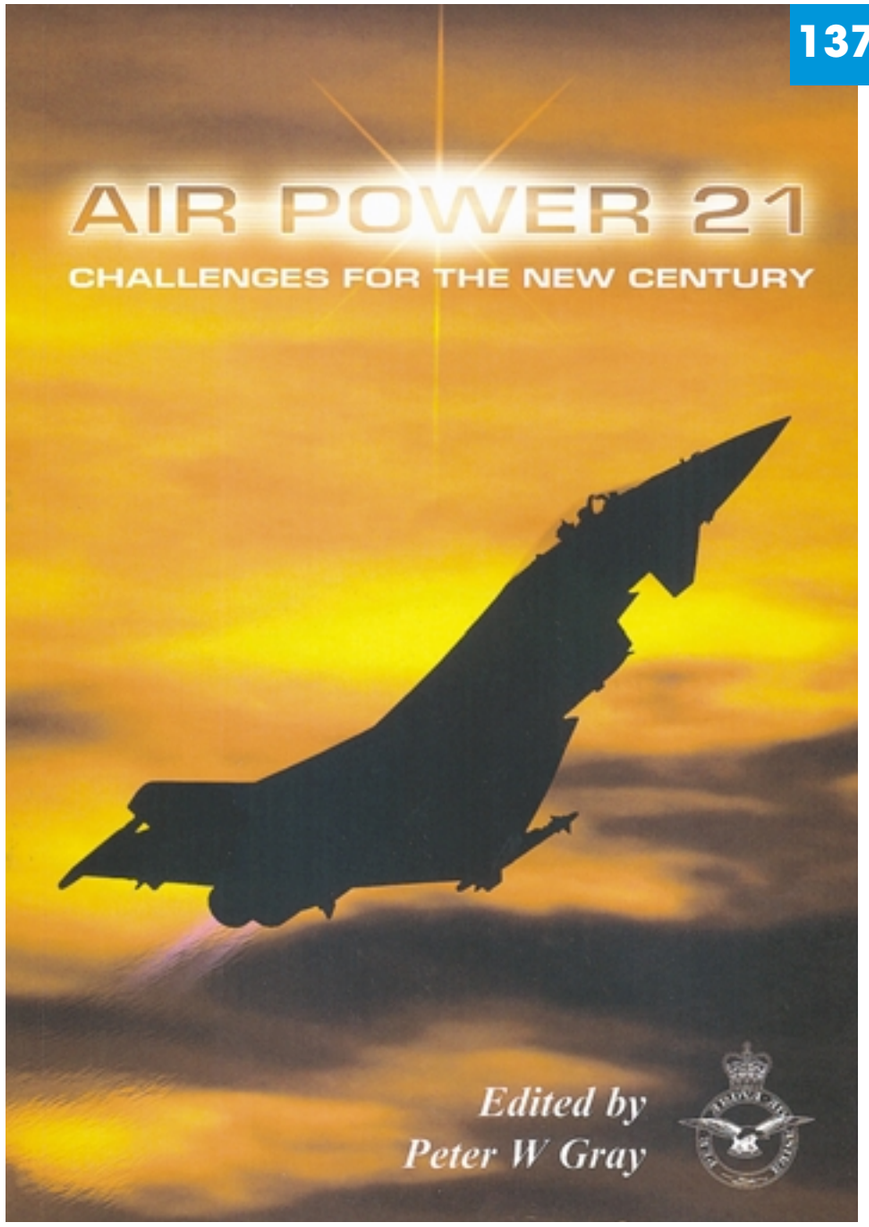

Air Power 21 – Challenges for the New Century is the product of the Chief of the Air Staff's Air Power Workshop; this consists of an ad hoc collection of leading academics and senior military officers. This new publication represents the leading edge of air power thinking in the United Kingdom based on detailed research and enhanced by considerable operational experience. The authors have shown how air power thinking has developed over the last decade in particular, but have not fallen into the

'comfort zone' of pretending that history only started in 1990 after the fall of the Berlin Wall and just before the Gulf War. Many of the lessons of history, even over the relatively short span of air warfare, remain valid and germane; we ignore the voices from the past at our peril as we will only have to relearn their message painfully. Where lessons have been drawn from history, these have been carefully selected to be relevant especially where the writings of strategists have been cited – just because Clausewitz said 'X' or Sun Tzu said 'Y', they were neither necessarily right, nor need their aphorisms be pertinent to modern warfare. At the other end of the spectrum, lessons emerging from the aftermath of the air operations over Kosovo and continuing fighting in Chechnya have been incorporated.

Beyond the self-evident theme of air power, several factors are common through the book. The first of these is the significant changes brought about by the collapse of communism and the concomitant demise of the Warsaw Pact. This removal of the threat brought with it the inevitable calls for so-called 'peace dividends' which, in many cases, were little more than treasury-inspired demolitions of national military capabilities. Only in a very few cases were cuts based on serious analytical work. Had such an examination taken place, it would almost certainly have indicated a need for caution somewhat akin to allowing steam to escape gradually from a pressure cooker. As the constraints imposed on world order by the ever-present risk of superpower confrontation were loosened it was inevitable that conflict would flare and that elements of the international community would have less hesitation than hitherto in responding with force. It is axiomatic that military forces that had spent two generations configured for war against a monolithic threat would take a finite period of time to adapt their structures to the new world order. In such an era of change, the flexibility and versatility of air power ensured that it would inevitably take its place in the vanguard of any action.

The Gulf War and subsequent operations over northern and southern Iraq have ensured that air power – at least for the United States and Britain – has been in constant operational use rather than just constant readiness. The political appetite for intervention as a force for good in the world has meant that readiness to respond has had to be maintained at high levels in those countries that have a desire for expeditionary operations. There is an immediate tension, however, between the competing resource demands on maintaining forces in operational theatres, having units at high readiness to deploy and having the assets with which to move them. Rather than a peace dividend there is arguably a case for a surcharge!

During the Gulf War, there was considerable debate within the American press as to the likely scale of US casualties in the event of a ground war meeting serious opposition. The media was also used as the debating ground between the exponents of the land war versus the air war. A similar theme developed at an early stage of the Kosovo air operations involving numerous pundits and retired senior officers. How much influence these debates had either on the public or, more importantly, on the decision-makers is inevitably hard to quantify. There can, however, be little doubt that all arms of the media occasionally descend into a self-feeding frenzy where the generation of column-inches and audience ratings is of more concern than the dispute at hand. Sensationalism becomes the norm with accuracy, balance and debate the first casualties. Or at least this is

how the majority of military audiences see the media. The verisimilitude of this viewpoint is, however, barely relevant. What actually counts is the real power of the media to change the direction of events. This again is impossible to quantify, leaving us with arguably the key question of influence. This can be exercised through editorial comment; inclusion or removal of a topic from the agenda; opinion polling or just the 'spin' that a given organ of the press gives to a story. What really counts is the sensitivity of the political/military leadership to what is being said and to a lesser extent by whom.

The supposed glamour of air power has always had its special appeal for the press, not least because of its photogenic nature. Professor Michael Clarke covers this in his chapter on *Air Power and Military Intervention: The Political Limitations*. In terms of the political context within which decisions are made, Professor Clarke highlights the difference between what a computer or a planning team would advise versus the intuitive judgements of the political (or military) leadership. These judgements, particularly of what is at stake, will be based on instincts, values and culture. No matter what the frustrations, those charged with the conduct of military operations must accept the reality that perceptions are all-important and that they can change rapidly. As if coping with changing perceptions was not difficult enough, having to do so in times of rapid inherent change is all the more difficult. As Professor Clarke admits in his conclusion, air power analysts may be forgiven for feeling victimised by the contradictions of the current era.

Parallel contradictions are immediately evident in Dr David Gates's chapter on *Air Power: The Instrument of Choice?* Dr Gates highlights the dangers of air power advocates achieving their nirvana – the state of bliss in which air power can achieve political goals without the involvement of land or maritime forces. The risk, of course, is that they are called upon to do so in circumstances that require the synergy of joint forces acting together. Dr Gates goes on to discuss the risk of the United States' technological supremacy resulting in potential opponents seeking asymmetric responses including the proliferation of missile technology. The place of air power in an age of rapid technological change is addressed by Wing Commander David Caddick in his chapter entitled *Air Power and the Revolution in Military Affairs*. Wing Commander Caddick enters the lists with a valuable debate on the definition of RMA with particular emphasis on the revolutionary aspects of the change. He situates the RMA within its contemporary and United States settings before going on to look at the role of air power as an essential component thereof. The American aspect of this debate is critical – not least because much of the academic output on the subject hails from there. Wing Commander Caddick leaves us to ponder the imponderable: does the so-called revolution exist, or is merely wishful thinking?

The huge lead, particularly in air power capabilities, that the United States has developed will inevitably increase the risk of asymmetric response. Not only is asymmetry a serious problem *per se*, but it is exacerbated by the extra resources that could be diverted should no attempt be made to develop even a token response. Professor Philip Sabin's chapter, *Air Strategy and the Underdog*, looks at the options open for those who are potentially on the receiving end of air dominance. These range from

limiting vulnerability through fostering restraint to generating the ability to strike back. Professor Sabin also describes the difficulty facing all sides in cobbling together advantages into some form of coherent strategy.

The issue of US dominance also applies amongst allies. In *European Air Power*, Air Marshal Sir Timothy Garden highlights the comparative wealth of the European Union which is out of proportion to the military capabilities that the member states are prepared to deploy. Air Marshal Garden points out the force structure implications of numbers of ground forces versus other arms; he also looks at the imbalance of air defence fighters over offensive aircraft and highlights the shortfalls in combat support aircraft. He goes on to argue that this latter area has the most potential for early co-operation with an airlift capability as a prime contender. Combat Search and Rescue and air-to-air refuelling could then follow before the more problematic areas of offensive aircraft were addressed.

It is, however, not sufficient to purchase or lease specific capabilities. Allowance has to be made for how the assets will be deployed and by whom they will be commanded and controlled. In his chapter entitled *The Airmen's Dilemma: To Command or to Control*, Air Commodore Stuart Peach has provided a stark reminder that the theory of both command and control may be far removed from the practical aspects. Air Commodore Peach draws on examples from the advent of air power in the first World War onwards. His comments on more recent operations strip away much of the gloss with valuable assessments on air operations over former Yugoslavia.

The value of the historical perspective is carried on by Brigadier Mungo Melvin whose chapter on *The Land/Air Interface* 'looks forward from the past and its lessons'. The theme of command and control is moved on from air operations into the joint arena with an emphasis on where the scope for friction in the joint battlespace of the future can be eradicated. Brigadier Melvin highlights the role of people in reducing this friction. This may seem obvious, but history is littered with examples of well-equipped forces whose training and doctrine have matched their operational needs, only to be let down by unseemly squabbles at the highest levels.

The joint arena is completed with a chapter from Dr Christina Goulter on *Air Power and Expeditionary Warfare*. She reaffirms that air power must never be so tightly defined as to omit naval aviation whether carrier borne or otherwise. The advent of Joint Force Harrier and the decision to order two new carriers is testimony to UK commitment in this area. Dr Goulter adds to the debate on the future potential of this force. Among the threats posed to a Joint Task Force,
Dr Goulter highlights the dangers from diesel submarines – especially in the littoral and en route to the area of operations.

In the final chapter, *Rethinking the Conceptual Framework*, Air Vice Marshal Professor Tony Mason looks at the inheritance of air power and how air power thinking has had to evolve over the last decade to cope with the multiplicity of potential conflicts. He stresses that doctrine and conceptual thinking must escape from the realms of dogma if it is to reach its full potential in the new century. This is indeed a challenge worthy of the name.