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**Do Air Forces Have
a Future?**

Cover Photos

Front—An F-111E mothballed at the Aerospace Maintenance and Regeneration Center, Davis-Monthan Air Force Base, Arizona (from <http://www.dm.af.mil/amarc>)

Back—Pencil drawing of the Air Force Academy Falcon mascot perched on the glove of a cadet handler. Bruce M. Kuelz, USAFA '76. Courtesy USAF Academy Department of English and Fine Arts.

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From The Editor

Do Air Forces Have a Future?

Professor Martin van Creveld of Hebrew University in Jerusalem is well known for his scholarship on military logistics and technology. In 1996, he wrote a provocative piece on the future of air power and presented it to the Royal Australian Air Force; in fall 1999, he gave a similar lecture to members of the faculty and cadet wing of the US Air Force Academy in Colorado Springs. Using impressive statistics and deductive logic, he argued that air forces around the world were in decline, both in numbers and in their importance to the conflicts likely to be fought in the 21st Century. These will be mostly intra-country affairs where high performance aircraft, even with precision weapons, will have little effect on outcomes. Van Creveld noted that air transport, helicopters, unmanned aircraft (UAVs), missiles, and space will retain or increase their relevance, but that the time for manned combat aircraft has come and gone.

At the US Air Force Academy — where the primary mission is to develop Air Force leaders, a good percentage of whom will become combat pilots — Dr. van Creveld's comments were naturally controversial. Most Academy personnel believe the US Air Force is among the premiere fighting forces in the world and that, if anything, improvements in training, technology, and doctrine are leading Air Force combat aircraft to even more important roles in the future. The 1991 Gulf War provided strong evidence for this belief, although the 1999 air campaign over Kosovo gave perhaps more ambiguous lessons. Van Creveld's conclusions encouraged future airmen at least to consider more varied ways of looking at the missions and future of air power.

This edition of *Airman-Scholar* hopes to further discussion on these important topics. Dr. van Creveld and the Royal Australian Air Force have graciously given permission to reprint his 1996 article, titled "New Era Security: The

as well comments by Air Vice-Marshal Tony Mason (RAF), General Richard E. Hawley (USAF), and Rear Admiral John B. Nathman (USN) that describe current air capabilities and certainly imply different views about the future of air forces from van Creveld. Captain Brian Anderson follows with a specific response to several of van Creveld's points, as does Cadet Patrick N. Giggy. Lieutenant David Bookstaber updates us on UAVs, Andrew Dorman on allied air power capabilities post-Kosovo, and Alice Hills on air power and urban operations — all part of discussions on the future of air forces. Drs. Dorman and Hills are members of the faculty of the Joint Services Command and Staff College of the Ministry of Defense of the United Kingdom and Air Vice-Marshal Mason is now a Professor at the United Kingdom's University of Birmingham. The several articles by international authors led us, only half in whimsy, to consider renaming our journal *Airman-Scholar International*.

We hope this issue of *Airman-Scholar* will make a legitimate contribution to discussions about the future of air power and our Air Force. As always, we invite your comments. The issue also features several works of original "air power" art created by US Air Force Academy cadets over the years in what may become a regular feature of our journal. Our thanks to Dr. Pam Chadick of the Department of English and Fine Arts for making this possible. Please read our plans for the fall issue later in this volume and consider submitting an article for publication. CK



New Era Security: The RAAF in the Next 25 Years

Air Power 2025

Martin van Creveld

The purpose of the present paper is to try and divine the way that air power may look in the year 2025 or thereabouts. It is not intended as a prescription for policy-makers; on the contrary it assumes that, globally speaking and disregarding local variations, history will march in the direction indicated regardless of whether individual policy-makers agree or not. To accomplish its purpose, it is divided into four parts. Part I discusses the relationship between air power and the political organization by which it is owned and which it has been used for the conduct of war, i.e., the state. Part II, based on work previously done by this author,¹ looks at the direction in which future war will probably develop. Part III attempts to understand the likely fate of air power within the context provided by these developments. Finally, Part IV represents our conclusions.

The most fundamental single fact about air power — so fundamental that it is seldom even noted, let alone questioned or investigated — is that it is owned and operated by the state. From the beginning of the twentieth century, which is when it all began, to the present day no organization other than the state has ever fielded an air force; conversely, no other organization could have done so even if it had wanted to. Political organizations that are not states — for example, city-states, independent militias of the kind that used to battle each other in Somalia and Bosnia, guerrillas, and terrorists — do not air forces own. Thus the PLO has long been one of the most important and richest twentieth century terrorist organizations; yet the closest it ever came to owning an air force was when one or two attempts were made to reach Israeli targets by flying motorized hang gliders across the border with Lebanon. When the Lebanese civil war

fought it were disarmed, the one commanded by Samir Jaja was found to own two light helicopters. The Syrians apart, these machines represented the sum total of air power employed by all sides — numbering some fifty different militias all told — in that long and extremely bloody conflict.

The reasons why no political organizations except the state have ever been able to develop air forces are obvious enough. First and foremost is the sheer expense and complexity of such a force.² A single modern attack aircraft, such as the F-15I, can cost almost one hundred million dollars if we include the kit — accessories and spare parts — with which it comes and without which it would be unable to operate. The price of an F-117 fighter, a B-2 bomber, let alone a J-STARS, is much higher still, running into several hundred of millions of dollars each. The machines in question are enormously complicated. The control system of one F-15 fighter engine (it has two) is said to consist of five thousand parts; whereas the number of different spare parts and items of equipment that have to be kept in store by a single air force base can easily run into the hundreds of thousands. Thus each aircraft must be supported by a vast organization consisting of logisticians, technicians, air controllers, meteorologists, communicators, and so on, to say nothing of the billions upon billions of dollars that must go into the physical structures and equipment required. It goes without saying that such complexity can be managed, and such sums raised, exclusively by the organization known as the state. In fact, so expensive and so complicated are modern air forces that they cannot be afforded even by the majority of states. Some three quarters out of the 185 or so now existing on this planet do not have such an air force; and

one reason or another, they wanted to do so in any kind of foreseeable future.

The other reason why air forces can only be fielded by states is the amount of space taken up by air bases, the vulnerability of aircraft, and the length of the runways they need in order to take off and land. Once in the air a combat aircraft is a potent instrument of war. It may be capable of flying at up to twice the speed of sound and of making the power of its weapons felt both against other aircraft and against ground targets; all this regardless of geographical obstacles and in some cases even if those targets are located thousands of miles away. So long as they remain on the ground, however, aircraft are extremely vulnerable owing to their relative immobility, the fragility of their structure (considerations concerning weight put strict limits on the amount of armor that can be provided) and the comparatively enormous quantities of fuel and explosive that, when ready for combat, they carry.³ To be sure, history shows that airfields can continue to operate even when subjected to heavy air attack. For example, the Royal Air Force went on flying out of Malta throughout the period of the strongest German offensives in 1941-42; although, at times, the capacity of the airfields in question was greatly reduced, they were never quite shut down. On the other hand, no air base in history has been able to operate for long while subject to persistent artillery or rocket bombardment; which of course explains, if an explanation were needed, why such bases are normally located well in the rear where enemy forces cannot reach. In other words, any organization which wishes to operate an air force in war will first of all have to exercise sovereign control over a considerable territory measured in hundreds if not thousands of square miles. That in itself is no mean feat, and indeed it is suggested that any organization capable of accomplishing it would be a state or something very much like it.

Finally, the third reason why only states are able to operate air forces is because states have borders. During much of their short history the firepower which air forces were able to deploy was fairly indiscriminate. Either pilots were unable to locate their targets because the latter were mobile or because they were obscured by night, cloud, fog, or rain; or else they failed to hit

them because the aiming devices with which they were provided were simply not up to the job. During the strategic bombing campaign of World War II only one in eight of all bombs dropped reached its target; not seldom misses could be measured in miles. Thus, to be on the safe side, air power was best employed across some state border or, at any rate, on the other side of some bombing line laid out in advance. In other words, in such a manner that a miss, whether large or small, would affect the enemy rather than friendly forces.

Though modern sensors on the one hand, and precision-guided weapons on the other, have gone a fairly long way towards solving the problem of identifying targets and hitting them, that of separating friend from foe remains. That is particularly true if the targets in question are not sophisticated; in other words, if they do not carry the transponders necessary for answering a friend/foe query. Under such circumstances it remains true that air power, especially that represented by the fastest-flying and most powerful systems (attack aircraft, bombers, and cruise missiles) is best employed across some kind of border line or, at the very least, inside a clearly-marked zone which is guaranteed to contain nothing but people and property belonging to the enemy forces. Otherwise its use is likely to be counterproductive or, in plain words, to result in friendly casualties. This happened very often from the time of the Normandy Invasion in 1944 (when no less a personage than the Commander of the US [Army] Service Forces, General Leslie McNair, was killed by friendly B-17s carpet-bombing the area which he was visiting) all the way to the 1982 Lebanon War (when an Israeli battalion was demolished by its own Air Force) and the 1991 Gulf War.

The above paragraphs already indicate why air power, besides being capable of being built, deployed, and operated solely by states, is useful primarily in the wars that those states wage against other states. Without exception, this basic condition applies to all the great air campaigns of history. For example, the various blitzkrieg offensives conducted by the Germans in 1939-41; the early Japanese offensives against Pearl Harbor, the Philippines, etc.; the Allied campaigns against the German and Japanese

forces; the Korean War; the 1967 and 1973 Arab-Israeli Wars; the Falkland War; the 1982 Israeli-Syrian War in Lebanon; and of course the Gulf War. Depending on the strength of the anti-aircraft defenses and on numerous other factors, the usefulness of air power in each of these wars and its ability to affect ground operations, productive capacity, and civilian morale varied. By and large it was largest where the terrain was open and the ground forces mechanized; smallest, where it was closest and ground combat conducted by infantry assisted, perhaps, by artillery. Still there is no denying that all were greatly influenced by it. Not only did victory always go to the side that was able to obtain and retain air superiority, but some campaigns were decided by it.⁴

On the other hand, where the opposition with which air power is faced does not consist of states with territories that are comparatively large and borders that are clearly defined; when it consists not of regular, state-owned armed forces but of militias, guerrillas, and terrorists operating in a decentralized manner; where combat takes place in close terrain, as in jungles or mountains, and where the belligerents mix with the surrounding civilian populations so that friend and foe are virtually indistinguishable; under such circumstances the use of air power is, as experience shows, much more limited.⁵ Had air power been decisive or even very useful, then the Nazis ought to have succeeded in putting down the partisans in Yugoslavia, Greece, and many other places. The French ought to have defeated the insurgents in both Indo-China and Algeria; the British, those in places such as Kenya, Cyprus, and Aden; the Americans, the guerrillas in Vietnam (where, in Operations Linebacker I and II, they did succeed in beating back the North Vietnamese attempts to invade South Vietnam by conventional means) and Somalia; the



B-52 operations during the Vietnam War. (Source: HistoricWings.com)

Soviets, the Afghanistani Mujahideen; the Indians, the rebels in Sri Lanka; the South Africans, SWAPO; the Israelis, Hizbullah in Lebanon; the Turks, the Kurds; and the Russians, the Chechnyan rebels. These cases only represent a small selection of the dozens and dozens which have taken place and could be cited. All have this in common that command of the air was in the hands of the counterinsurgent power and was about as complete as one could wish it to be (although, in places such as Angola and Afghanistan, the insurgents had fairly effective anti-aircraft defenses). In many of them it was employed ruthlessly, even to the point that, during the Vietnam War alone, the quantity of bombs dropped by the US Air Force was almost three

times as large as that dropped on both Germany and Japan during the whole of World War II.⁶ Even if we grant that the US Air Force could have done more to win the War in Vietnam if it had been given a free hand — which, contrary to the claims of its commanders, is by no means self evident — the same does not apply to the Soviet use of air power in Afghanistan where there were few, if any, holds barred. In this case, as in others, air power did not lead to

victory. Nor, by most accounts, did it even bring the Soviets close to victory.⁷

The long and the short of it is, the one organization capable of building a modern air force is the state; whereas the ability to use it effectively in war is critically dependent on that war being waged by one state against another. To put it in a different way, of the three services the air force is the one that is most closely associated with the state. Historically speaking many organizations that were not states have been able to conduct operations on land and were sometimes highly effective in doing so; as the recent revival of piracy on several parts of the world (particularly South East Asia and West Africa) reminds us, a few have even been able to operate sea power on a small scale. However, and with very minor exceptions such as the handful of

hang-gliders, helicopters and light aircraft that are sometimes possessed by guerrillas and drug-traffickers, to date it is only states which have succeeded in developing air power, deploying it, and using it. Having done so, invariably they found that its main use was in fighting other states, whether in the air or on the ground; employed against organizations of a different kind it was found to be much less effective if not counterproductive. The principal reasons behind this situation are the cost of air forces, as well as their size and complexity. Next in line is the difficulty that they often experience in hitting their targets; especially if those targets are located in difficult terrain or among friendly forces and civilian populations.⁸ Should air forces some day be able to do without the vast ground facilities with which they are associated; should the vulnerability of stationary aircraft decrease and their ability to identify and hit targets from the air improve; in that case, perhaps, the situation will change. As of the present, however, the facts have spoken for themselves.

Given that air power is much more useful in some wars than in others — in war between states than in wars that take place between, or against, other kinds of organizations — which one of the two kinds represents the wave of the future? Obviously there can be no single answer to this question; from one part of the world to the other much will depend on geography, politics (both domestic and foreign) as well as economic, religious, and cultural factors. While this paper cannot presume to look at each region separately, it can take a global approach and look at the post-1945 period as a whole. Once the question is put in such a way it is capable of being answered. The answer that emerges is as clear as any that we are likely to obtain by looking at history, employing the historical method, and assessing historical trends.

The facts, then, are as follows. By my count, since 1945 there have taken place approximately one hundred wars.⁹ Of these wars, fewer than twenty were full scale conventional affairs fought by states against other states with the aid of their regular, uniformed, armed forces. Of those that did fall within this category, the majority took place in just two regions: namely, the Middle East and South Asia. Depending on the

way one counts, the former witnessed six conventional interstate wars (1948, 1956, 1967, 1969-70, 1973, and the three day clash between Israel and Syria in June 1982). The latter saw three wars between India and Pakistan (1947, 1965, 1971). These regions apart, conventional war has become a comparatively rare phenomenon. I count the Korean War (1950-53), the Indo-Chinese War (1961), the Chinese Invasion of Vietnam (1978), the Falkland War (1982), the Iran-Iraq War (1980-88) and the Gulf War (1991). There have been numerous other cases when the armed forces of two states engaged in shelling or skirmishing as between China and Taiwan, China and the former Soviet Union, as well as India and Pakistan; however, few if any which led to full scale war. Given that, during the period in question, the number of states has increased almost four times over, these are astonishing figures. At the time of this writing in the spring of 1996, out of approximately thirty wars that are being waged all over the world, all are fought either between organizations that are not states or against them. As the names that are often applied to them — subconventional war, low intensity war, and the like — show, the members of regular, state-run, armed forces have long had a tendency to look down upon non-state conflicts, belittle them, and denigrate them. Given that the most powerful organizations and the most powerful weapon systems — including, specifically, air forces and their high performance combat aircraft — are usually absent from these wars such a tendency is understandable; objectively, though, nothing could be more mistaken than to regard the wars in question as small and harmless. In point of fact, they have proved far more destructive and far more bloody than the conventional ones; even to the point where there can simply be no comparison between the two. For example, Israel in all its wars combined only suffered some 18,000 dead; by contrast, and in spite of the fact that the Lebanese Air Force in 1982 consisted of a mere half dozen obsolete Hawker Hunters, the number of dead during the Lebanese Civil War has been put at 151,000. Depending on which side one decides to believe, the Algerian War against France cost the lives of perhaps 300,000-1,000,000 people. The Soviet campaign in Afghanistan is supposed to have

caused the deaths of another 1,000,000 — how many have died in internecine fighting since the Soviet withdrew cannot even be estimated — whereas the independence and unification of Vietnam were bought at the cost of anything up to 2,000,000 dead. These are large figures indeed, but even they are exceeded by those of the Nigerian Civil War of 1967-69 which is supposed to have resulted in 2-3,000,000 dead. In fact, from 1945 on the only two conventional conflicts that even came close to matching subconventional war in terms of bloody casualties were the Korean War and the Iran-Iraq War. Judged by the standards of so-called subconventional war most of the interstate wars that did take place — such as the 1956, 1967 and 1973 Arab-Israeli Wars, the 1982 Falkland War, and even the 1991 Gulf War — have been mere skirmishes. The reason being that, in subconventional war, it was not only combatants but entire populations which were considered legitimate targets and, consequently, often butchered in large numbers.

Wars, though, are neither games nor sporting matches. Although casualties do matter, wars are not judged in terms of the number of points gained or lost; nor is it a question of counting the number of rounds fought as in boxing and various other competitive sports. Instead, to quote a dictum so famous that it is known even by those who have never read its author, war is the continuation of politics by other means.¹⁰ This point of view obliges us to plan wars, prepare them, wage them and judge them by the political effect which they have on the international system. Take any other approach, and one risks reducing it to a game, a senseless thing, without an object. Judged from the political point of view, the gap which separates conventional interstate war from subconventional war that is waged by, or against, other kinds of organizations is nothing short of momentous. Since 1945, the year when the Soviet Union took for itself chunks of German, Japanese, and Czechoslovak territory, there has not been a single case when an interstate war has caused an international border to be moved by as much as a single inch; which, considering that the UN Charter as the most subscribed document in human history explicitly forbids any such action

from being taken, is perhaps not as surprising as it appears at first sight. Of the above-listed conventional wars none has led to territorial changes, at any rate such as were recognized by the international community as well as the belligerents themselves. Even the one apparent exception, i.e., the 1948 Arab-Israeli War, is not really so. The borders of Palestine were fixed in 1920 by Winston Churchill in his capacity as Britain's Colonial Secretary. The 1948 war led to the country being partitioned; approximately one quarter of the total territory was occupied by King Abdullah of Jordan (Trans-Jordan, as it then was). However, the change was only ever recognized by two countries, Britain and Pakistan. For the rest, no international border was affected by that war — or by the remaining Arab-Israeli Wars — and indeed the precise location of one of those borders is even now being contested by Israel and Syria.

Whereas conventional war has singularly failed to bring about territorial change, the results of subconventional war during the same period have been momentous. The largest, mightiest, and most sophisticated Empires that ever existed have been brought down; causing hundreds of millions if not billions of people all over the so-called Developing World to change the regimes under which they lived. Contrary to what one might expect, the defeat and retreat of the Empires in question were not brought about by vast fleets of tanks, naval vessels, and aircraft. Instead it was the handiwork of militias, guerrillas, and terrorists many of whom went barefoot and some of whom — notably in places such as Afghanistan — could not even read. The various movements that accomplished these feats did not amount to regular armed forces. Though often supported from outside they did not own large quantities of modern weapons, especially heavy ones, nor would they have been capable of operating such weapons even if, by some miracle, they had come to possess them. Above all, given that they did not possess large stretches of sovereign territory and often depended on stealth for their operations they were neither capable of running air forces nor desirous of having them. It would thus be no exaggeration to say that the most important wars fought since 1945 have been waged and won without the benefit of air power

and, in a very great number of cases, in the teeth of everything that it could do. The reasons behind the shift from conventional to subconventional war are, once again, not difficult to find and indeed they were foreseen with some clarity by several people active during the years immediately following World War II.¹¹ The period since 1945 has seen the introduction of nuclear weapons, first by one country and then by several others. As bombs and their delivery vehicles proliferated, for the first time in history the link between victory and survival was cut.¹² It became possible for a state to win a war and still face the risk of being annihilated; indeed the more decisive the victory the greater the danger that the vanquished, like Samson, would either press the nuclear button or, with his command and control system in ruins, fall on it. Under such circumstances any attempt to wage full scale war against an opponent who possessed, or was even strongly suspected of possessing, nuclear weapons and their delivery vehicles became tantamount to suicide. On both sides of the former Iron Curtain rivers of ink were spilt, esoteric doctrines designed, and countless wargames held, with the objective of finding ways to fight a nuclear war without necessarily blowing up the world. In the end, though, it became apparent that the one way to win this particular game was by not engaging in it.

With nuclear weapons slowly spreading to additional states, it is no wonder that large scale interstate war tended to disappear and indeed the larger and more powerful any state, the earlier and the more pronounced the inhibiting effect. Notwithstanding the very strong differences that separated them and the pronounced asymmetries that existed between them the US and the USSR never came to blows; by some accounts, particularly those written by former officials concerned to show how deeply responsible their own behavior had been, they never even approached the point where they were about to do so.¹³ In both Europe and the Far East the Superpowers' close allies, coming under their protective umbrellas offered (or, in some cases, imposed) by Washington and Moscow were almost as safe against all out military attack as were the Superpowers themselves. Precisely because the armed forces fielded by those Superpowers were

the most powerful in history they took very good care not to engage each other directly. At most it was a question of doing so by means of allies or, as they were sometimes known, "proxies." Usually the proxies were Third World countries, located in parts of the world where nuclear weapons had not yet penetrated, and notable for nothing so much as their extreme military weakness compared to their patrons which handled them like puppets on a string.

As the example of both China and Israel shows, from the 1960s on any state capable of fielding reasonably large, reasonably modern conventional forces and weapon systems was also capable of producing nuclear weapons if it wanted to. First China and the USSR, then China and India, then India and Pakistan, and finally Israel and its neighbors were compelled to resolve their differences; if not to the extent of concluding full peace and engaging in brotherly love, then at any rate to the extent of refraining from full scale war against each other.¹⁴ As a result, what conventional wars could still be fought anywhere around the world tended to be extremely limited, as the 1973 one between Israel and its neighbors was; or else had to involve third and even fourth rate military powers on at least one side. Put in other words, a strong argument can be made (and has been made) that the proliferation of nuclear weapons has been a boon to mankind. While clearly incapable of putting an end to all wars, at any rate they have prevented World War III from taking place. As of the last years of the twentieth century they seem to be well on their way to pushing large scale, conventional interstate wars under the carpet.¹⁵ When it comes to wars waged by organizations other than states, however, nuclear weapons are simply irrelevant. Though differing greatly among themselves, all such wars have this in common that they tend to be waged at relatively close quarters. As Bosnia illustrated very well, the enemy, instead of being separated from us by some international border and firing at us with the aid of long range weapons, is represented by our neighbor; he is located in the next town, the same town, the next neighborhood, the same neighborhood, even the same street, the same house, and the same room. Under such circumstances the use of nuclear weapons becomes preposterous —

and the same is only slightly less true of the majority of heavy weapons and weapon systems, airborne ones specifically included. There thus exists a sense in which the spread of low-intensity war simply represents the sound tactician's reaction to nuclear proliferation. Since the enemy, assuming he is in possession of nuclear bombs and missiles, is capable of annihilating any opposition provided only it is sufficiently far away, the logical method is to get as close as possible to him without being observed.

As has been stated in the opening paragraph of the present section, these developments affect various parts of the world to a very unequal extent. Partly because the proliferation of nuclear weapons is more rapid in some regions than in others, partly for other reasons, some countries are more likely to engage in conventional wars whereas others find that the main threat to their existence comes from organizations other than states. Globally speaking, nevertheless, the direction of change seems to be both uniform and easily understandable. Slowly, unevenly but inexorably nuclear proliferation is causing interstate war and the kind of armed forces by which it is waged to disappear. The future belongs to wars fought by, and against, organizations that are not states. Indeed in most parts of the world this form of war has already taken over. Recognizing the fact, in March 1996 thirty one heads of states assembled in the Egyptian town of Sharm al Sheik in a meeting formally dedicated to finding ways of coping with it.

In view of the ongoing changes in the nature of war, what has happened to air power and what can be expected to happen to it in the future? The answer to the first of these questions is loud and clear: compared to what they were fifty years ago, the majority of air forces have already all but disappeared. During a recent meeting at the World Economic Forum in Davos this author was on a panel with General (ret.) Joseph P. Hoar, the officer who replaced Norman H. Schwarzkopf as COS, US Central Command, and who was consequently in charge when President Bush ordered America's armed forces to rescue the Kurds in northern Iraq from Saddam Hussein's clutches. In the course of a debate the General pointed out, quite rightly, that in the

Gulf the Allies possessed approximately 2,000 aircraft and carried out as many as 2,000 combat sorties per day without suffering a single collision.¹⁶ Undoubtedly doing so represented a very great achievement; what the General forgot, or perhaps had never known, was the fact that on D-Day in 1944 the number of aircraft used was six times as large. In fact, during the period of most intensive air operations in 1943-44, any day which saw only 2,000 Allied sorties over Western Europe would have been regarded as a day wasted. To look at it in a different way, during each of the four years 1941-45 the US produced 75,000 military aircraft on the average. By 1995 the number purchased by all three services combined was down to exactly 127 — including helicopters and transports — and still falling.¹⁷ Though the details vary from one case to another, by and large the experience of the US Air Force has been shared by its counterparts in other developed countries. With few exceptions the story of air power during the last half century is one of constant downsizing; albeit that some services, particularly those of the USSR, China and Israel, latched on to the trend much later than others. The rest of the story may be found in any set of data being published around the world. The USSR, which during much of the Cold War retained a comparatively enormous air force (as part of an equally enormous military establishment) ended up by collapsing under the financial burden and is now reduced to offering its most advanced aircraft as tourist attractions. Though technically less advanced, the air force which Communist China built up during the fifties and early sixties also counted several thousand aircraft; however, it has since been cut back very sharply to the point that, as of the time of writing, the sum total of modern attack aircraft that it possesses is fewer than one hundred.¹⁸ During the last decade or so even Israel, for a long time perhaps the most beleaguered single society on earth and one that always gave priority to its air force, has felt sufficiently secure to begin cutting back on the number of the military aircraft that it keeps operational.¹⁹ To anyone who is at all familiar with the cost of acquiring and operating modern air forces these cuts do not represent a mystery. Looking back, and taking into account the overwhelming power of nuclear weapons

only a few of which are needed to devastate any country, the mystery is rather why they were delayed for so long.

Nor is the diminishing number of major weapon systems produced simply a function of growing capabilities, as has often been claimed. It is true that, thanks to increases in power and also in accuracy — the latter, the direct result of developments in electronics — the destructive capabilities of air power have grown by leaps and bounds. However, this only applies to operations which are directed against undefended targets; or perhaps one should say that the various calculations that have been made ignore the strength of the opposition that is likely to be encountered. For example, much has been made of the fact that a modern attack aircraft can destroy a bridge, a headquarters, or a depot by means of a single laser or TV-guided “smart” missile instead of the hundreds or perhaps thousands of “dumb” iron bombs that were needed to achieve the same purpose back during the Vietnam War.²⁰ On the other hand, if the targets in question are of any importance they are likely to be defended. Regardless of whether the defensive system consists of missiles or guns (or, a fortiori, interceptor aircraft) it is certain to rely on electronic guidance and contain circuitry very similar to, if not identical with, that which is incorporated into the attacking aircraft. In spite of the successes booked by air power in the Gulf War, it remains to be shown that, when confronted with each other, present-day air forces have grown more capable vis a vis a well-organized anti-aircraft defense system, i.e., one that is run by forces other than Iraqis, than they were in 1939-1945. Let alone that, given the lessons from that War, they will retain their superiority in the future.²¹

As to air to air combat, had weapon systems really grown more powerful in relation to each other, then by conventional military logic the resulting high attrition rates ought to have led to larger air forces, not smaller ones. This is what usually happened in the past, e.g., before 1914 when France and Germany raced each other to see which of them could field the largest number of artillery barrels; this, too, is what happened during the adolescence of air power between 1919 and 1939 when, against the background of galloping technological progress, the

size of air forces grew and grew. This, no doubt, is what would have happened after 1945 if nuclear weapons had not appeared on the scene and overshadowed anything that mere conventionally-armed aircraft could do.

Once nuclear weapons were introduced and proved capable of turning the globe into a radioactive desert, however, the age-old rules of the game changed. The question as to “How Much is Enough?” took on a new and menacing aspect and, in the long run, admitted of only one answer. Though the process required time and was not without its fluctuations, in one country after another it caused orders of battle to shrink and armed forces, including specifically air forces, to melt away; in the same way that the escalating cost-quality cycle of suits of armor after 1525 marked the imminent demise of knightly warfare in favor of others that were cheaper and more effective.

While the number of manned aircraft has tended to decline almost to the vanishing point, other systems which did not even exist in 1945 but which were equally the responsibility of air forces underwent spectacular growth. On the one hand there was everything connected with space. This included long range ballistic missiles which in most countries were entrusted to the air force; as well as anti-missile defenses and satellites of every kind. By the late twentieth century the lat-

“The fact that the US possesses the most advanced space-warfighting systems ... did nothing to prevent the World Trade Center and the Federal Building in Oklahoma City from being bombed.”

ter in particular had become vital to the conduct of conventional operations of the most advanced kind. Their usefulness for reconnaissance, surveillance, targeting, damage-assessment, communication, and navigation was brought out very strongly by the Falkland War and the Gulf War.²² Yet the fact remains that most states, including specifically those which are in the forefront of

military-technological development, do not possess them and are unlikely to acquire them in the foreseeable future. As in the case of aircraft, this is partly a function of escalating cost — to develop, launch, and control a satellite that is militarily useful may easily involve an outlay of hundreds of millions of dollars and is entirely beyond the means of all but a very small number of states. On the other hand, one reason why failure to incur those costs could be justified was precisely because the threat of large scale conventional interstate war seemed to be receding in any case. Another reason why most countries have failed to do much about the military aspects of space is the latter's marginal utility in respect to the most important threat with which they are confronted, i.e., low intensity conflict. To say that space is altogether irrelevant to the kind of war that we saw in Somalia and Bosnia — let alone to guerrilla and terrorism — would be going too far; satellites have been known to photograph terrorist training camps, intercept their radio-communications, help commando teams navigate to their targets, and the like. On the other hand, there are clear limits to what can be done. The fact that the US possesses the most advanced space-warfighting systems of any country did nothing to prevent the World Trade Center and the Federal Building in Oklahoma City from being bombed, nor are such systems at all likely to prevent such incidents from taking place in the future. Whatever military capabilities which France, or Britain, possess in space are entirely irrelevant to the bombing campaigns that both have witnessed and are still witnessing in their own capitals. As one Intifada-related Israeli joke has it, why did Israel launch its satellite, Ofek I? Answer: to take pictures of Arab kids picking up rocks in real time. While the fundamental irrelevance of space to low intensity conflict is obvious, the same is not true of some other airborne platforms such as unmanned aerial vehicles (UAVs), light tactical transport, and, above all, helicopters of every kind. Not having to provide for a human operator, UAVs are relatively affordable. Their usefulness for reconnaissance, surveillance, and certain kinds of combat operations is evident and their employment in these roles growing all the time.²³ Given that the ground installations that they require are not

nearly as extensive or as expensive as that needed by combat aircraft or heavy transport, light transport aircraft represent an eminently suitable way for bringing troops into battle during a low intensity conflict; and this will be all the more the case if the aircraft in question can be provided with a vertical take-off and landing capability, as the American Osprey is. Above all, the usefulness of helicopters in various types of low-intensity war has been demonstrated time and again. They can bring troops and supplies to the spot, serve as flying command posts, locate targets from the air, and evacuate the wounded; being both much slower and more maneuverable than combat aircraft, they can also deliver devastating quantities of very accurate firepower at selected targets. During the last decade or so helicopters such as the Apache have been provided with highly sophisticated optronic gear, enabling them to locate those targets on a twenty four hour basis (although heavy vegetation on the one hand, and meteorological phenomena such as fog, rain and sandstorms on the other, still represent a problem). All of which may explain why several countries, particularly in Western Europe, keep on procuring them at a time when their air forces are rapidly shrinking or, as in the case of Belgium, being more or less shut down.

Looking into the future from the vantage-point of the present, the age of manned aircraft which opened during the early years of the present century is almost certainly drawing to its end. In particular, today's high performance attack aircraft and bombers, which for a long time constituted the backbone of any air force worthy of the name, are unlikely to have successors. This is because their cost is staggering and their usefulness in fighting both the most dangerous kind of war — namely, nuclear one — and the most common one — namely, low intensity conflict in its various forms — is marginal. By the year 2025 the missions that used to be entrusted to them will almost certainly be divided between missiles (including also cruise missiles) and space-based platforms on the one hand and UAVs and helicopters on the other. Everything in between is likely to disappear. Judging in quantitative terms, it has already all but disappeared as orders of battle in virtually every country are being cut, cut, and cut again.²⁴ At the

high end of the spectrum air forces, here understood as autonomous parts of the armed services, are likely to survive in those countries — no more than a handful — that possess the economic muscle and technological expertise that are needed for the purpose. Possibly they will come to represent some kind of cross between the former Soviet Strategic Missile Command and the US Space Command. Their principal weapon systems will consist not of manned platforms but of missiles, cruise missiles, satellites, and possibly anti-missile defenses of the kind currently under development in the US and Israel (the only two countries that seem to take them seriously); all combined with satellites used for communication, navigation, surveillance, reconnaissance, damage-assessment, and the like. Although, technologically speaking, these and similar systems are very sophisticated, they only require a very small number of people to operate them. Hence, in terms both of personnel and of the order of battle, whatever air forces remain in existence are likely to shrink very drastically.

At the low end of the spectrum the UAVs, helicopters and light transport (long range heavy-transport, being too vulnerable to approach the battlefield, is likely to be civilianized) that are useful for fighting low intensity war will also survive; and, in terms of both budgets and numbers, prosper. However, and given the fact that they will operate in very close cooperation with the ground forces, it is not at all certain that they should be organized in a separate service as is still the case in many countries. Instead a very good case can be made for the need to group them in air cavalry regiments of the kind used by the Americans in Vietnam and the Soviets in Afghanistan; this, too, is already the road taken by the Australian armed forces. Beyond these generalities, much will depend on the nature of the threat, the size of the country, and the extent that it wants to project its military power beyond its borders. A country which is threatened mainly by subconventional conflict will naturally tend toward the low end of the spectrum and, with the possible exception of satellites, may well end up by more or less abolishing its air force. A country with large spaces and far-away interests will lean to the high end of the spectrum and put its faith in various systems that are either designed

to operate in space or based in it. To provide a faster reaction capability than is provided by helicopters such a country may also want to maintain a few squadrons of attack aircraft, whether land- or sea-based. And the same is also true for heavy transport.

Finally, the electronics on which modern weapon systems, airborne ones included, rely work better in simple environments than in complex ones. Hence logically countries whose primary defensive concerns consist of protecting their sea-lanes should be among the first to put greater emphasis on missiles and space-based systems for surveillance, target acquisition, and guidance. This movement is well under way in many places; in the long run is likely to put an end to sea-borne air power as we know it.²⁵ One replacement currently under consideration is the so called “arsenal ship,” an entirely new kind of vessel which will carry not aircraft but perhaps a hundred or so missile launchers of various kinds including sea to air, sea to sea, and of course cruise missiles. Conversely manned platforms in the form of light transport and attack helicopters will prove most useful to countries whose main concern is with low intensity operations on land. While the details will have to be worked out by each national defense establishment separately, the overall direction in which change will move appears reasonably clear. Unless some yet to be designed system enables states to reliably defend themselves against nuclear weapons — which may very well prove to be a contradiction in terms²⁶ — the writing for large-scale, interstate, conventional war, as well as the armed forces by which it is waged, is on the wall. If present trends persist, thirty years from now most air forces will have dissolved into space commands on the one hand and some form of air cavalry on the other. In between, most major combat aircraft will have disappeared. Like dinosaurs, they will be confined to musea where they will no doubt be admired by gaping crowds. Pilots will have hung their pressure suits in the closet, never to put them on again. An age in military history will be gone. It was glorious while it lasted.

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Notes

¹ M. van Creveld, *The Transformation of War* (New York: Free Press, 1991), particularly Chapters 1 and 7; also idem, *Nuclear Proliferation and the Future of Conflict* (New York: Free Press, 1993). See also E. Luard, *The Blunted Sword: the Erosion of Military Power in the Modern World* (London: Tauris, 1988).

² The most comprehensive analysis of the rising cost of weapon systems, both absolute and relative to GNP, remains F. Spinney, *Defense Facts of Life* (Boulder, CO: Westview, 1986). For the cost of military aircraft see also M. A. Armitage and R. A. Mason, *Air Power in the Nuclear Age* (Urbana, IL: University of Illinois Press, 1985), 252-53; for that of operating them N. Brown, *The Future of Air Power* (New York: Holmes & Meier, 1986) Chapter 12. K. Hartley, "The Affordability of Air Systems," in Ph. Sabine, ed., *The Future of United Kingdom Air Power* (London: Brassey's, 1988), 109 shows that, after almost a decade of steady rearmament, the number of RAF operational squadrons was actually twenty per cent smaller in 1986 than it had been in 1977.

³ For some figures and calculations see Brown, *The Future of Air Power*, 89.

⁴ "In twentieth-century war defeat will almost always be avoided (and outright victory very likely gained) by the side that has secured air superiority"; N. Brown, *The Future of Air Power*, 17.

⁵ See also A. Gropman, "Operations other than War," in this volume.

⁶ The figures are: Europe, 2,000,000 tons; Japan, 153,000 tons; and Vietnam, 6,162,000 tons. R. Overy, *The Air War 1939-1945* (London: Europa, 1980), 100-120; E. H. Tilford, Jr., *Setup: What the Air Force did in Vietnam and Why* (Maxwell AFB, AL: Air University Press, 1991), 282.

⁷ For a short appreciation of the role that air power can play in war as waged against organizations other than states see O. Erez, "The Role of an Air Force in Counterinsurgency," in M. Hugh and M van der Merwe, eds., *Contemporary Air Strategy* (Pretoria: Institute for Strategic Studies, 1986), 19-26

⁸ The most recent demonstration of the problem was given by the Israeli Air Force in April 1996 when over a thousand strikes by the most sophisticated combat aircraft and attack helicopters fielded by any country in history failed to prevent the Hizbulla guerrillas from firing their Katyusha rockets at northern Galilee.

⁹ Definitions of what constitutes a war, and hence the number of wars, vary greatly. However, all observers are agreed that since 1945 wars between states have been greatly outnumbered by those that are fought between, or against, other organizations. See, e.g., K. J. Holsti, "War, Peace, and the State of the State," *International Political Science Review*, Vol. 16, No. 4, 1995, 321 Table 1; also P. Wallenstein and R. Axell, "Armed Conflict at the End of the Cold War, 1989-1992," *Journal of Peace Research*, Vol. 30, No. 3, 1993, 331-46.

¹⁰ C. von Clausewitz, *On War*, M. Howard and P. Paret, eds., (Princeton: Princeton University Press, 1976), 87.

¹¹ See above all B. Brodie, *The Absolute Weapon* (New York: Columbia University Press, 1946), Chapter 1; also J. Viner, "The Implications of the Atomic Bomb for International Relations," *Proceedings of the American Philosophical Society*, 90, January 1946.

¹² Much the best explanation of what becomes of strategy under such circumstances continues to be Thomas Schelling, *Arms and Influence* (New Haven, CT: Yale University Press, 1966.)

¹³ See above all McGeorge Bundy, *Danger and Survival; the Political History of the Nuclear Weapon* (New York: Random House, 1988), passim.

¹⁴ For the effect of nuclear weapons on war in the two regions in question see M. van Creveld, *Nuclear Proliferation and the Future of Conflict* (New York: Free Press, 1993), Chapters 3 and 4.

¹⁵ Among the first to suggest that proliferation might be a blessing was K. N. Waltz, *The Spread of Nuclear Weapons: More May be Better*, Adelphi Paper No. 171, (London: IISS, 1980). His views, as well as those of his opponents, have been summed up very neatly in S. Sagan and K. Waltz, *The Spread of Nuclear Weapons: a Debate* (New York: Norton, 1995).

¹⁶ For more detailed figures on Allied air strength in the Gulf see P. Hine, "Air Operations in the Gulf," in A. Stephens, ed., *The War in the Air 1914-1994* (Fairbairn UK: Air Power Studies Centre, 1994) 308-9.

¹⁷ World War II production figures from R. Overy, *The Air War*, 150; 1995 figure from D. M. Snider, "The Coming Defense Train Wreck," *Washington Quarterly*, Vol. 19, No. 1, Winter 1996, 92.

¹⁸ See International Institute of Strategic Studies, ed., *The Military Balance 1995-96* (London: IISS, 1995) 178.

¹⁹ For the current balance of forces in the Middle East see A. Karp, "The Demise of the Middle East Arms Race," *The Washington Quarterly*, Vol. 18, 29 Autumn 1995, A. Hashim, "The State, Society and the Evolution of Warfare in the Middle East: the Rise of Strategic Deterrence," *ibid*, 53.

²⁰ See Brown, *The Future of Air Power*, 88; J. A. Warden, III, "Air Theory for the Twenty-First Century," in K. P. Magyar, ed., *Challenge and Response: Anticipating US Military Security Concerns* (Maxwell AFB, AL: Air University Press, 1994), 313 and 328; also D. T. Kuehl, "Air power vs. Electricity: Electric Power as a Target for Strategic Air Operations," *Journal of Strategic Studies*, Vol. 18, No. 1, March 1995, 250-60.

²¹ For some comparative figures on lethality see Brown, "The Future of Air Power," 123-36; also J. Clemens, "Air Defence Mythology," *RUSI Journal*, Vol. 127, No. 3, September 1982, 27-32.

²² For the latest on the capabilities of satellites for these purposes see V. Gupta, "New Satellite Images for Sale," *International Security*, Vol. 20, No. 1, Summer 1995, 94-125, as well as I. Lachow, "The GPS Dilemma," *ibid*, 126-48; for the future, see T. S. Moorman, "The Challenges of Space Beyond 2000," in this volume.

²³ An excellent analysis of what UAVs can do in war is S. M. Shaker and A. R. Wise, *War Without Men; Robots on the Future Battlefield* (London: Pergamon, 1988). Chapter 4, updated by M. Hewish, "Sensor Payloads for Unmanned Aerial Vehicles," *International Defense Review*, December 1995, 53-8.

²⁴ The latest country to announce cuts is France. When the reorganization of the forces — including a switch from conscription to an all volunteer force — is completed in the year 2015 the number of combat aircraft will be down from almost 900 today to a mere 300, plus perhaps forty maritime aircraft. Source: Ministry of Defense, quoted in *Le Point*, Vol. 24, No. 2, 1996, 55.

²⁵ Once again, in quantitative terms the movement is already well under way. Only one navy around the world still possesses global capabilities; the rest are being reduced to coast-guards. Out of almost one hundred aircraft carriers which that Navy possessed in 1945 only twelve remain. The total number of aircraft that they can carry has also fallen, from perhaps 4,000-5,000 to fewer than 1,000.

²⁶ According to the would-be manufacturers, anti-ballistic defenses now at the "concept exploration stage" will be able to shoot down 90 per cent of incoming missiles; M. Hewish, "Providing the Umbrella," *International Defense Review*, 28 August 1995, 33. Should those missiles be armed with nuclear warheads, though, 90 per cent is simply not good enough.

Biography

*Dr. Martin van Creveld is a Professor at Hebrew University, Jerusalem. He is internationally acclaimed as a scholar on numerous military issues, including particularly his focus on technology and military logistics. He has authored several books including **Command in War** (Harvard University Press, 1985), **The Transformation of War** (Free Press; Collier-McMillan and Maxwell-McMillan International, 1991), **The Sword and the Olive: A Critical History of the Israeli Defense Force** (Public Affairs, 1998), and most recently, **The Rise and Decline of the State** (Cambridge University Press, 1999).*

Air Power: Rethinking the Conceptual Framework

Air Vice-Marshal Professor Tony Mason

In the last decade of the Century, air power has been used to great effect by western Coalitions in the Gulf War of 1990-91, in the later stages of the Bosnian conflict of 1995 and in the Kosovo Crisis in 1999. Not only have their circumstances been very different from those of the preceding period of confrontation between East and West, they have been very different from each other.

The collective difference between the circumstances of the 1990s and those of preceding periods stimulates the re-evaluation of several underlying concepts of air power which evolved during eighty years of air operations. The differences between the events of the 1990s themselves induce great caution in projecting conceptual frameworks or paradigms with validity for air power into the next Century. Nonetheless, alongside the differences in the circumstances of the 1990s, there have been significant similarities in achievements. From the similarities, a paradigm may be constructed which more clearly indicates, and explains, the overall contribution of western air power to contemporary defence and security policies.

At present, and for the foreseeable future, the full potential of modern air power can only be exercised by the United States. The new paradigm, however, is equally relevant to a state less well endowed than the US, or to a Coalition of states which did not include the USA.

The Inheritance

Air power is a product of the 20th Century: a Century in which military evolution has been dominated by three wars which engulfed the globe. The first two were fought to bloody conclusions in 1914-18 and 1939-1945. The Cold War mercifully ended virtually bloodless after fifty years, with the collapse of the Soviet Union and its satellites. All

three were fought with the instruments of the industrial age.

In the struggles of World War I and World War II, and in sustaining deterrence in the Cold War, attacks on civilian infrastructure and populations were widely accepted as unfortunate but inevitable, when national will, government control, national resources and armed forces were inextricably harnessed to total warfare. At the same time, images of Guernica, Coventry, Dresden and Hiroshima never disappeared, at least from media memory. Underlying all was a residual, albeit minority and controversial, unease at the legal and moral justification for air attacks which inflicted heavy civilian casualties. Such casualties, even in the well remarked instances, were far less than those endured in the ravaging of civilian populations by contending armies. Such comparisons, however, had little apparent effect on entrenched critics of air power.

Militarily, the 20th Century ended with the Gulf War of 1990-91. In Desert Storm, the technology of the information age made its first dramatic impact in a conflict fought for limited objectives in one small geographical region. The technology was further refined in the unfamiliar surroundings of two very different wars in the Balkans. Air warfare throughout the last decade of the century, except in Chechnya, was conditioned by limited political objectives and the promise of precision munitions.

In the later stages of World War II, the United States came to possess the largest air forces in the world. There was not yet, however, a noticeable difference in the technology of aircraft, weapons and other systems from those of the United Kingdom, except for the possession of the atomic bomb. In the NATO years, the technology gap between the US and its allies progressively widened.

Its dimensions, however, lay largely unrevealed because of the absence of alliance or coalition warfare and periods of long operational stagnation in the shadow of nuclear confrontation. In 1991, Desert Storm revealed the real extent of United States dominance in the air. There were now two kinds of air power: that wielded by the US, and the capacity of the rest. The distinction was no longer simply one of scale. The United States had crossed the threshold of the information age in air warfare, marked by stealth, precision guided munitions (PGM), information systems, and command, control and communications (C3).

Meanwhile, the Russian Federation rapidly became a spent military force, with little prospect of conventional arms regeneration in the foreseeable future. With one or two honourable exceptions, the United States' allies and putative coalition partners gave higher priority to consuming their post cold war peace dividends than to modernising or restructuring their armed forces to meet new technological and international realities.

Together, these factors changed the nature of air power and its environment. As a result, concepts which evolved in a century of operations require scrutiny to ensure their continued validity.

Global War

“Global War,” the environment in which air power matured, was defined in the Royal Air Force Manual of Operations, AP 1300, published in March 1957, as “The unrestricted conflict between the USSR and its allies on the one side and the USA and its allies on the other. As the concept of global war envisages war without restrictions of any kind, it is unnecessary to qualify the term global war in any way. Throughout this manual it is, therefore, assumed that the kiloton and megaton nuclear weapons would be used from the outset”¹

Had a later Manual of Operations been published before 1989, the assumption of the use of nuclear weapons “from the outset” may have been dropped but not the nuclear dominance of strategy. In several fundamental respects, the “Global War” envisaged in AP 1300 resembled World Wars One and Two with the addition of nuclear weapons. For the major participants, national survival was at stake.

In World Wars One and Two, national resources were harnessed and focused on the war ef-



A 1940s British Avro Lancaster B Mk1 Bomber.
(RAF Photo: <http://www.raf.mod.uk>)

fort. In Global War, similar conditions were expected but in a shorter time scale. In all three cases, “victory” entailed, or would have entailed, the capitulation and submission of the enemy. There were no limits to resources allocated, no limits to casualties inflicted or endured and, with the exception of chemical warfare in World War Two, no limits to the weaponry employed. On all sides the media was incorporated, with little or no demur, in support of national policy and to the favourable presentation of national operations.

In all three wars, the focus of the participants was on Central Europe, even after confrontation spread across the globe. The prize was territory. Strategies were ultimately directed at the occupation of territory by armies. Decision would be reached by the destruction of the enemy's capacity to resist by battle. The symbol of that resistance, despite attacks by air power and submarine warfare on a state's economic and political infrastructure, remained the enemy's deployed ground forces. Had deterrence failed, Central Europe would have become a nuclear battlefield.

The 1957 Manual defined “Cold War” as simply “the continuing world wide struggle between Communism and the Free World, waged by all means short of armed conflict.”² The Cold War was the Global War which was never fought. Other conflicts, described as “Limited War” were defined by their relationship to Global War. “The reasons which limit any particular conflict may be many and varied; but in the background will inevitably be the fear of the war becoming global in

scope, and thus laying open the homelands of the Great Powers to nuclear devastation.”³

Such a definition was perhaps a little simplistic. Nevertheless, the circumspection of the US in Korea and Vietnam, fears about Yugoslavia after Tito, and the tension induced by conflict in the Middle East in the 1960s and 1970s may be compared with the comparatively relaxed approaches of the great powers to the Gulf and the Balkans in the 1990s, when international confrontation had dissolved.

The end of the Cold War has restored traditional sources of conflict to international relations. Interests have replaced survival in the foreign and defence policies of the western powers and friends. All our foreseeable scenarios are of limited war and limited commitment. All our armed forces have to readjust to these new circumstances, but for air power, they are especially significant.

Wars of the New Era: The Gulf War

The transition from three global wars was made in the Gulf in 1991. Here, the concepts of the Cold War met the realities of the new era. Coalition political and military objectives, to restore the independence of Kuwait and to expel Iraqi forces from its territory, were agreed by all Coalition members and empowered by the UN Security Council.

Seldom have circumstances combined so favourably for one side in a conflict. Command and control of Coalition forces, under US leadership, was unified and unambiguously directed. Iraq enjoyed little international support or sympathy. Saddam Hussein was strategically blinkered. His armed forces were stifled by Soviet doctrine and practice. His air force was heavily outnumbered and technologically inferior. His ground forces were deployed in open, largely uninhabited territory. His lines of reinforcement were highly vulnerable to air attack. The Coalition could exploit its massive supremacy in the air by attacking from the South, West and North. The Coalition air forces were well trained and well led. Coalition information dominance was overwhelming. Only his air defences presented a serious threat to the Coalition. His surface to surface missiles would threaten the unity of the alliance, by tempting independent Israeli retribution. Iraq’s weapons of mass destruction would remain inert.

After Saddam Hussein was content to consolidate his position in Kuwait, in August 1990, and took no action to impede Coalition forces massing in the Gulf area, the Coalition determined the tempo of the confrontation. Poor weather slowed down the air campaign but had no influence on its outcome at the end of February 1991. Considerable synergy was achieved between air, land and naval forces.

It is likely that most of the significant facts about the Gulf War are now in the public domain. The impact of air power was greater than all but the most confident of believers could have imagined. Iraq, and its Soviet training mentors, were taken completely by surprise by the sustained intensity of the Coalition air attacks, sharpened in concentration by the combination of stealth and PGM. Iraqi air defences were neutralised, command and control almost decapitated and deployed ground forces cut off, demoralised and degraded. After forty three days of incessant Coalition air attacks, Iraq’s ground forces were expelled from Kuwait, not in “the mother of all battles,” but in a heavily one sided four day engagement. The war, as the present author later wrote, “marked the apotheosis of 20th Century air power.”⁴

There was, naturally, widespread jubilation among air power enthusiasts about such an outcome. From the outset, however, there were extensive grounds for caution about projecting the air campaign of Desert Storm as a model for the future application of air power. The unusual combination of favourable circumstances which enabled the domination of air power in the Gulf War was not repeated in the remainder of that decade and is unlikely to re-occur in the next.

Bosnia

In the Bosnian conflict, from 1992-1995, the circumstances were very different. For three years, the United Nation’s humanitarian objectives co-existed uneasily with the need to coerce the combatants, and especially the Serbs, to agree to a peaceful resolution of the disputes. There was no consensus among potential Coalition members about either political objectives or the role and nature of military force. The humanitarian origins of the Bosnian intervention discouraged the early employment of combat aircraft. Command, control

and authorisation of air power were convoluted and constrained by the duplication of UN and NATO structures. Rules of engagement, designed to reduce friendly and hostile force casualties, inhibited pre-emptive air attack and delayed retribution. Such factors aggravated the inherent difficulties for air power when combatants were frequently in close contact with civilians in either built up areas or countryside which provided plenty of natural cover. Typical European weather produced some degree of cloud cover in the region for a large majority of the time.

In 1995 however, UN army and civilian units were withdrawn from vulnerable positions in Serb controlled territory. In the same period, Croatian and Bosnian Muslim ground forces increased their pressure on Bosnia Serb positions, while large scale NATO ground force deployments into the region began. For the first time in the conflict, joint force synergy could be achieved. After fourteen days of suffering intensive air attacks, the Bosnian Serbs accepted the Dayton Peace Accords.

Kosovo

In the third situation, in Kosovo in 1999, several of the features of the Bosnia conflict reappeared. The topographical and climatic environment was very similar. While stopping Serbian persecution of ethnic Kosovars was widely supported within NATO, there was little agreement on the means to be adopted. The crisis unfolded, however, in a very different way from its predecessors.

Political and military objectives were defined, but without the clarity of those in the Gulf. NATO sought to persuade President Milosovic to put an immediate and verifiable end to violence, to withdraw all his troops from Kosovo, to agree to the deployment in Kosovo of an international force, to allow all refugees to return, and to accept an interim political solution.

Supreme Allied Commander Europe, General Wesley Clark, announced that "The military mission is to attack Yugoslav military and security forces and associated facilities with sufficient effect to degrade its capacity to continue repression of the civilian population and to deter its further military actions against his own people. We aim to put its military at risk. We are going to systematically and progressively disrupt, degrade, devastate and ultimately destroy those forces and support unless

President Milosovic complies with the demands of the international community."⁵

After 78 days, only the "objective of an interim political solution" remained outstanding. No NATO combat casualties had been suffered and in approximately 35,000 sorties, unintended Yugoslavian civilian casualties probably numbered less than 1,000. Yet, from the first days of the conflict, at the end of March 1999, there were rumbles of criticism of NATO's strategy, of the employment of air power and even of air power itself.

On 23 March, Pentagon spokesman Kenneth Bacon, in a Press briefing, announced, "We have plans for a swift and severe air campaign. This will be painful for the Serbs. We hope that, relatively quickly, ... the Serbs will realise that they have made a mistake."⁶ But the initial weight of air attacks on Yugoslavia was, compared to that of the Gulf War, relatively light. In the first week, an average of 48 air strikes sorties a day were flown.⁷ In Desert Storm, the overall daily rate was approximately 1,300. To a certain extent, the sortie rates reflected the numbers of combat aircraft deployed to the Balkan theatre compared to the Gulf: approximately 400 as opposed to 2,600.

However, not only was the weight of attack much less, but the targets attacked in 1999 were very different from those of 1991. In the Gulf, the well known opening "parallel" attacks on air defence, political, infrastructure and other military targets were subsequently enshrined in official United States Air Force Doctrine: "... aerospace power is usually employed to greatest effect in parallel, asymmetric operations. This includes precision strikes against surface forces, information attack against command and control systems, or precision strikes against infrastructure and centers of gravity."⁸ In the early days of the Kosovo conflict on the other hand, various air defence and military targets were attacked, including munitions factories and deployed Serbian forces in Kosovo. No attacks were made on political or other targets in Belgrade.

Reports of disagreements between NATO members about targeting began to reach the media by the beginning of April.⁹ The official NATO position was defined by a Deputy Chief of the UK Defence Staff in the second week of the conflict: "NATO's plan had never envisaged beginning the air campaign with a massive application of air bombardment. This was not the start of a war

where we were determined to win as quickly and as harshly as possible to overwhelm his entire military forces.”¹⁰

The difference between NATO’s position, summarised by Air Marshal Day, and the inclinations of many senior USAF airmen, was most succinctly illustrated by Lieutenant General Michael Short, Joint Forces Air Component Commander, in his statement to the Senate Armed Services Committee on 21 October 1999: “I believe the way to stop ethnic cleansing was to go to the heart of the leadership, and put a dagger in that heart as rapidly and decisively as possible ... I’d have turned the lights out on the first night. I’d have dropped the bridges across the Danube. I’d have hit five or six political and military Headquarters in downtown Belgrade ...”¹¹

In interviews during the war, General Short had expressed similar opinions, raising the spectre of “gradualism,” the USAF memory of the air war in Vietnam. “Airmen,” he said, “would like to have gone after that target set (Serbian leadership) on the first night and sent a clear signal that we were taking the gloves off from the very beginning, that we were not going to try a little bit of this and see how you like it and try a little bit of that and see how you like it.”¹²

The “gradualism” was well documented. On 31 March, General Clark requested an expanded range of targets.¹³ On 2 April, targets in Belgrade were attacked, apparently for the first time. In the following week additional British and US combat aircraft were deployed into theatre before General Clark requested an additional 300 on 12 April.¹⁴ On 6 April, oil targets were struck for the first time; on 8 April a warning of attacks on TV antennae and “facilities” was given.¹⁵ On 21 April, NATO spokesman Shea announced that “any aspect of Milosovic’s power structure is a target.”¹⁶ On 23 April, Milosovic’s official residence and a TV station were destroyed. On 2 May, the electricity grid was put out of action by carbon fibre submunitions. Meanwhile, attacks on deployed Serbian forces in Kosovo were also intensified: facilitated by improved weather and an increase from 120 to 550 strike aircraft.¹⁷ On 27 May, NATO reported that 308 strike sorties had been flown, including 50 against Belgrade and 74 on defence suppression.¹⁸

Near its conclusion, the air campaign was

summarised by USAF Chief of Staff, General Michael Ryan. He observed, “The campaign did not begin the way that America would normally apply air power — massively striking at strategic centres of gravity that support Milosovic and his oppressive regime. A month into the campaign, it became apparent that a constrained, phased approach was not effective. NATO broadened the campaign to achieve strategic effects. The result is that Serbia’s air force is essentially useless and its air defences are dangerous but ineffective. Military armament production is destroyed. Military supply areas are under siege. Oil refinement (sic) has ceased and petroleum storage is being systematically destroyed. Electricity is sporadic, at best. Major transportation routes are cut. NATO aircraft are attacking with impunity throughout the country. With the continued build up of aircraft and better weather, the attacks are intensifying and the effects are mounting.”¹⁹ In a post war interview, the General added, “Air power could not stop the door to door thuggery and ethnic cleansing that were going on directly. The only way you were going to be able to do that was by taking it to the heart of the matter — in this case, Belgrade.”²⁰

By this time, there were widespread reports of anti war sentiments within Yugoslavia and increased expectations of peace talks.²¹ Nonetheless, the alliance’s reliance upon air power as the only military instrument came under widespread fire. The general antithesis was that the contribution of ground forces would inevitably be required because air power had never won a war on its own.²² Arguments ranged from the simplistic, “In Vietnam, for example, the Air Force dropped some six million tons of bombs, almost triple the tonnage dropped in World War II, without breaking the Vietnamese will to resist,”²³ through the more debatable, “The challenge of just using air power is that you leave it in the hands of your adversary to decide when he’s been punished enough. So the initiative will remain with President Milosovic,”²⁴ to the well founded, “Not having ground troops in place in the region, permitted Milosovic not only to accelerate his ethnic cleansing, but it precluded him from having to arrange Serbian defensive forces differently, to protect both northern and southern borders.”²⁵

A rather diffident estimation of the contribution by the Kosovan Liberation Army to the final result, came from US army sources: “What you

have, in effect, was the KLA acting as a surrogate ground force. It was a confirmation, of sorts, of our joint doctrine, which calls for using air and ground forces together.”²⁶ Others attributed Milosovic’s capitulation to the assembly of the NATO Implementation Force in Macedonia, the dispatch of Apache helicopters to the theatre, and the threat of a ground invasion.

It was left to one of the most trenchant and inveterate British critics of air power to refute the pretenders to air power’s achievements. John Keegan wrote, “After the war ... there will be no grounds for debate or dispute. Aircraft and pilotless weapons have been the only weapons employed. The outcome is, therefore, a victory for air power and air power alone.”²⁷ In case any of his readers had missed the point, he followed up, two days later, “Already some of the critics of the war are indulging in ungracious revisionism, suggesting that we have not witnessed a strategic revolution and that Milosovic was humbled by the threat to deploy ground troops or by the processes of traditional diplomacy, in this case exercised — we should be grateful for their skills — by the Russians and the Finns. All to be said to that is that diplomacy had not worked before 24 March when the bombing started, while the deployment of a large ground force, though clearly a growing threat, would still have taken weeks to accomplish at the moment Milosovic caved in. The revisionists are wrong. This was a victory through air power.”²⁸

A similar sentiment was more circumspectly expressed by General Clark to the US Senate: “The victory over Yugoslavia was the result of a variety of factors, but the indispensable condition for all the other factors was the success of the air campaign itself ... Everything else hinged on that.”²⁹

The conversion of a heretic is always a source of rejoicing, as long as it is accompanied by a broadening of the mind and not simply the replacement of one form of myopia by another. In fact, some earlier criticism of the air operations by John Keegan and others were accurately directed, if insecurely based.

The Alliance Context

The initial air attacks were light. Even had overwhelming force been available, the Alliance would have been reluctant to use it. After many

months of prevarication and clear evidence of oppression in Kosovo by Milosovic’s forces, some doubts remained about the legitimacy, purpose and extent of the use of force. At the outset of the conflict, British MOD media briefing notes included the comment, “Phased air operations (will be) conducted by Allied aircraft and UK and US cruise missile attacks. Phases could include a demonstration element, but, if no compliance, would extend progressively to military strikes throughout the FRY. The operations would be ‘controlled, minimal and proportionate.’ A possible NATO peace implementation force of 36,000 troops was being considered.”³⁰

There was no provision for an opposed Alliance ground force invasion because the members could not agree to mount one. As US Defense Secretary Cohen explained to the Senate Armed Services Committee, “Let me say that the reason that we have gone forward as we have with an air campaign is that there was not a consensus within the NATO alliance to do anything but this. There was a year — nearly a year, let me say three quarters of a year — spent dealing with the NATO allies in terms of taking collective action.”³¹ Six weeks later, nothing had changed, “The President said he would not take any option off the table, but it’s clear to me that there would need to be a concensus. There is not a concensus for a major ground effort.”³²

After the conflict, the British Chief of the Defence Staff described the frustrations and tensions within the Alliance during “the most complex political and military operation (I have) experienced in 40 years in the army ... It was an enormously complicated thing, with NATO’s 19 member nations — each with its own political view and varying public opinion — having to agree by concensus ... There were those who felt that the alliance would fall apart ... In the end, the ability of the alliance to remain united was pretty remarkable.”³³

The conflict began with a desire to end persecution in Kosovo. It ultimately threatened the existence of the NATO alliance itself. This was the overall context of the application of air power in the Kosovo crisis. It exposed air power adherents who have sometimes appeared to believe that military operations should not be constrained by political circumstances. Colonel John Warden predicta-

bly observed, “The way the air war has been designed suggests it was a very bureaucratized, compartmentalized and not very competent approach. The target list has clearly not been designed to have a systematic impact on the Serb forces ... This is very unprofessional on the part of the various political authorities.”³⁴

Colonel Phillip Meilinger offered a refreshingly direct and perceptive alternative view: “This air war is different than any we have ever fought. There is a feeling of frustration among the Air Force about the way it’s going, but I say, ‘Tough. Grow up. That’s life.’ We aren’t in charge. The politicians are in charge because there are other larger considerations.”³⁵ Colonel Meilinger was in good company. “No major proposal required for war,” wrote Clausewitz, “can be worked out in ignorance of political factors; and when people talk, as they often do, about harmful political influence on the management of war, they are not really saying what they mean. Their quarrel should be with the policy itself.”³⁶

Nor were the larger considerations restricted to allies’ political sensitivities. Italian and other European bases were essential for the prosecution of the air campaign. Allied air space was used for several kinds of mission from multiple directions. Greek support was required for access to NATO’s ground forces in Macedonia. Other than the USA, twelve NATO members contributed over 40% of NATO’s bombing missions and 30% of the total.³⁷

The operational penalties of the “larger considerations” were identified by General Klaus Naumann, in the middle of the war, as he handed over his duties as Chairman of NATO’s Military Committee: “Quite frankly and honestly, we did not succeed in our initial attempts to coerce Milosovic through air strikes to accept our demands, nor did we succeed in preventing Yugoslavia pursuing a campaign of ethnic separation and expulsion ... We need to find a way to reconcile the conditions of a coalition war with the principles of military operations, such as surprise and overwhelming force.”³⁸

From the outset, air power was the only military instrument available to NATO, and it was applied in the only way possible. The alternatives were not a replay of Instant Thunder from the Gulf or Rolling Thunder from Vietnam. The circumstances of this coalition war dictated that there were

no alternatives at all. It was not “the condition of coalition war” per se which precluded “surprise and overwhelming force,” as alleged by General Naumann, but one coalition which was not prepared to risk heavy casualties and costs either in pursuit of humanitarian objectives or to forestall a wider Balkan crisis. Just eight years previously, in very different circumstances in the Gulf, a coalition had required sensitive control and management, but surprise and overwhelming force had not been compromised.

The true extent of the success of the Kosovo action may be measured against two theoretical alternatives. The first would have entailed no military action against Milosovic at all. There is no evidence to suggest that ethnic cleansing of Kosovo would have been halted by diplomacy or by any other pressure and there remained a serious risk of an expanding Balkan war. The second alternative was of an opposed invasion by NATO ground forces at some unspecified later date. Assuming that sufficient troops could have been mustered, then transported and supplied over mountainous territory in winter, it is likely that Kosovo would have become a battleground of World War II proportions: all in a humanitarian cause. In comparison, the casualties and damage inflicted by NATO aircraft in Belgrade and elsewhere were small indeed.

Gradualism and Responsiveness

Air power, like any other kind of military force, must be focused on and subordinate to, a political objective defined by political leaders. Limited objectives imply limits on the military force applied. If a political objective falls short of destruction or overthrow of a government, or occupation of territory, or destruction of economic infrastructure or total annihilation of armed services, coercive military force will be limited. In Kosovo, there was for a time a mismatch between the level of force required to coerce Milosovic and the willingness of NATO to apply it. That is not a weakness of air power but of a political judgement about the use of armed force itself.

Nevertheless, the accusations of “gradualism” in Kosovo, laid in many quarters against NATO planning staff, are well founded. Similarly, a widely held belief in the USAF that

gradualism significantly weakened the US bombing campaign in Vietnam can be strongly argued. Undoubtedly, the pauses in the bombing campaign in Vietnam to allow diplomatic exchanges were exploited by the North Vietnamese to repair damage and reinforce defences. Prohibition of attacks on North Vietnamese airfields is difficult to understand.

A problem arises however, if “gradualism” as a principle is considered to be incompatible with the effective use of air power. Air power exponents consistently and justifiably uphold flexibility as its primary characteristic. It can be applied swiftly in different ways, against different targets, in different directions and over different distances. It is that flexibility which arguably makes air power even more suited to limited warfare than it was to the previous era of global, unlimited conflict. In a period of hesitant and unpredictable political commitment, the apparent weakness of air power — that it cannot sustain a presence — becomes a desirable attribute.

From a distance, air power can threaten, it can be applied, it can disengage. It can concentrate and it can select. It can be devastating on a large scale or it can, as in Iraq in 1981 or Libya in 1986, apply precise and limited force. Allied to such flexibility is speed, increasingly accelerated by the acquisition of relevant and timely information. The aggregate of those attributes is versatility and responsiveness, which enable air power to be swiftly coupled with a wide range of diplomatic activities and political decisions. Under these circumstances, gradualism becomes a significant and flexible option for the application of air power, not inferior to the high intensity “parallel, asymmetric” operations incorporated in USAF doctrine.

If, however, air power is to be applied in cadence with diplomatic and other pressures, it becomes essential to ensure that the target state or entity is not allowed to take advantage of pauses in the cadence. In Vietnam the weakness lay not in an attempt to coordinate bombing and diplomacy, but in failing to prevent North Vietnam exploit the pauses and in the erroneous allocation of sanctuaries to its airforce. The problem was not the principle of gradualism, but the failure in practice to harness air power tightly to the diplomatic process. By contrast, in the later stages of the conflict in Bosnia, a combination of clearly drawn “lines in

the sand” and the close association of diplomatic pressure with the threatened destruction of Bosnian - Serb war stocks, swiftly brought the conflict to an end without any need to “go downtown Belgrade.”

The virtues of intensive parallel air attack have been credibly argued, and in Desert Storm powerfully demonstrated. But only in the opening hours of the highly favourable circumstances of the Gulf War has air power been used in the manner described by General Ryan. Such intensity will not always be possible, desirable or acceptable. If air power can indeed only be used effectively with overwhelming force, it is difficult to envisage its frequent application in a sensitive and complex political environment. The USA, even without the constraints of an entangling alliance, may not always see highly intensive “parallel, asymmetric” attacks as a productive military instrument.

Conversely, if air power is flexibly applied in concert with diplomacy, it can finally enter the Clausewitzian lexicon. Moreover, air power will not be just one of “the other means” which, in war, is added to “political intercourse,”³⁹ but increasingly will become “the means” of first choice.

Shaping the Environment

Over the decade, air power’s effectiveness in the very different environments of the Gulf, Bosnia and Kosovo has been based on a versatility hitherto only available in doctrine and theory. It has contributed to the resolution of conflict in three ways: by shaping an environment, by providing support to surface forces and by operating distinctly. These three contributions of air power are not new, nor are the roles which they include, but such a classification highlights its inherent versatility, put at risk by undue concentration on overwhelming parallel attack. By placing air operations in a different conceptual framework, air power’s complete potential may be more easily recognised, explained and understood in a post global war environment. Such a conceptual framework sits well in joint service or multi-national operations, and is relevant to many levels of engagement, from low level peace support to traditional large-scale conflict.

Perhaps the most emphatic use of air power to shape an environment before the Gulf War occurred when allied air forces isolated and weakened

sion in June 1944. Now, the combination of information dominance, precision attack and effective control offers much greater strength. In the Gulf and in Bosnia in 1995, air power shaped an environment for surface forces to exploit, and denied an opponent the opportunity to fight on his terms. In the Gulf, the “mother of all battles” disintegrated into large-scale demoralisation and defeat. In Bosnia, conventional operations were inhibited and threats of partisan style opposition were stifled by the severing of Bosnian Serb communications and destruction of war stocks.

Aerial preparation will exploit air power’s reach, speed, penetration and concentration. Versatility can be exploited to attack political leadership, command and control and war stocks. The opponent’s war fighting capacity can be reduced by air attacks which deny him opportunities for concentration, manoeuvre, momentum and reinforcement. Air power used in this mode will, as in the Gulf, make the ensuing task of surface forces easier and cheaper, with reduced casualty risks and requiring smaller numbers for a given objective. This is an attractive proposition to politicians and one readily understood by tax-payers.

However, for air power to be employed for its maximum effectiveness in the “preparation” mode, it should be incorporated in a joint service plan from the outset, with surface movement coordinated with air operations rather than vice versa. In Bosnia, without such coordination, surface force deployment actually inhibited air operations for many months, creating hostages rather than synergy.

The overall contribution of air power in shaping the environment is to determine the extent and nature of the battle-space. It now extends theatre-wide beyond the reach of ground or littoral forces. It is no longer the space above and behind an enlarged, old fashioned battlefield. Traditional battlefield fronts, lines, edges, depths and formations will become increasingly rare. Potential opponents will note the vulnerability to air power of conventionally deployed armies. As in the Balkans, “expeditionary” governments will be reluctant to expose their own ground forces in large numbers to unpredictable opposition on hostile territory. Under these circumstances there are opportunities to create new joint service synergies by the exploitation of air power by ground forces.

Support

Traditionally, the synergy of joint service operations has been most obvious in direct air support of surface forces engaged in a traditional ground force engagement. It was effective in the Gulf War; much less so at first in Bosnia, for well rehearsed reasons of conflicting objectives, unrealistic constraints and convoluted command and control. In Kosovo, except for attacks on Serbian forces deployed against the KLA in the closing stages of the conflict, close air support of any kind was not required.

The Kosovo experience suggested that difficulties long associated with direct air support may increase if the traditional battle field is replaced by less definable, more fluid engagements. Discrimination between friendly and hostile ground forces in close contact has always been difficult, even with good visibility, definable “front lines” and local air control. In theory, precision attack capability reduces these problems. Ground forces however, when threatened by air attack, have quickly learned the value of proximity to non-combatants, rapid movement, small numbers and concealment. In Kosovo, the Serbs never had to confront an invading NATO force, but even had they done so, there is no guarantee that they would have obligingly taken up formal defence positions. The lessons of the Gulf War have been studied by many countries.

That said, while direct fire support may in some circumstances be problematical, protecting friendly forces from air attack, inhibiting hostile manoeuvre, concentration and reconnaissance and providing tactical airlift and re-supply will remain significant air power contributions to deployed surface forces. Airborne surveillance and PGM availability offer the Joint Force Commander far more options than his predecessors. Deeper vision, earlier warning and swifter communication will enable him to deploy both his ground and supporting air assets far more effectively. Hopefully, such roles will have been largely discharged in an earlier phase of aerial preparation of the battle-space. In both preparation and direct support, the roles are likely to have been carried out by similar aircraft or UAVs, with similar weapons and systems.

Distinct Operations

In Kosovo, air power was NATO’s sole

military instrument. In traditional language, it was “independent” of activity by naval or ground forces. Unfortunately, the term “independent” has associations which may impede, rather than enhance, air power’s versatility in post Global War age.

The British decision in 1917 to create an independent Royal Air Force flowed directly from the failure of the two existing air services, the Royal Flying Corps and the Royal Naval Air Service, to provide adequately for the nation’s home defence. At a most critical period of the war, the previous separation of the flying services was widely perceived to have generated wasteful duplication of procurement, training, infrastructure and operations to the detriment of activities not directly associated with the immediate needs of the Army and the Royal Navy.

The Second Smuts’ Report of 17th August 1917 established the Royal Air Force. It explained how, unlike artillery for example, “Air Service ... can be used as an independent means of war operations far from, and independently of, both Army and Navy. ... The day may not be far off when aerial operations, with their devastation of enemy lands and destruction of industrial and populous centres on a vast scale, may become the principal operations of war ...”⁴⁰

Such a capability for air power lay far into the future, but up to that point Smut’s comments were visionary and positive. Unfortunately, the sentence concluded with the words “to which the older forms of military and naval operations may become secondary and subordinate.” By implication, air operations in support of armies and navies were also “secondary” and “subordinate.” First for the Royal Air Force, and later for the USAF, “independent operations” became synonymous with “independence.”

In an age of coalitions and joint service components in expeditionary forces, there is a need to distinguish, carefully and publicly, between the need for an independent armed service whose professional *raison d’être* is the military exploitation of air and space, and the misunderstanding that such independence depends upon a requirement for “independent” operations.

There are good grounds, therefore, to replace “independent” by “distinct” to describe air operations which are not accompanied by, or re-

lated to, surface or maritime action. The Oxford Dictionary definition of “distinct” is most appropriate: “Different in kind, unmistakable, positive.” Thereby, the mind-set, which instinctively associates “independence” with “independent” action, can be broken. Consequently, “support” or “preparation” operations become “complementary,” and not “subordinate” to action by armies or navies.

In the past, “distinct” operations have ranged from the Strategic Bomber Offensive against Germany, with its considerable influence not just on the German war effort but on surface operations elsewhere, to the pre-emptive Israeli attack on Osirak in 1981, or the punitive US attack on Libya in 1986.

In some respects, air power in Kosovo was a victim to its earlier success in the Gulf and Bosnia. It is difficult to exaggerate the impact of PGMs on air power in the last decade of the Century. Their operational cost effectiveness has been widely documented. They reduce the number of aircraft and weapons required to achieve a particular kill or destruction probability. That reduction may be taken back through numbers of air crew, numbers of ground crew, amount of infrastructure and support staff, fuel, logistics and, indeed, to all aspects of force size, shape and costs. But their well publicised impact in the Gulf War also coincided with a reassertion of humanitarian values in warfare, and with the unprecedented, international exposure by the media of war’s individual tragedies and brutalities. In these circumstances, the PGM has been welcomed as the harbinger of sanitised, bloodless conflict. Ironically, the technology which, more than any other has realised the promise of air power, is now stimulating a further level of expectation from believers which is likely to be at least as difficult to fulfill as its predecessor.

In Bosnia, the impact of air power was delayed by lack of UN consensus and political determination. Consequently, the Bosnian Serbs were not inhibited from escalation nor coerced to serious negotiations until operation Deliberate Force was launched in August 1995. The Kosovo experience reinforces the requirement in limited war, whether in coalition or not, to apply force commensurate with the objectives to be achieved and with considerations of post conflict reconstruction and rehabilitation. Dropping the Danube bridges may or may not have delivered a message to President Miloso-

vic but the attacks certainly blocked one of Europe's most important trade arteries and damaged the economies of several countries dependent upon it.

Modern air power can attack strengths or weaknesses beyond the reach, capacity and responsiveness of friendly surface and naval forces. In the previous era, "strategic bombing" was a blunt instrument. Now, in distinct operations, PGMs have transformed the bludgeon into a rapier which, on many occasions, may be wielded directly in support of policy with a fraction of the resources previously required. It may be brandished for deterrence or coercion. It may be inserted or withdrawn in cadence with diplomatic and other coordinated pressures. Distinct, direct air action can be taken at all levels, from response to state inspired terrorism, to specific strikes in large scale conflicts. Its targets may range from the centre of government to an isolated and otherwise inaccessible terrorist training base.

An air force which is known to have a long reach, with or without flight re-fueling, can directly influence policy by its very existence. An increase in alert states and augmentation of front line personnel are the modern equivalent of Mahan's "fleet in being," except that diplomacy may now be supported without the expense of surface deployment. Deterrence by air power is as relevant to peace inducement as it is to major nuclear or conventional confrontation, provided it is accompanied by a manifest determination to use it, if necessary.

Nor are distinct operations associated solely with combat. Perhaps the most influential uses of air power in the entire cold war period were the Berlin airlift, which determined the political shape of Europe, and strategic reconnaissance, which continuously informed western political and strategic decisions. In activities such as disaster relief, the monitoring of Treaties and the early identification of crises, contributions may now be less spectacular, but they are still powerful projectors of the national or cooperative interest.

Command of the Air

Within an overall conceptual framework, the oldest and most enduring air power concept, "command of the air," also requires reexamination in the light of recent experience. At Chicago in 1893, Major Fullerton observed that "command of

the air would be an essential prerequisite for all land and air warfare."⁴¹ In 1911, in the first article on air power in the *Royal United Service Institute Journal*, Captain CJ Burke of the British Army Air Battalion wrote: "As aeroplanes employed on (such) reconnaissance duties will encounter hostile aeroplanes with a similar mission to themselves, ... one must be prepared for a struggle between hostile aeroplanes, similar in its object to the struggle between the independent cavalries of two hostile armies."⁴² In that same year however, the first battle damage sustained by aircraft came from Turkish troops firing on Italian aircraft over Tripoli. From the outset, command of the air would also be challenged from the ground.

Opinions about how to achieve "command of the air" would vary, but all would focus on combat between aircraft. Trenchard believed in the offensive, against enemy aircraft on the ground and over their own lines.⁴³ Churchill also envisaged "real mastery of the air" in 1918 by exploiting an expected allied numerical superiority of aircraft.⁴⁴

In World War One the "Archies" (anti-aircraft guns) exacted a heavy toll on allied aircraft, but it was the fighter pilots who passed into legend, which was reinforced in World War Two. "Command of the air" came to denote a degree of control which allowed one side to operate with little or no enemy interference in a theatre of war. While denying the opponent similar opportunities. The diminutives, "favourable air situation" and "air superiority" suggested limitations of time or space on "command." In each case, however, the concept denoted a relationship between aircraft. Despite the lethality of German surface to air defences in north west Europe for example, command of the air continued to be measured by defeating the enemy air force, either in the air or on the ground.

In 1960, the shooting down of Gary Power's U-2 near Sverdlovsk focused attention on the impact of the guided surface to air missile (SAM). Western responses were to switch to low level offensive operations and to accelerate the acquisition of defence suppression measures. In South East Asia, the strength of the North Vietnamese air defences stimulated the creation of the USAF's Wild Weasel role. It was estimated that surface to air defences accounted for 85% of all USAF losses during the Vietnam War, including 637 shot down over North Vietnam.⁴⁵ In 1973, the

Israeli Air Force was surprised and seriously wounded by the coordinated medium and low level air defences deployed by Egypt and Syria at the outset of the October War.

Heavy aircrew losses in the two World Wars were accepted by grieving populations as a sacrifice justified by the immensity of the cause. In the nuclear shadows of the Cold War, potential casualties were seldom mentioned, but their scale may be assumed. But as protection of interests replaced national survival, the sacrifice in war of human lives was re-evaluated in western democracies. When protection of interests was itself followed by more nebulous humanitarian motivation, sensitivity to casualties would begin to shape operational behaviour.

By the time of the Gulf War in 1990-91, the attitude of the USA to casualties was no longer that of World Wars One and Two. Memories of losses in Korea and later in Vietnam were to influence political and military considerations about casualties in a conflict which, initially at least, did not receive unqualified public support in the USA.

Among many relevant comments was General Horner's on the 7th February 1991, when he "stressed that American support at home for the war depended in large measure on the ability to operate 'with less than anticipated' losses of human lives among Coalition airmen, soldiers, sailors and Marines."⁴⁶ In Washington, Congressman Lee Hamilton, Democratic Chairman of the House of Representatives sub committee on European and Middle Eastern affairs, warned, "Saddam Hussein does not need to win the war; he doesn't need to win the battles. All he needs to do is keep this war going and to create casualties. If he does that over a period of time, then you are going to see an erosion of support for the war. That is a worst case scenario."⁴⁷

In one sense, the lessons had been learned by the time of the Gulf War. The massive attacks on Iraq's air defence network and destruction of those IQAF aircraft foolhardy enough to attempt opposition led General Schwarzkof to declare after three days that Coalition air superiority had been achieved.

This was not strictly accurate. Control of the air had been established only against Iraqi aircraft and only above the range of low level air defences. It was estimated that 16,000 SAM and

7,000 anti aircraft guns were deployed throughout Iraq and occupied Kuwait.⁴⁸ Destruction of the integrated air defence system degraded the effectiveness of medium and high level SAM, but the sheer volume of mobile and hand held SAM, plus AA guns, restrained low level Coalition attacks until the end of the war. Throughout Desert Storm, most Coalition sorties took place above 10,000 feet except for A-10 attacks on Iraqi forces deployed near to the Kuwait-Saudi Arabian border.⁴⁹

Nonetheless, fighter pilots' preoccupation with other fighter pilots died hard. Eight years later, General Horner wrote, "AAA and SAMs were dangerous, but the most lethal threat to our attack was the enemy's interceptor aircraft." He then allocated four pages of careful analysis to explain how easily, in the event, that threat had been overcome.⁵⁰

The Coalition was however, so superior in aircraft numbers and quality, in weapons, in aircrew skills, in electronic warfare, in strategy, in tactics, in training and in leadership, and Iraqi ground forces so vulnerable, that conceding the lower air space to Iraqi air defences had little or no impact on the outcome of the Gulf War. The overall loss rate of Coalition aircraft was approximately one fixed wing aircraft in 1800 sorties. At most, only one aircraft was lost to Iraqi fighters, in a 33 to one exchange, but 32 out of 38 Coalition losses were attributed to Iraq's surface to air defences.

Circumstances were different in the two Balkan conflicts, when national interests among Coalition members became mixed with humanitarian considerations. As the first Balkan crisis unfolded in Bosnia between 1992 and 1995, disagreements over the use of air power were aggravated by the priorities afforded to force protection by air and ground force commanders. In June 1995, a single F-16 was shot down by an SA-6 missile. The pilot was recovered safely but the USAF commander re-adjusted his combat patrol routes away from hostile SAM range. In this same conflict, a British Defence Secretary asserted that, "our primary responsibility as the United Kingdom is obviously the safety of our own forces (ground troops)."⁵¹ Such well publicised Coalition sensitivity to casualties relayed encouraging messages to the Bosnian Serbs but still did not affect the final impact of air power.

In the Kosovo crisis of 1999, there were insufficient aircraft to launch parallel attacks on air

defences and deployed forces powerful enough to induce shock or paralysis. Priority was, in the traditional manner, given to achieving control of the air, while attacks on deployed Serbian forces were made from medium level for reasons of force protection. Moreover, there is strong circumstantial evidence to suggest that Coalition concern about friendly casualties was even more acute than during the Bosnian crisis. NATO Commander General Wesley Clark was reported as issuing a “no loss of aircraft” restriction in November 1998.⁵² Lieutenant General Short subsequently denied receiving such an order, but acknowledged that “zero losses were a major goal.”⁵³

Now, however, the operational circumstances were very different. In the Gulf war, Iraqi armour and other ground forces had been largely deployed in open terrain well away from civilian settlements. There had been no crescendo of persecution in Kuwait. In 1999, the world watched as Serbian repression accelerated in Kosovo, apparently impervious to NATO air power. Serbian forces were mobile and mingled with the population they were persecuting. General purpose unguided munitions could only be used when there was no risk of collateral damage or civilian casualties. The biggest single technological advantage possessed by NATO lay in its PGM, which also promised maximum target discrimination. But targets were frequently obscured by low cloud and bad weather. Even in clear skies, with considerable care, distinguishing between military and civilian vehicles in convoys from medium altitude proved difficult.

Yugoslavia was reported to have fifteen Mig-29s and forty-seven Mig-21s at the outbreak of the Kosovo crisis. Of these, fourteen and twenty-four respectively were destroyed. By contrast, the US Department of Defence subsequently reported that NATO aircrew observed almost 700 firings of various SAMs.⁵⁴ Even then, it appears that the air defence operators, well aware of their vulnerability to counter-attack from anti radiation missiles, were reluctant to maintain illumination or guidance for any length of time. As a result, in the words of General Ryan, Serbia’s air defences remained “dangerous but ineffective.” Not surprisingly, one of the earliest “lessons” to be drawn by the USAF from the air campaign in Kosovo was the shortage of dedicated SEAD aircraft and electronic warfare



A British F-3 Tornado releases a missile during operations in Kosovo.
(RAF photo: <http://www.raf.mod.uk>)

systems.⁵⁵ General Ryan observed, “To do any kind of military activity, whether that’s air or ground, we absolutely must have air superiority.”⁵⁶

Handfuls of Migs and Sukhois, a few advanced western aircraft and weapons inherited by unfriendly governments, even a handful of obsolescent Galebs [fighter-bombers] could make life unpleasant for civilians or unprotected ground forces. Indeed, no expeditionary force, and especially one drawn only from European air forces, could afford to ignore any air to air threat. But the prospect of any opponent in the foreseeable future offering a serious challenge in the air to a western operation by a coalition led by the US using air power as its primary instrument is very remote.

On the other hand, the proliferation and evolution of SAM continue unabated. Systems such as the S-300 series, SA-14, SA-16, SA-18, Stingers, Rolands and other widely circulating western missiles supplement residual Cold War stocks. They are cheap and readily available for countries and factions who have the political will, but not the military capacity, to challenge the US and friends in the air. Their function is not to secure military victory, but to inhibit air-power effectiveness and to threaten unacceptable levels of casualties. So far in this decade, they have been more successful than they have been given credit for.

Superiority over hostile aircraft remains imperative, but the conflicts in this decade have demonstrated that defence suppression should be given as much priority in procurement, planning, and training as other more traditional offensive operations. Otherwise, while we may still be able to

power, we may not be able to exploit our own. Command of the air has, since the days of Captain Burke, been a means to an end, not an end in itself. Moreover, superiority is no longer required simply to operate, but now to operate with minimal or no casualties. That innovation, if sustained, has considerable implications for the effectiveness of air power. In the dynamic operational environment of Kosovo, because there were insufficient assets to achieve air superiority and to inhibit Serbian ground forces at the same time, the latter retained the initiative for several weeks. On this occasion, giving priority to gaining such a degree of air superiority weakened, rather than enhanced, air operations elsewhere. When, in addition, concern about aircrew casualties inhibited the use of PGMs below medium level, the total impact on air operations of modern surface to air defences could be clearly seen.

In sum, if air power is to fully exploit its versatility across the spectrum of 21st Century conflict, the fundamental concept of command of the air is now even more important. Political sensitivity to casualties suggests that it continues to be given the highest priority. If the prospect of single figure casualties should ever become a deterrent to the use of air power, the instrument of choice will be neutralised. Without air power, the opposition will be freed to determine the conditions of the battle-space. These are good grounds for re-emphasising the fundamental concept of command of the air and, after almost a century, for elevating defence suppression to the same priority as the fighter aircraft.

The Obsolescence of Strategic and Tactical Distinction

Finally, while command of the air is still an essential and meaningful concept, the equally venerable distinction between the expressions “strategic” and “tactical” to identify different kinds of operations is no longer quite so helpful. It may indeed be argued that the distinction has frequently inhibited the most effective application of air power and, in the new international environment, has lost its utility altogether. The distinction originated in World War One to distinguish between direct attacks on an enemy’s heartland and direct support of surface forces.⁵⁷ After World War Two the concept was formally identified in the United States’

“Strategic Bombing Survey.”

Subsequently, strategic air power became synonymous with long range nuclear attack on the USSR, the role allocated to Strategic Air Command. “Tactical” air power was used in “theatres” such as Korea or Europe. Strategic air operations were defined in the USAF as attacks “designed to disrupt an enemy nation to the extent that its will and capability to resist are broken.” Such operations “are conducted directly against the nation itself rather than its deployed armed forces.”⁵⁸ In contrast, “theater” or “tactical” operations were conducted in a confined geographical area with the objective of destroying or neutralising the enemy’s military forces.⁵⁹ The distinction persisted to absurdity with the advent of “tactical” nuclear weapons deployed by both sides in Europe.

In 1999, General Horner contributed a typically rumbustious critique of the terms in his reflections on the Gulf War. “More recently,” he wrote, “‘strategic’ has come to mean nuclear strikes against the Soviet Union, or other powerful enemies, and ‘tactical’ all other forms of warfare ... I don’t understand tactical or strategic. The words have become meaningless and dysfunctional. In fact, in modern military speech, they are more often used to divide people and frustrate efforts than to illuminate and facilitate.”⁶⁰ As General Horner’s comments imply, there are more reasons to re-evaluate the concepts of strategic and tactical air power than mere pedantry or fashionable revisionism.

Strategic effect, in the sense of bringing pressure to bear on an opponent’s decision making process, remains a primary task of offensive air power. Now however, it can be achieved by “tactical” F-117s as well as by B-2s. Within the theatre battle space, any air attack which has a direct impact on that decision making process justifies the appellation “strategic.” It could be against the Iraqi Republican Guard, Bosnian Serb war stocks or oil refineries in Yugoslavia. In Kosovo it could have been to inflict unacceptable losses among Serbian ground forces or unacceptable damage to the infrastructure of the state. The accurate identification of the most productive and accessible pressure point to achieve “strategic” effect becomes an even more important precursor to operations.

When the confines of a theatre of operations are commensurate with the boundaries of the con-

flict as a whole, General Horner's criticism is thoroughly well founded. The terms "strategic" and "tactical" have little further to contribute to the understanding of air power's contemporary versatility. They may be confidently subsumed in the more helpful categorisation of roles which prepare an operational environment for surface force exploitation, or directly support surface forces or contribute distinctly to coercive diplomacy.

Beyond The Millennium

Technology has transported air power from the industrial to the information age. For those states which may choose air power as their preferred military instrument, survival has been replaced as a primary security concern by the protection and projection of interests, tinged with hesitant humanitarian aspirations. A great deal of positive revision of air power doctrine has already taken place in the last decade to ensure that intellectual mastery of air power's new environment is sustained.

There is however, a danger that the malign shadow of Douhet will be cast over the next millennium. There can be no single template for the successful application of air power. The versatility of air power application is as wide as the spectrum of conflict itself and the range of political objectives being pursued. There is now the need and opportunity to revisit some well-worn ideas and construct a conceptual paradigm appropriate to many different scenarios, in which air power can sustain coercive diplomacy and become a primary instrument reinforcing the ongoing political dialogue. Thereby, it may sometimes act distinctly and directly, with overwhelming strength or more gradually, against an opponent's will to resist. On other occasions it may shape an environment for others to exploit. Elsewhere, it may protect and enhance other forces. These are contributions which can be made nationally or in coalitions, whatever the size and capacity of air forces. Provided air power is released from its strands of dogmatic inheritance, it can cross the millennium as a most versatile, effective, comprehensible and politically attractive military option.

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- ³ *ibid.*
- ⁴ "The Air War in the Gulf," *Survival*, Vol. 33, No. 3, May/June 1991, 225.
- ⁵ NATO Briefing, Brussels, 25 March 1999.
- ⁶ Pentagon Briefing, Washington DC, 23 March 1999.
- ⁷ *Daily Telegraph* [London], 2 April 1999.
- ⁸ AFDD-2, "Organization and Employment of Aerospace Power," USAF, 28 September, 1998, 6-7.
- ⁹ *Daily Telegraph*, 1 April, 1999.
- ¹⁰ Air Marshal Sir John Day, Deputy Chief of Defence Staff UK, Press Briefing, 3 April, 1999 as reported in the *New York Times*, 4 April 1999.
- ¹¹ *Washington Post*, 22 October, 1999.
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- ¹³ *The Guardian*, 1 April 1999.
- ¹⁴ *Daily Telegraph*, 13 April 1999.
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- ¹⁷ *Air Force Magazine*, August 1999, 62.
- ¹⁸ *The Guardian*, 28 May 1999.
- ¹⁹ *Washington Post*, 4 June 1999.
- ²⁰ *Air Force Magazine*, August 1999, 23.
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- ²² See "Kosovo or the Future of War" by Alan Stephens, [RAAF] Air Power Studies Centre, Paper 77, 2-8, for a selective list of notable critics.
- ²³ Colonel Harry Summers, USA, (Ret.), *Washington Times*, 12 May 1999.
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- ⁴⁰ Appendix II to Cabinet Minutes (WC 233) 24 August 1917. See the present writer's *Air Power, A Centennial Appraisal* (London: Brassey's 1994), 20-27, for a more detailed appraisal of the Smuts Report.
- ⁴¹ Cited in A F Hurley, in the Appendix "Additional Insights" to *Billy Mitchell, Crusader for Air Power* (Bloomington IN: Indiana University Press, 1975), 142.
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- ⁴⁸ Richard P Hallion, *Storm over Iraq* (Smithsonian, 1992), 147.
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⁵² *Washington Post*, 30 May 1999.

⁵³ "Washington Watch" op cit. 5.

⁵⁴ *Air Force Magazine*, August 1999, 61.

⁵⁵ Interview in *Air Force Magazine*, *ibid.*, 23.

⁵⁶ *ibid.*, 25.

⁵⁷ E.g., John Terraine, *The Right of The Line* (Sceptre, 1988), 9.

⁵⁸ USAF Manual 1-8, "Strategic Air Operations," 1 May 1954, 2, 6, cited in Clodfelter, *The Limits of War* (Free Press/MacMillan, 1989), 28, 29.

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⁶⁰ Clancy/Horner op cit. 15.

Biography

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A formation of British Short Stirlings. (RAF photo: <http://www.raf.mod.uk>)

Air Expeditionary Force — Ready, Aim, Fire

General Richard E. Hawley, USAF

Today, I'd like to share with you the commander of ACC's perspective on the status of our Air Force today and, particularly, the status of Air Combat Command. This really has been a tough decade for the United States Air Force and for ACC, and it remains so today.

We read a lot in the press about some of the difficulties we face. We read about adverse retention trends, the mission capability rates of our equipment, the personnel tempo that our people are carrying for the country as they go engage in operations all over the world. Any of us who have spent time in the air can't help but cringe a little bit. Every morning we pick up the paper and read about the latest missile shoot-out in the Middle East, where we kind of have this Mexican standoff going on, with missiles firing back and forth at each other everyday. You wonder when is this going to stop working out so well.

About a year ago at this same symposium, I tried to describe the pain that some of our people in uniform are feeling, and what I think might be fairly described as the benign neglect of our military. What I was doing for our force was kind of a crude attempt to connect some of the dots among high OPTEMPO, declining spares inventory, and aging airplanes. As the Chief pointed out, we're now at 20 years for the average age in our airplane fleets. And you've all heard a lot in the past year or so about eroding pay and benefits for our people and the emerging pay gap. And of course, all of that led to a pretty rapid decline in the rate at which we were retaining these wonderful young men and women who serve us so well in so many places, in so many odd environments all over the world. It really wasn't a very pretty story. And given the nation's preoccupation with achieving a balance in the federal budget, there wasn't much reason for optimism.

But you know, a lot has happened in the past 12 months. Keep in mind where we were a year ago. The federal budget has gone from where the people who account for such things were predicting a tentative balanced budget, I think, in 2002. In fact, we achieved balance in 1998, and people are now predicting multi-billion dollar surpluses for about as far as the eye can see. That benign neglect that was causing me such concern over the past couple of years has been transformed into what I think is an emerging bipartisan support for better custody of these wonderful institutions that have served, and are serving, our nation so well. Hopefully, bipartisan support will make for substantial increases in the resources that we make available for our national security accounts, to include some of those space issues that General Myers just talked about.

A year ago, our deployments to the Gulf — remember, that was February of last year — had risen to where Air Combat Command had 7000 men and women deployed to the Gulf. Well, by late springtime, those deployments had fallen to about 4000 people — actually, below 4000 — for the first time in many years. Because at the end of that engagement that began in the fall of 1997 and extended through the spring of 1998, we actually drew the force down to below where it had been over the previous couple of years. And despite two build-ups since then, which culminated in the recent strike called Desert Fox, we still have fewer than 5000 ACC people deployed in the Middle East. Now, many more than that deployed, did their job, and then came back home. We're beginning to learn some things about how to employ this great national resource called air power.

In the past year, we've also made substantial progress in sharpening some of the tools that our great men and women need to do their jobs.

The first seven Block-D B-1s are on the ramp at Ellsworth. Now, you probably say, “Well, what’s a Block-D B-1?” All right, well, a Block-D B-1 comes with integrated GPS, a towed decoy, the ability to spot moving targets from that fantastic radar that has always been one of the finest offensive radars ever put in an airplane, and the ability to deliver the Joint Direct Attack Munition (JDAM).

A month or so ago, I went out to Ellsworth and flew the first operational JDAM drop. I take great credit for delivering that weapon on target. I want to tell you, I know many of you in this room have dropped a lot of bombs. This is a different experience; it’s almost ethereal. You climb up to 26,000 feet, you fly the airplane to the black line, you put it on autopilot, and then somebody in the back does something, and you feel a “clunk,” as a 2,000-pound bomb comes out of the bomb bay. Sixty seconds time of fall later, it shacks the target on the ground — an amazing experience. So, we need to keep it on track. It is delivering a capability that will give our bomber force ten times the lethality of the bomber force that migrated from SAC to ACC in 1992 — *ten times*.

We’ve transitioned to an all-Block-30 B-2 fleet at Whiteman. We don’t have any Block-20s left. Every plane on the ramp at Whiteman is a full-up Block-30. And by the way, a year ago we were taking a lot of criticism about the deployability of the B-2. Well, since then it’s been on two deployments. In the springtime we sent it to Guam, mostly because I was sick of hearing about that criticism, so I called up the wing commander at Whiteman and said, “Go deploy that thing and prove to people that you can operate in a deployed status.” Well, they did that, and it did great. They went out there and they dropped a full load of Mk-82s and shacked the targets. And this past summer, we sent some B-52s and some B-2s to Guam, and they spent 30 days there. They delivered JDAMs, they explored the territory all over the theater, they showed these tremendous global reach capabilities to many of our allies all over the region, and they gained some great experience in operating the B-2 from a deployed status.

Then, of course, there’s our munitions modernization programs. As I recall, last year I showed you a film. I know most of you have seen the film of that amazing set of B-2 sorties, where we sent three B-2s over the Nellis ranges and dropped 16

JDAMs, scoring 16 hits on 16 targets dispersed over several kilometers of desert out there. Well, those are progressing nicely.



B-2 Bomber conducting munitions testing. (US Air Force Photo)

This year, our inventory of sensor-fuzed munitions — my favorite tank-killer — has passed the 1000 mark. We took delivery of our first production JDAMs, and this year we’ll continue to build that inventory. By the end of the year we’ll have more than 1000 JDAMs in the inventory. So this is no longer pie-in-the-sky stuff; this is no longer programs and plans; this is no longer line items in the budget; this is real capability: all weather, day/night, near-precision attack capability anyplace in the world, anytime, against anybody who deserves to get “schwacked.”

This year we took delivery of our fifteenth Block-30/35 AWACS at Tinker. You say “What is that?” Well, it’s a tremendous enhancement to that great, overworked workhorse of the surveillance world, because it gives it a lot of capability. It gives it the new Link 16 radio that improves the latency eight-fold. Latency of the AWACS picture will be reduced from 40 seconds to 5 seconds. What a quantum leap forward in capability! Integrated GPS will improve the accuracy of the targets that it feeds to the common operational picture, by a factor of 200, and it gains its own electronic systems suite, so that it can be a better informed platform. In EFX 98, which General Myers mentioned, we demonstrated the feed of all of our intelligence into the AWACS so that we could integrate all the “int” capabilities — space based, air based, and land based — into that picture.

Predator has continued its evolution. This month we take delivery of the sixth system. The

sixth system is a fully developed weapons system, complete with identification-friend-or-foe capability, much better capability to move data [through data links]. It will have an air traffic control voice link so it can begin to operate in that FAA environment, which has been such a challenge for us. It will have Mode 4, a better engine, and improved or, for the first time, a reasonable anti-ice/de-ice capability.

And by the way, it just became operational in its second theater. It's been deployed almost non-stop for several years now, as you know, in Bosnia. Well, now it's taking up operations in Southwest Asia in support of General Tony Zinni. So the Predator is getting out and about, and we will rapidly build to our full complement of systems over the next couple of years so that we can sustain three systems forward deployed at all times. And those folks are doing a great job.

There are some things in development that have come along a lot in the past year: Global Hawk, for example. It has now completed 11 flights. It has flown at 61,000-plus feet at 350 knots, and it has demonstrated its move toward full endurance capabilities with a 9 [and] 1/2-hour sortie.

Great promise, but promise beyond reconnaissance and surveillance. Our battlelab down at Eglin, the UAV battlelab, is exploring many other missions with this and other unmanned platforms. Early on I think there will be a radio relay capability. It will begin to give us the capability to take a crew out of the back end of systems like the ABCCC [Airborne Command, Control, and Communications] and just move digits back and forth and move that communications flow from a radio relay on a high altitude platform. Suppression of enemy defenses — we've already demonstrated this capability on other UAVs with the precise geolocation of threats on the ground, and it won't be long after that before we can locate them and attack them.

The Airborne Laser. A great system, and what potential! This is the future! Now, unfortunately, it suffered a \$25 million cut as the Congress finished work on the '99 budget, but we've re-phased the program; we've incorporated some added risk-reduction elements. It will slide about a year to the right and, of course, like all things that slide to the right, it will add to the cost. But it's

been a tremendous achievement this year because they've demonstrated 110 percent of the spec power output from the flight-weighted laser module that will form the firing element in that weapons system. And that's just the start. So we are going to deliver this capability. We'll take delivery of the 747 platform that we're going to integrate six of these laser modules on, later this year, and that's the real test for the airborne laser program-integration of all this capability on a flying platform. The technologies are all in hand.

Our Aerospace Command and Control Agency made great strides this year, and on the first of January they morphed into an alphabet soup agency called the Command and Control Intelligence, Surveillance, and Reconnaissance Center. We now have an organization that is responsible for closing the loop from sensor to decision-maker to shooter, and it's doing great work for our Air Force. It is integrating all those disparate command and control programs that we had across the Air Force into a program that makes sense and that we can afford. And now, we are tying in the surveillance and reconnaissance piece so that we close the loop. Great success!

They were responsible for pulling off EFX 98, which was a great experiment in many areas, not just in how to do reach-back, as has already been mentioned. The deployment of what we're calling collaborative tools to allow many dispersed nodes of the command and control system to integrate one to the other so that the members who are in those places don't care where anybody else sits. Great advances — great advances in the ability to put sensor-to-shooter capabilities on our B-1 and other platforms so we can launch some of these Global Reach platforms without even giving them a target. We'll assign them their target en route and send them their mission folder and all their target data so that we can accelerate the decision cycle, which is usually the slowest part of any command and control structure.

In our struggle to better manage the high OPTEMPO that is putting so much strain on our people and their families, we have had some successes. Two years ago, when we sent people to support operations in places like Prince Sultan Air Base in Saudi Arabia and Al Jabber in Kuwait, frequently they would be tagged to go off all by themselves. They'd put their duffel bag over their

shoulder and go catch a hop to the Middle East and generally spend three or four days in Europe on the way, sometimes longer. They'd show up and they didn't know anybody and nobody knew them and they didn't know their boss. And it wasn't much fun. Frequently they did that with as little as seven or eight days notice.

We have changed the whole process. We have re-engineered the way that we do that kind of work. Now, 80 percent of the men and women in Air Combat Command who are given these assignments have 120 days notice so they can plan both their personal and their professional lives around that deployment. They also go as part of teams. Almost nobody goes as a single anymore. If the security force is called, it's a 13-person team. Even if they're a public affairs person, we try to get them married up so there's at least two of them who go from the same unit, so they've got some mutual support. Great progress!

And then, of course, there's the Aerospace Expeditionary Force concept, which we are in the process of fielding. General Cook talked about it. I think he gave you all that you'd ever want to know about AEF. So let me put a little different spin on it from my perspective at ACC.

One of the real benefit of AEF will be for the warfighter. The warfighter will know that he is getting forces that have been tailored for his mission and specifically trained and prepared to do his work, rather than just stacked up in the middle of the country and stuck over there without any focused, tailored preparation.

And our people, will get predictability in their lives that they haven't enjoyed in many years. Because they will now know well in advance — a year or a year and a half in advance — that they're going to be deploying next June, July, or August, and they'll know where and in what theater it is that they're vulnerable to deploy.

We'll get greater participation from the Total Force, because we'll be able to give our Air National Guardsmen and our Air Force Reservists adequate notice so that they can plan to participate in these operations to an even greater extent than they have been in the past. And we've had great Total Force participation in these operations already, but that's going to get even better. And that will relieve some of the stress on the active force that is causing us such grief.

We've even had some notable successes in the facilities area, which is, by any measure, the most neglected part of the DoD budget and of the Air Force budget. But even there, we've had some successes. When Howard Air Force Base closes in December of this year, ACC will no longer have a single gang latrine-equipped dormitory.

Then, of course, there is what I consider to be our most important modernization program: the F-22. Now you know you can't invite me to the platform without hearing something about F-22s, so just gird your loins and be prepared for it!

You know, those who have to win control of the skies may have one of the most daunting tasks of any warfighter. Think about it. No terrain to hide behind — you can't mask your movements. There aren't any fields or forests to provide cover and concealment. When they enter battle, they are visible to everybody who has eyes of any kind to see them. So the only thing that assures their success is the technical virtue of their aircraft and their own confidence in their skills.

And today I might use the analogy of two very equally equipped foes facing each other in hand-to-hand combat, and the only thing that will assure our warrior victory today is the training superiority.

Because today we are matched equally in this environment. Some would say that we are sending our warriors into combat at a potential disadvantage against some of the systems that have already been fielded in other air forces around the globe. It's not a very forgiving environment, and it grows more dangerous every year.

We have surface-to-air missile systems, with a 100-mile reach, that are proliferating. We've all read about the SA-10 that might show up in Cyprus, of all places, any day. And failure in the endeavor to control the third dimension will come at an enormously high cost for our nation. Our expeditionary forces that we're working so hard on, both in concept and in reality, could be subjected to the awesome destructive power of modern aerospace forces before they even get to the ports and airfields from which they have to disperse when they get to the theater. They could be decimated as they get themselves organized to leave those air bases and seaports. And for the first time since the Korean War, Americans in battle could have to fight against an attacking enemy air force.

Our ability to dominate the air battle has enabled every military success from Normandy to General Schwarzkopf's famous left hook in Desert Storm. But it gets tougher to do with every passing year, because technology is proliferating across the globe at a tremendous rate. Every day we see the fielding of systems with important capabilities that exceed our grasp today: missiles with tremendous reach, incredibly accurate radars, electronic countermeasures that are able to blind the eyes of our fighters — the radar eyes upon which they depend for their situational awareness and to employ their weapons.

So what we need is what we decided to procure back in the '80s, when we invented the F-22 program. We sat down and thought through what we thought we were going to find in the next century in the way of threats. And we decided we needed an airplane that was very stealthy, that was able to sustain high-mach cruise for a sustained period of time. It needed the ability to give its aviators unmatched situational awareness and the kind of maneuverability that you have to have to survive in a close fight.

Now, that's a tall order, but — fortunately — the F-22 Raptor will soon be in the hands of our air warriors whom we will ask to do battle for dominance of the skies over future battlefields. It will give them the stealth, speed, agility, lethality, and dominant situational awareness that will make them victorious over any foe in any place and at any time through the first three decades of the 21st century. And the program is delivering.

What a year it has been for this Air Force! Now, this time last year, I was very proud to tell you that we had logged two flights and three hours. And of course there were some people who thought "You ought to do more!" Well, we did more. The airplane now has more than 200 hours on it. It's been flown to six G's and 26-degree angle of attack, at 50,000 feet, airspeeds up to Mach 1.4, and it has refueled literally dozens of times. It is living up to its promise, both in performance and in the key areas of maintainability and reliability.

Because remember, when we hear about all those issues of supportability, that it's not the affordability of a system when you buy it that counts; it's the affordability of a system when you have operated it through its lifetime that's most important. And the F-22 will give us an airplane that we can

deploy with half the airlift of a comparable F-15 squadron today, one that we will sustain with one-third fewer people. And when you can save airlift, that means combat power for the CINCs. And when you can save people, that's money, because 50 percent of the DoD budget goes to pay for our people. And by the way, that's too little. They need more.

I guess the bottom line of all that is, unlike last year, when I was a purveyor of gloom and doom, that I am really optimistic. Now, that doesn't mean that all our problems have gone away. I'm optimistic because I see things coming into place that can make our problems go away. So I think we're going to be on the uptake very soon. That doesn't mean that mission capable rates for ACC's fighter fleets, which last year were in a precipitous decline, have turned around — but they did level off. Our mission capable rates to date in 1999 are identical to our average mission capable rates in 1998. So that's a start, and I hope soon to see them on the uptake.

I wish I had good news on retention, because retention rates are even worse today than they were a year ago, in all areas. The pilot shortfall, which I think last year we predicted would bottom out at about 1,800 short of our requirements, is now predicted to bottom out about 2,000 short of our requirements. So we've got some work cut out for us.

But the just-released presidential budget is a huge step in the right direction, especially the proposals to restore the value of military retirement as a career incentive and to arrest the erosion of military pay scales that have failed to keep pace with those in the rest of the economy for too many years. And last week, the Senate moved to enhance the President's proposal in both of these areas, both in the value of retirement benefits and in the increased rate of compensation in general. This attention to the needs of our people is long overdue. It's the right thing to do, especially when we are asking so much of military people and their families in this very turbulent world that General Ryan described. And it sends the message that our force has been yearning to hear for many years: it tells them that they're important.

I spend a lot of time with our airmen, and most of that I spend listening. And what they have been telling me is pretty clear. They have been

wondering whether the American people still value their service. Their service has not been an element of the national debate for a long time, so they wonder — as they see their compensation and benefits steadily eroding, as they struggle so hard to maintain the mission-capability rates of the equipment for which they are responsible, as they get asked to deploy countless times to far-off places under difficult conditions — they wonder whether the nation still cares about them.

So these recent moves in Washington to enhance the pay compensation and benefits of our people, to restore some fairness to the compensation system, send exactly the right message.

And it's not the money that's important to them. It's the fact that we're telling them for the first time in a long time that the nation really cares about their service — that the nation values their service — that the nation considers that what they do is important.

The President has also committed to increased funding of spare parts for our aging equipment, and to buy new equipment to replace that which is simply too tired to continue. But more is needed, and some of the sources for the increases already proposed may never be realized. We are counting on continued low inflation to cover many of these needs. But inflation in the supermarket may not match that for military hardware. So we

need to examine the assumptions very carefully, and should they prove false, we must be prepared to provide more direct sources of funding for these critical needs. I think we're on the right track.

Thank you for your continued support of our armed forces and for this great Air Force Association. And again, thanks for this opportunity to spend some time with such a wonderful group of people, talking about the Air Force and Air Combat Command. I hope my perspective has been of some use to you today.

General Hawley delivered this speech at the Air Force Association's Air Warfare Symposium, 4 February 1999, in Orlando, Florida. It is reprinted here with the kind permission of the Air Force Association's Director of Policy and Communication, Mr. Steve Aubin.

Biography

General Richard E. Hawley, USAF, (Ret.), served his country as an Air Force officer for 35 years. He was a 1964 graduate of the US Air Force Academy, and retired as the Commander of Air Combat Command in 1999. He was a command pilot with over 2,500 hours in 6 different aircraft, and flew 435 combat missions as a forward air controller in South Vietnam.

Painting by Ted Frazier, USAFA '98. Courtesy of the USAF Academy Department of English and Fine Arts.



A Revolution in Strike Warfare

Rear Admiral John B. Nathman, USN

On the night of January 17, 1991, more than 100 Tomahawk cruise missiles were launched at pre-programmed targets by nine US Navy warships in the Mediterranean Sea, Persian Gulf, and Red Sea, marking the beginning of Operation Desert Storm. That same night, 228 combat sorties were launched from the decks of six aircraft carriers in the Red Sea, the Persian Gulf, and the North Arabian Sea. The total American naval forces assembled in the region as part of the US-led coalition included six carrier battle groups, two battleships, and a 31-ship amphibious task force — more than 100 ships in all — carrying nearly 75,000 sailors. In addition, some 67,000 Marines comprised the Marine Expeditionary Force ashore, while another 18,000 Marines were embarked in the ships of the amphibious task force — bringing the total US naval contingent to 160,000 personnel.

During the next five weeks, the world was riveted by the astonishing success of coalition forces as they overwhelmed the world's fourth largest military power and drove Saddam Hussein's occupying army from Kuwait — thereby achieving one of history's most visible and rapid victories.

In the United States, the images of the Gulf War, which included strike aircraft rocketing from the decks of carriers and Tomahawk missiles arching skyward from battleships, became fixed in the minds of many Americans and are now part of the national subconscious. The sound-bite and video-clip depictions provided by the news media of subsequent military operations, including the recent air campaign in Kosovo, are often so similar to the remembered images of Desert Storm that the public might naturally assume that little has changed in the past ten years in terms of the US-warfighting capability. For the US Navy and naval aviation, however, nothing could be further from the truth.

A Factor of Ten

During the last decade, naval aviation has been engaged in a revolution — a revolution in strike warfare — which will culminate early in the new century with the introduction of the F/A-18E/F Super Hornet strike fighter into carrier air wings and with the stocking of carriers' magazines with through-the-weather precision ordnance. Once this revolution is completed, the strike capability of an aircraft carrier and embarked air wing will be more than 10 times greater than that of their late-1980s predecessors — making a single aircraft carrier battle group (CVBG) nearly twice as powerful as the six that combined to enable victory during Desert Storm.

It is important to recognize that US naval aviation's future does not derive solely from a single platform or weapon system. Although the Super Hornet and the critical warfighting systems that come with it are at the heart of the revolution in strike warfare, the vision for naval aviation goes beyond the strike fighters to include balancing and shaping our air wings, helicopter force, maritime aircraft and, of course, the aircraft carriers themselves.

In order for naval expeditionary forces to be decisive, naval commanders must have access to the battlespace and be able to build and sustain battlespace awareness and knowledge with a high degree of fidelity. Naval aviation is well suited for this: its platforms, systems, and sensors that support command and control, intelligence, surveillance, reconnaissance, antisubmarine warfare, anti-surface warfare, precision strike targeting, and electronic attack all are critical to making that vision a reality.

As has been the case for many years, most of today's naval expeditionary forces work up and deploy as part of CVBGs or amphibious ready groups (ARGs). A typical CVBG is equipped with

a total of 74 aircraft, 50 of which are strikers. Battle-group power-projection capability is augmented by Aegis guided-missile cruisers and destroyers that provide naval surface fire support, which includes the Tomahawk land-attack missile (TLAM). The nuclear-powered attack submarines that deploy as part of the CVBG are TLAM-capable as well, and add to the battle group's ability to project power ashore — as demonstrated so effectively during NATO's Operation Allied Force.

The striking power of an ARG is centered on the Marine Expeditionary Unit (Special Operations Capable), or MEU(SOC), embarked in the ARG's amphibious assault ships. It includes 2,100 Marines plus heavy armor, artillery, and command and combat support elements. The ARG's Air Combat Element (ACE) includes both fixed- and rotary-wing strike aircraft, including AV-8B Harriers, which are capable of vertical takeoff and landing, and AH-1W Super Cobra attack helicopters. Other naval expeditionary forces

that operate in support of CVBGs and ARGs, but which often deploy independently, include not only individually deployed warships and submarines, but also SEALs, special operations and coastal patrol craft, and forward-deployed land-based patrol and reconnaissance aircraft, such as the P-3C Orion and EP-3E Aries II.

World events since the collapse of the Soviet Union and the end of the Cold War have demonstrated an increasing need for naval expeditionary forces and naval aviation. Despite the post-Cold War drawdown and widely anticipated "peace dividend," the reality is that the Navy and Marine Corps are being called upon to respond with greater frequency — and at an accelerating pace. For example, during all the years of the Cold War, the Navy/Marine Corps team responded to 190 different crises, an average of one such operation every

11 weeks. From 1990 through 1997, the team reacted 80 times to global hotspots — once every four weeks — nearly a threefold increase. In 1998, naval forces responded to a different crisis every 3 weeks on average — a fourfold increase over Cold War crisis-response levels. The adage that the first question asked by the president during any crisis is most often "where is the closest carrier" has been borne out time after time as naval forces have responded around the world to crises from Iraq to Haiti, from Taiwan to the Balkans. For those who

have participated in these operations and understand just how effective naval air power can be, the secretary of state's observation that "the only thing that can replace a Carrier Battle Group is another Carrier Battle Group" rings absolutely true.

Precise, Lethal, Coherent

As the centerpiece of naval expeditionary forces, naval aviation possesses several characteristics that make it uniquely suited for the full spectrum of

military operations from humanitarian relief to sustained power projection. One important characteristic is the speed of response that comes with forward presence, aircraft carrier mobility, and the range and reach of its tactical aircraft, sensors, and weapons. Another is the independence and freedom of action that come from being a self-contained total force and the ability to operate from international waters, free from issues of sovereignty, basing rights, and force-protection considerations that often diminish access by land-based forces. Most significantly, naval aviation brings the ability to conduct sustained power projection that is precise, lethal, and coherent.

The dramatic increase in power projection from the revolution in strike warfare is best illustrated by a direct comparison of striking power among carrier air wings from the 1980s, 1990s, and



Carrier Air Wing Nine performs an airpower demonstration over the *USS John C. Stennis* (CVN 74) Battle Group ships, and South Korean naval vessels. (US Navy photo by Photographer's Mate 3rd Class Brian A. Dunn: <http://www.chinfo.navy.mil>)

into the first decade of the 21st century. In the late 1980s, a typical air wing included two squadrons of F-14A Tomcat fighters, one squadron of A-6E Intruder medium-attack aircraft, two squadrons of A-7E Corsair II light-attack aircraft, one S-3A Viking sea-control squadron, one EA-6B Prowler electronic attack squadron, and one E-2C Hawkeye squadron providing airborne early warning, command, and control. In terms of striking a “punch,” the mainstays of this air wing were the 24 Corsairs and 12 Intruders.

By the late 1990s, the A-6s and A-7s that fought in Desert Storm had been completely replaced by squadrons of F/A-18 Hornet strike fighters — a multimission aircraft that brings the air wing high-reliability, less intensive maintenance requirements, and the potential of greatly increased sortie rates. Concurrently, F-14 Tomcat has evolved from being an exclusively air-superiority fighter to the “Bombcat,” a LANTIRN-(Low Altitude Navigation and Targeting Infrared for Night)-equipped strike fighter having excellent day-and-night precision strike capability. Additionally, the EA-6B Prowlers are now High-speed Anti-Radiation Missile (HARM) “shooters,” so they, too, have the ability to strike and destroy targets.

Effects-Based Targeting

In less than a decade, the number of strikers in a typical carrier air wing has grown from 36 to 50, while simultaneously moving from a “dumb bomb” to an all-precision force capable of much higher sortie-generation rates. Not only did this significantly increase the lethality of the air wing’s aircraft but — by every metric used to measure the strike capability of an air wing — a revolution in strike capability was in the making. Rather than calculating the number of targets put at risk per day by a particular air wing based on any given set of conditions, the introduction of precise weaponry — which allows the surgical destruction of specific aim points within a target — meant that air wing effectiveness could be measured in terms of aim points at risk instead of targets struck.

In practical terms, rather than estimating how many sorties it would take to destroy a target (e.g., a refinery to be taken out by many aircraft dropping dozens of weapons), strike planners could employ nodal analysis to leverage the accuracy of precision weapons to achieve the desired effect

(interruption of refinery production for a specified length of time) with far fewer weapons and aircraft sorties. As a result, the naval expeditionary forces that provided the preponderance of force for Operation Desert Fox in Iraq in December of 1998, and more recently contributed to the allied victory in Kosovo, enjoyed nearly a 3-to-1 advantage in effective striking power over that generated during Desert Storm.

The revolution in strike warfare will culminate as new weapon systems currently in development and production enter the fleet over the next several years. New families of precise through-the-weather weapons, many with standoff capability, will further increase naval aviation’s lethality, effectiveness, and survivability. Two of these — the Joint Standoff Weapon (JSOW) and the Joint Direct-Attack Munition (JDAM) — have been combat-tested and proven in Iraq and the Balkans with stunning success. Both combine inertial/GPS (global positioning system) guidance to provide tremendous accuracy with an ability to attack despite bad weather conditions that obscure the pilot’s view of the target. These weapons also allow air crews to attack and destroy targets with precision from higher altitudes and at greater ranges than possible before. Other weapons, such as the enhanced response Standard Land Attack Missile (SLAM-ER), will provide even greater lethality by allowing strike aircraft to stand off outside the enemy’s area defenses.

Decade of the Super Hornet

The final and most significant component of the revolution in strike warfare will be the introduction of the F/A-18E/F Super Hornet, which is currently undergoing operational evaluation. As this aircraft replaces the F-14 Tomcat and current versions of the F/A-18 Hornet, it will bring significant increases in range, payload, survivability, weapons carriage capacity, and growth potential to carrier air wings. When its capabilities are combined with the new generation of sophisticated weaponry, the typical carrier air wing operating in 2001 will be able to strike 10 times the number of target aim points over any given period of time than was possible in Desert Storm. This, then, is the revolution in strike warfare for naval aviation — an order-of-magnitude increase in capability, achieved in less than a generation.

A Seamless Battlespace

The challenge naval aviation now faces is how to maximize the combat performance of highly capable individual platforms by integrating them into a seamless battlespace-centered network. Continuing advances in information technology promise to give a revolutionary increase in combat effects by shifting the focus from specific platforms to a netted striking force. Netting geographically dispersed sensors and shooters into a coherent fighting force that can — almost instantaneously — observe, orient, decide, and then act in response to enemy actions will dramatically increase the capability of deployed commanders to rapidly target and strike a diverse array of aim points, including the mobile short-dwell targets that pose such targeting difficulties today. In plain English, Network Centric Warfare (NCW) is about getting the right information to the right shooter at the right time.

For ease of understanding, the effects of NCW as a warfighting concept and organizing principle for naval forces can be thought about as occurring on three different levels or planes: the planning and coordination plane, the force command and control plane, and the engagement plane. On the planning and coordination plane, new state-of-the-art, network-linked, computer-based planning systems will compress the time it takes to do mission planning and significantly increase the fidelity of the product. On the force control plane of NCW, naval aviation will enable naval forces (as well as joint forces) to engage targets through the E-2C, equipped with Cooperative Engagement Capability (CEC). Because of the uniquely mobile nature of aircraft, naval aviation has more dispersed platforms and sensors on the engagement plane of NCW than any other force. The potent new-generation strike fighters, armed helicopters, and Standoff Land Attack Missile (SLAM)-capable maritime aircraft all deliver precision ordnance and provide today's strike force an unsurpassed level of lethality and versatility.

Upcoming weapon system upgrades will dramatically increase the combat capability of these already potent platforms. JSOW and JDAM will be greatly enhanced with Automatic Target Acquisition/Recognition systems.

Synthetic-aperture radar and electronically scanned radar systems will provide high-resolution data for engaging targets at long range through all

weather. These powerful systems will then be netted together via the next-generation network communication/information system, Link-16. Netting offboard and onboard sensors will not only give aircrews better situational awareness at the tactical level, improving their effectiveness, but will also contribute to building battlespace awareness at the operational level — enabling intuitive command-and-control decisions by operational commanders.

CVNX: Smart Carriers

The central role of our aircraft carriers themselves, operating within a Network Centric Warfare environment, is another critical aspect of the vision for Naval Aviation. More than the “flattop” at the heart of our striking capability which provides for fueling, arming, launch, recovery, and turnaround of our tactical aircraft (as important as that is), our carriers possess a tremendous potential to enable operational-level command and control of expeditionary naval and joint forces. The Nimitz-class nuclear-powered aircraft carriers of today's fleet will continue to serve as the backbone of Naval Aviation to 2050 and beyond—their flexibility and capacity for adaptation to new aircraft, new weapons, new command-and-control systems, and enhanced communications and connectivity serve as a testament to the strength of their design and the foresight of the teams that conceived and built them. The next 10 years, however, will usher in the dawn of an evolution in carrier design, with a new generation of aircraft carrier currently known as the CVNX.

The CVNX will incorporate several major improvements over the Nimitz design based on today's cutting-edge technology. These include new high-density nuclear reactors, a new electrical power-generation and distribution system, and internal redesign of spaces within the hull. This smart, reconfigurable design will be focused to fully support Network Centric Warfare and maximize the carrier's capabilities as a command platform. Equipment will be installed in modules to allow selected computer and combat systems to be replaced or modified several times over the ship's life span, giving CVNX greater flexibility and more longevity than even the highly successful Nimitz-class carriers.

In summary, it is clear that there is an increasing demand for expeditionary forces and that

this demand has placed a premium on the inherent flexibility and responsiveness of US naval aviation. The ability of carrier battle groups and amphibious ready groups to rapidly respond across the spectrum of conflict only reinforces their value and credibility to theater commanders and national leaders.

Revolutionary improvements in combat capabilities and effects, spearheaded by the men and women of naval aviation and supported by enablers such as the Super Hornet, are giving US forces the ability to dominate the battle space from the littoral. In addition to the presence they maintain in areas of national interest around the globe, naval forces bring the right mix of capabilities to be decisive upon arrival. Whether shaping the deep battle, supporting the Marine maneuver scheme, or simply demonstrating US resolve, no force is better suited to meeting the challenges faced by the United States at the dawn of the 21st century.

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Biography

Rear Admiral John B. Nathman is the Director, Air Warfare, Chief of Naval Operations (N88). He graduated with distinction from the US Naval Academy in 1970, and subsequently attended flight training whereby he was selected as Naval Training Command's Outstanding Pilot Graduate in 1972. He served as commanding officer of the nuclear powered aircraft carrier USS Nimitz, during which time the ship was awarded three consecutive Admiral Flatley Memorial Awards for fleet operational excellence and aviation safety. Rear Admiral Nathman has over 3600 hours flying 40 different types of aircraft and has over 750 carrier landings.



The USS George Washington (CVN 73) (left) comes alongside USS Nimitz (CVN 68) in the Arabian Gulf in support of Operation Southern Watch in November 1997. (US Navy photo by Photographer's Mate 2nd Class Robert Catalano)

The United States Air Force, B. 1947 — D. 2025

Captain Brian Anderson, USAF

In his address *New Era Security: The RAAF in the Next 25 Years**, Martin van Creveld, shocked airmen by stating, “If present trends persist, thirty years from now most air forces will have dissolved into space commands on the one hand and some form of air cavalry on the other.” USAF officers strongly believe in air power and in the need for an independent air force. These officers learned early in their careers how Brig Gen Billy Mitchell fought for an independent air force and consider it blasphemy to even suggest that an independent air force might not be necessary. There is a certain irony that today’s air force officers are as firmly entrenched in paradigm as those ground commanders that Billy Mitchell confronted seventy years ago. For these officers especially, van Creveld’s remarks deserve another look and serious consideration.

Before examining the validity of van Creveld’s argument, some of the basic premises of his theory should be clarified. First, he does not offer his comments as the best way to organize the armed forces. Rather, he claims that “history will march in the direction indicated regardless of whether individual policy-makers agree or not.” It is important to note, as well, that his initial audience was composed of members of the Royal Australian Air Force, not the US Air Force. Second, he claims that only states have air forces, giving three reasons why: 1) sheer expense and complexity, 2) amount of space required, vulnerability of aircraft, and length of runway required, and 3) states have borders, greatly reducing the likelihood of friendly casualties from air strikes. Third, van Creveld states that very few wars will take place between states, largely due to the deterrence of

nuclear weapons. Fourth, and perhaps most important, he assumes that air power is less effective in conflicts which are not state vs. state.

As we continue to examine van Creveld’s theory, we must remain focused on the future. If we apply these arguments based on today’s situation, they are certain to fall short. He is talking about the state of air power, and warfare 25 years in the future. A quick look at the last 25 years should be enough to convince anyone that things will be radically different in 2025. Think about the impact of the following events on how we wage war:

- 1) The Defense Reorganization Act of 1986 (Goldwater-Nichols).
- 2) The debut of CNN.
- 3) The fall of the Berlin Wall.
- 4) The end of the Cold War and break-up of the Soviet Union.
- 5) The reunification of Germany and reduction of US forces in Europe.
- 6) The rise of terrorism.
- 7) The disestablishment of Strategic Air Command.
- 8) Terrorism within the Continental United States.
- 9) Operation DESERT SHIELD and subsequent US Air Force deployments in Southwest Asia.
- 10) On-going deployments in the former-Yugoslavia.
- 11) Expansion of NATO.
- 12) The Internet.
- 13) Employment of cruise missiles and stealth aircraft.
- 14) India and Pakistan join the nuclear club.

* All quotes attributed to Dr. Martin van Creveld are taken from his ad-

years ago? To shrug off the possibility that most air forces will dissolve in the next 25 years is shortsighted thinking; the same thinking that prompted one British colonel to state in 1908 “we do not consider that aeroplanes will be of any possible use for war purposes.”¹

To examine van Creveld’s claim better, we must explore the properties of airpower. In his handbook, *10 Propositions Regarding Air Power*, Col Phillip Meilinger examines some enduring truths about the use of aircraft in combat. These will serve as a good measuring stick for evaluating Dr. van Creveld’s claims.

The 10 Propositions

Meilinger’s Proposition 1 states: “Whoever controls the air generally controls the surface.”² When we talk about controlling the air we mean either air superiority or air supremacy. *Air Force Doctrine Document 1* (AFDD-1) defines the two: “Superiority is that degree of dominance that permits friendly land, sea, and air forces to operate at a given time and place without prohibitive interference by the opposing force. Supremacy is that degree of superiority wherein opposing air and space forces are incapable of effective interference anywhere in a given theater of operations.”³ Two considerations for gaining air superiority: 1) is it possible to gain air superiority without an air force, and 2) if the opposition has no air force and cedes air superiority, do we still need to fight for it? Could the second situation ever happen? Two examples: Osama bin Laden and Chechnya. Osama bin Laden is suspected of financing the bombings at Khobar towers in Saudi Arabia in 1996 and the American Embassies in Kenya and Tanzania in 1998. He is the leader of a terrorist organization and has no air force. Likewise, the republic of Chechnya, which is fighting for its independence from Russia, also has no air force. When we look at these two examples the answer to “do we need to fight for uncontested air superiority” is an obvious “no.” But if we must fight for air superiority, can we do it without an air force? Perhaps not today, but in the future we will be able to arm US Army helicopters with a variety of air-to-air missiles, and ground attack weaponry giving the Army this capability. However, the current Air Force paradigm says that air superiority

is won by fighters. This begs the question of how many Scud missiles were shot down by fighters during the Gulf War? The next question then follows: could enemy integrated air defense systems (IADS) be taken down through information warfare rather than explosives? Col Meilinger answers this question by echoing AFDD-1: “the first mission of an air force is to defeat or neutralize the enemy air force so friendly operations on land, sea, and in the air can proceed unhindered, while at the same time one’s own vital centers and military forces remain safe from air attack.”⁴ Dr. van Creveld claims this mission could be accomplished by army, navy, or space assets.

Col Meilinger’s Proposition 2 states: “Air Power is an inherently strategic force.”⁵ Dr. van Creveld does not argue this point, but he notes that in future conflict strategic targets will be less significant. He explains: “where the opposition with which air power is faced does not consist of states with territories that are comparatively large and borders that are clearly defined; when it consists not of regular, state-owned armed forces but of militias, guerrillas, and terrorists operating in a decentralized manner; where combat takes place in close terrain, as in jungles or mountains, and where the belligerents mix with surrounding civilian populations so that friend and foe are virtually indistinguishable; under such circumstances the use of air power is, as experience shows, much more limited.” He is speaking primarily of the effects of air power at the tactical level, but it is clear to see that insurgents rely on the same power plants (read strategic targets) as not only the general population, but also the legitimate government. In these situations, taking out strategic targets related to infrastructure runs the risk of destroying a state in order to save it. If Meilinger’s claim is accurate then the assumption must be made that strategic targets are always available. Our two examples above, Osama bin Laden and Chechnya, seem to indicate that this may not always be the case.

Proposition 4 states: “In essence, Air Power is targeting, targeting is intelligence, and intelligence is analyzing the effect of air operations.”⁶ To avoid being sidetracked, let’s assume that there will be strategic targets identified in

every situation. Do we need an air force to destroy them? Look again at what Meilinger says. He says that *air power*, not an air force, is inherently strategic. We used air power against Osama bin Laden in August 1998 by launching Tomahawk missiles against a chemical plant in the Sudan and suspected training bases in Afghanistan. Are these types of raids more likely or less likely in the future? I think even van Creveld's harshest critics will agree that they are more likely. Advances in technology will potentially reduce the cost of such unmanned weapons, and most certainly will increase the effectiveness of the guidance systems to make them even more precise. Dr. van Creveld speculates on the role of high performance attack aircraft and bombers saying that "By the year 2025 the missions that used to be entrusted to them will almost certainly be divided between missiles (including also cruise missiles) and space-based platforms on the one hand and UAVs and helicopters on the other." We must open our minds to the possibilities of alternate means for hitting these strategic targets. Just as we had to adjust our thinking when it became unnecessary to battle through the enemy's front line to cause havoc in the rear, we must be open to alternatives to manned bombers when it comes to strategic attack. Perhaps in 2025 it will be possible to take out strategic targets using artillery or electromagnetic pulse or some form of weaponry yet to be developed. The targets will still be viable, however the Air Force may not be the service of choice to strike them as it is today.

One of the reasons targeting is so important is explained in Proposition 3: "Air Power is primarily an offensive weapon."⁷ To sit and wait in defense robs air power of its innate advantages: speed, range, and flexibility. Therefore, on both the strategic and tactical levels air power goes after the enemy. This can be challenging when the enemy's personnel and resources are intermingled with the local population. When Dr. van Creveld explains why only states have air forces, he maintains one reason for this is that states have borders. This is important because borders provide some separation between targets and friendly forces. He continues: "Though modern weapon sensors on the one hand, and precision-guided weapons on the other, have

gone a fairly long way towards solving the problem of identifying targets and hitting them, that of separating friend from foe remains." Imagine a cornered criminal who uses a hostage as a human shield. He may be outnumbered and outgunned, but his pursuers are frozen despite their firepower for fear of hitting the hostage. In the movies, the hero is usually a marksman who can make the miracle shot, but in reality a decision to fire is accompanied by the acceptance of killing the hostage. In the same way, the offensive firepower of air power can be paralyzed by the lack of a defined front found in state versus state conflicts.

We've already mentioned Proposition 4, which explains how air power is dependent on "analyzing the effect of air operations."⁸ When fighting against another state, we can see if the electricity is shut down, if the bridge is dropped, or if the pipeline is severed. When fighting organizations other than states, it may be much more difficult to determine the effects, especially on a strategic level. Despite the Tomahawk raids on his training camp in Afghanistan, Osama bin Laden is still at large, and still a threat. Furthermore, the Taliban continues to provide bin Laden with sanctuary. What did those raids really accomplish? Similarly, during Operation ALLIED FORCE, NATO forces enjoyed air supremacy, yet an operation expected to last only one or two weeks dragged on for three months. The desired effect of forcing President Milosevic to bow before NATO might didn't happen immediately.

The leaders of NATO counted on air power to send a message loud enough to force Milosevic to submit. This is in line with Proposition 5: "Air power produces physical and psychological shock by dominating the fourth dimension — time."⁹ Although Milosovic eventually relented to stop the bombing, the delay raised doubts on the ability of air power to produce shock effect in the asymmetric conflicts van Creveld discusses. Col Meilinger addresses the point in his commentary:

This leads to an important insight regarding the effectiveness of air power in low intensity conflicts. Because guerilla war is protracted war, by its very nature it is ill-

suiting for air power, denying it the ability to achieve decision quickly. Campaigns like Rolling Thunder during the Vietnam War indicate that air power is particularly ineffective when denied the opportunity to telescope time. In these instances the limitations of air power are magnified. Indeed, when robbed of its time dimension, the psychological impact of air power may be virtually negative.¹⁰



A-10 "Warthog" firing a missile. (US Air Force photo)

Proposition 6 covers some of the same ground as Proposition 2 on strategic attack. It states: "Air power can conduct parallel operations at all levels of war, simultaneously."¹¹ This is certainly true and will still be true in 2025, but parallel attack does not require fixed winged manned aircraft. We've already discussed how missiles and helicopters can attack strategic targets and provide close air support. Former Chief of Staff of the Air Force General Merrill McPeak went so far as to say that the theater air force commander need not control CAS assets. Specifically, General McPeak said, "the commander with responsibility for the close battle does not require systems or capabilities that reach across the boundaries into the deep and high battles. If there are such systems in the field or on the drawing board, they might be good candidates for retirement or transfer to another service. Alternatively, the commander with responsibility for the deep battle does not need forces that are configured for direct support of close combat op-

erations. If there are any, they too could be transferred or cut."¹² Three things should be considered when analyzing the general's statement. First, Gen McPeak's intention was clearly to further separate the missions of the Air Force, notably in counterair and strategic attack, from the other services and, therefore, emphasize the need for a separate air force — therefore opposed to van Creveld's proposition. Second, he admitted that so-called air-to-mud assets could be removed from Air Force control. Third, to remember that van Creveld doesn't claim that doing away with the Air Force is the best way, but rather that it is simply the direction we are heading. And for those who may not recall, General McPeak's thoughts on relinquishing weapon systems such as the A-10 to the US Army were reviewed and dismissed as not being the best option for the current situation.

Dr. van Creveld gives us his thoughts on close air support. One of his central assumptions is that the nature of warfare is changing. As warfare moves from the front line battles of World War II to the low-intensity conflicts seen in Bosnia and Somalia, the requirements, nature, and methods of employing CAS will change. He explains: "At the low end of the spectrum the UAVs, helicopters and light transport (long range heavy-transport, being too vulnerable to approach the battlefield, is likely to be civilianized) that are useful for fighting low intensity war will also survive; and, in terms, of both budgets and numbers prosper. However, and given the fact that they will operate in very close cooperation with the ground forces, it is not at all certain that they should be organized in a separate service as is still the case in many countries."

Dr. van Creveld points out that the actual number of airframes has decreased dramatically in the 50 years since WWII. He uses this as proof that the expense of maintaining an air force is driving their extinction. Most airmen will immediately point out that B-17s had to drop over 9,000 bombs to ensure target destruction where it would only take one bomb from an F-117.¹³ Dr. van Creveld counters the bomber argument by saying the one target-one bomb assumption applies only to lightly defended targets and that Desert Storm did not prove that modern air power is more capable versus an integrated air defense

system. What is often not mentioned and not addressed by Dr. van Creveld is that 120 C-17 aircraft, each with a payload of 130,000 lbs, will replace 207 C-141 aircraft with payloads of only 68,000.¹⁴ The decrease in the number of airframes due to increased efficiency is not limited to bombers.

An F-117 was shot down during Operation Allied Force. Regardless of why it happened, the casualty indicates there is a vulnerability to stealth aircraft. But this is not enough to deny that the F-117 has definitely forced a re-evaluation of mass as principle of war.

Col Meilinger's Proposition 7 states: "Precision air weapons have redefined the meaning of mass." Air Force Doctrine Document 1 (AFDD-1) explains that "mass is an effect...not just overwhelming quantity."¹⁵ This takes exception to van Creveld's claim that shrinking number of airframes means the disintegration of air forces. The US Air Force is able to concentrate combat power as never before. The circular error of probability* for a 2,000-pound bomb has decreased from 3,300 feet in WWII to less than 10 feet in Desert Storm, a level of accuracy now expected. Meilinger points out that this puts more pressure on our political leaders because the public now expects us to be able to drop a bomb through the window of one room without injuring anyone in the next room. That may be a little exaggerated, but it points out that the need to minimize collateral damage is a political reality. We have already discussed the difficulty of bombing forces which are mixed with, and often indistinguishable from, the local populace. The precision of today's munitions has become both a benefit in efficiency and a limitation based on expectations.

What is an Airman?

Proposition 8 is the "Big Daddy," the "Ace-In-The-Hole," the "Silver Bullet" that ensures van Creveld's premonition will never come to pass. "Air Power's unique characteristics necessitate that it be centrally controlled by airmen."¹⁷ To test van Creveld's theory against this proposition we must define the term "airman." According to the AeroSpace Basic Course mis-

sion briefing, "every [Air Force] officer is an airman."¹⁸ However, that is not what Col Meilinger means when he uses the term "airman." In his explanation of Proposition 8, Col Meilinger does not define what an airman is, but he addresses those who are **not** airmen as "non-aviators" and "non-flyers."¹⁹ Those two terms apply to approximately 89 percent of the active duty Air Force.²⁰ In practice, "airman" has come to mean "Air Force pilot." So if van Creveld is correct, and the Air Force as an organization is dissolved, there would be no airmen left. This can not be true. Col Meilinger alludes to the real meaning of "airman" as "those who understand airpower."²¹ If we take this in its pure form, the key would be the **understanding** of airpower not the color of the officer's uniform, nor his occupational specialty. If we define "airman" as someone who is air-minded, or as someone who understands airpower, then we open up the control of airpower to non-flyers and aviators in our sister services. Certainly there is a challenge here to get the naval aviator to think past fleet defense, and the army aviator to think faster than 3 mph. However, the argument could be made that an Army aviator who is intimate with the capabilities of helicopters would better understand airpower as van Creveld imagines it will be, focusing more on helicopters and unmanned aerial vehicles. Understanding what constitutes being an "airman" should alleviate the intra- and inter-service battle for control of the airpower assets.

The reason air power must be controlled by airmen lies in the inherent advantages of air power, such as speed, range, and flexibility. This is best accomplished through centralized control and decentralized execution. AFDD-1 explains:

Centralized control and decentralized execution of air and space forces are critical to force effectiveness. Air and space power must be controlled by an airman who maintains a broad strategic and/or theater perspective in prioritizing the use of limited air and space assets to attain the objectives of all US forces in any contingency across the range of operations. During the initial en-

* Circular error of probability (CEP) = radial distance from a point in

agements of World War II and through the entire Vietnam conflict, command of US airpower was fragmented and controlled by competing commanders. The results taught airpower leaders that centralized control was the best way to effectively employ airpower. The outcome of the Gulf War stands in stark contrast to that of Vietnam.²²

So the concern is that air power be centrally controlled by someone who understands the capabilities of air power. During Desert Storm this was accomplished through the position of joint force air component commander. The Joint Doctrine Capstone and Keystone Primer says, "The joint force air component commander (JFACC) is a functional component commander that the JFC will normally designate to exploit the capabilities of joint air operations. The JFACC directs this exploitation through a cohesive joint air operation plan for centralized planning and a responsive and integrated control system for decentralized execution."²³ It is important to note that the JFACC is not defined as an Air Force pilot. The JFACC should be an airman, however an airman is someone who is air-minded, who understands the benefits and limitations of air power in all forms, and who understands how to employ air assets. We should not assume this mindset is limited to pilots or members of the Air Force, nor should it be assumed that being in the Air Force guarantees this mindset.

The highest-ranking airman in our country's history, General of the Air Force Henry H. "Hap" Arnold, knew that air power and technology were tied together. In 1944 he wrote: "I believe the security of the United States of America will continue to rest in part in developments instituted by our educational and professional scientists."²⁴ The importance of technology to air power was recognized then and it is affirmed in Proposition 9: "Technology and air power are integrally and synergistically related."²⁵ This concept ties in closely with Dr. van Creveld's basic assumptions. The emergence of UAVs, missiles, and cruise missiles may make it possible for states to get rid of manned aircraft. Certainly,

advances in guidance, propulsion, and miniaturization will only increase the use of unmanned aircraft through a wider scope of missions. As the technology of UAVs progresses, the distance that separates the operator from the aircraft will also increase. Of course, we will still need someone on the ground to replace film or munitions and refuel, but the aircraft can be monitored from anywhere in the world via satellite. Bomber missions directed at targets in Europe and South West Asia can already originate and terminate in CONUS, freeing them from the limitation and hazards of being based in the theater of operations. Likewise, UAVs will be monitored and controlled from home station in the CONUS. Once that is possible, the pilots of UAVs will be contracted civilians such as those who serve as simulator instructors at flying training bases. The line between what is done by uniformed service personnel and what is done by civilians will shift.

The relationship between the military and civilian communities can determine the strength of a nation's air power. In the late 19th century Alfred Thayer Mahan began to write about sea power. He explained that sea power is not confined to purely military issues, that it "includes not only the military strength afloat, that rules the sea or any part of it by force of arms, but also the peaceful commerce and shipping from which alone a military fleet naturally and healthfully springs, and on which it securely rests."²⁶ Likewise, air power is not purely military strength as explained in Proposition 10: "Air Power includes not only military assets, but an aerospace industry and commercial aviation."²⁷ Meilinger goes on to point out that one reason for this is that skills associated with civil aviation such as maintenance and air traffic control are similar enough to allow those technicians to easily cross over from one sector to the other. These areas are already being converted from military personnel to contracted civilian personnel. How much more will they be able to do in the future? Will air traffic controllers still have to be in the back of AWACS aircraft, or will they be able to operate from Tinker AFB in Oklahoma while the aircraft circles over Saudi Arabia? In the future, the question is less likely to be "what can we contract out?" but rather "what are we allowed to

Will Civilians Fly Combat Missions?

Dr. van Creveld never goes so far as to say that fighter pilots will someday be civilian contractors; he thinks they will become obsolete. But could they be contractors? The limit appears to be a legal one. I've heard the argument that combat missions could not be outsourced because civilians will not fly into combat zones. History has shown that there have been Americans willing to put themselves in harm's way even though not on active duty in the US armed forces. Two examples that come to mind are the Lafayette Escadrille to France in World War I and the American Volunteer Group (The Flying Tigers) to China in World War II. Mercenaries have been around for centuries. Machiavelli wrote about the use of condottieri in the 16th century (although his opinion of them was not favorable).²⁸ This opens the door for the possibility that our warriors would not necessarily even be Americans. This would probably help public opinion during strikes since we wouldn't be sending our own people to die. However, Congress might not go so far as to allow contractors to operate outside US borders (and their home districts). It is important to remember two things about using mercenaries in this situation: 1) Machiavelli had good reasons for not liking mercenaries, and 2) van Creveld didn't say not having an air force is the best way, but the direction states are moving. The new breed of civilian contractors would specialize in combat operations. They would want to go into combat because that is when they would make their money. How much they would charge would be determined by their operating costs and computed before signing the contract. The government would still save money in personnel costs. The contractor would also save money. Their war-fighters wouldn't be full time employees, but follow the lead of the reserves by working one weekend a month for proficiency. There would be no retirement plan, no medical benefits, and no commissary to subsidize. Experience in World War II and Korea demonstrated that boldness usually outweighed a college education when it came to combat flying. Judging by the number of extreme sports on television, it doesn't seem the military has cornered the market on audacity.

Conclusion

As we measure Dr. van Creveld's theory against accepted principles of air power we see that he doesn't really break any, although he does bend some paradigms. It is doubtful he will convince any of our generals to start making plans for the disestablishment of the USAF. However, it may be possible for him to catch the attention of members of Congress. They have a much bigger picture to look at and many more things to take into account. Providing for the common defense is only one of their priorities. They are concerned about the rest of the budget, about saving social security, about keeping jobs in their districts, and about relationships with other nations. Procurement of weapon systems, base realignment and closures, and the push for outsourcing and privatization all indicate that our political leaders do not always see eye-to-eye with our military leaders. Our military leaders have a "can-do" attitude, and our military has shown that we will do whatever we are asked, even if it is not the best thing to do. Even so, the death of the Air Force is still not enough of a possibility for us to consider seriously. What may apply is this statement by van Creveld: "At the high end of the spectrum air forces, here understood as autonomous parts of the armed services, are likely to survive in those countries — no more than a handful — that possess the economic muscle and technological expertise that are needed for the purpose." History shows Americans are egocentric when viewing global issues. So Americans will naturally assume Dr. van Creveld is saying the USAF will be gone by 2025. That is not exactly what he is saying. The US will be part of the "handful" of states who retain their air forces. Other possible members of the "air force club" may be found in the permanent members of the UN Security Council: Russia, China, and Great Britain, with Israel replacing France as the fifth member.

Imagine how different the world would be if the British were the only member of the European Union with an air force. Imagine what the balance of power would be in Asia if air forces were replaced with nuclear arsenals. Who would be called to respond to unrest in Africa? Will the Cold War return with all players choosing which air power umbrella to stand under?

The US Air Force is not going away. On the contrary, in 2025 we will be doing even more than we are today.

NOTES

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Biography

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"I believe the security of the United States of America will continue to rest in part in developments instituted by our educational and professional scientists."

—General of the Air Force Henry "Hap" Arnold

Photo from Arnold Engineering and Development Center: <http://www.arnold.af.mil/aedc/images>

Airpower 2025: A Response

Cadet 2d Class Patrick N. Giggy, USAFA

In a 1996 article, Martin van Creveld attempted to convince his readers that there will be little use or need for any state to have an air force by the year 2025. He saw the only military air assets of importance for the future to be light transport aircraft, helicopters, unmanned aerial vehicles (UAVs), and cruise missiles. Van Creveld pointed out that there were an incredible number of casualties in the large-scale wars fought earlier in the 20th century. Since the nuclear age began at the end of World War II, however, conflict between major powers has diminished; the threat of World War III — an Armageddon the people of earth would not survive — made the United States and Soviet Union very cautious. With no large interstate wars to be fought, van Creveld argued that there will be little need for air power since it will not be decisive in the small wars likely to be fought in the future — such as the multiple insurgencies of the developing world the past 50 years. But his analysis failed to emphasize sufficiently a number of important factors and recent events that established air power as vital to the military of the future and to the survival of the state.

Van Creveld should reexamine the Principle of Mass when it comes to air power. He compares numbers from World War II, where the United States was producing up to 75,000 aircraft per year, to today's figures of roughly 125 aircraft per year — concluding that this clearly describes how the need for air power is declining. What he fails to emphasize is how the concept of air power "Mass" has changed in the past 55 years. No longer are 200 B-17s manned by 2000 airmen required to drop thousands of dumb bombs over a city to destroy a factory. The task can be performed by a single pilot and his F-117 loaded with two 2000-pound laser-guided bombs.

day, simply more efficient due to technology.

This improvement in air power technology has also led to a reduction of casualties in conflict — both friend and foe. During the 1991 Gulf War, air power made it possible for the ground invasion of Kuwait and Iraq to last a mere 100 hours and to minimize the amount of collateral damage. Allied high-tech air power allowed the timely destruction of vital centers of gravity, bypassing the need for a prolonged period of killing people as in past wars of attrition; the war was shortened dramatically from what was expected.

A major objective in any conflict is the establishment of air superiority. This was discovered during World War II if not earlier in World War I. Without air superiority, ground troops have difficulty advancing and taking territory. In Vietnam, the United States had air superiority forcing the North Vietnamese to resort to guerrilla warfare tactics. As soon as the United States pulled out of Southeast Asia and gave up air superiority, the North Vietnamese were able to take over the South. In Kosovo in 1999, the Serbs had difficulty taking over new territory and re-supplying their forces once the United States and its allies had established air superiority in the region. Although air superiority may not win the war, as was the case in Vietnam, it is essential to any conflict the United States is likely to enter. UAVs or helicopters cannot establish air superiority; fighter aircraft must be employed to perform the task they were designed to do.

Van Creveld also implied that the need for military heavy transport aircraft was declining or could be conducted by alternate means. Here he failed to point out how much of our ground forces and support equipment depended of military transport to deploy to regional battle-

military lift was absolutely essential to the allied effort in Desert Storm and is likely to remain so for future theater conflicts. Most of these tasks cannot be performed by light aircraft such as the V-22 Osprey, as van Creveld suggested. Even during smaller more limited engagements like the US involvement in Somalia, ground forces needed equipment such as armored personnel carriers, tanks, and helicopters. US Air Force heavy transport aircraft performed the job and remain absolutely vital in ground support operations, as they have in every conflict and many other support operations since World War II.

Throughout the history of warfare, technological advantages in weapon systems have proved to be the decisive factor in the outcome of conflicts. From the development of the longbow, rifle, cannon, machine gun, and airplane, all have played an enormous role in the conflicts following their invention. There have been many advances in aircraft technology made in the past 10 years, such as in advanced avionics, weapons systems, and stealth, that have pushed the United States far ahead of all other countries. It is only prudent for the United States to build on this advantage. History has shown that dulling one's sword is rarely the best path to peace and that a strong and vigorous military deterrence is much more successful. The US air power advantage can help deter war; if that fails, it can virtually assure victory in major campaigns, as was demonstrated in the Gulf and the Balkans.

Van Creveld argued that since nuclear weapons prevented World War III and that since most conflicts now happen within states not between them, there will be little use for air forces in the future. He bases his argument on examples like Bosnia, where fighting occurred across streets and in small villages. He must recognize, however, that the United States uses its military for many other forms of security enforcement. It is the "tool of choice" for our presence around the world. It is neither practical nor possible, for example, for ground troops or ships to enforce the No-Fly zone over Iraq. Clearly and simply, manned fighter aircraft must patrol the No-Fly zone. As long as the United States has objectives such as this, there must be an air force to carry out the missions.

The Gulf War and the air campaigns in the Balkans demonstrated that the shock of modern massed air power can win on the battlefield while at the same time minimizing collateral damage to lower levels than ever thought possible. Because the Principle of Mass has been consolidated into fewer planes with smarter and better weapons, it is even more important that the United States keeps its Air Force well-manned and well-equipped. There will be a strong need for all types of aircraft and air power in the future. If the United States hopes to continue to defend its interests and values, it must continue to keep the US Air Force the best in the world.

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Biography

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US Air Force Academy cadets march past the F-15 static display during the 2000 Sponsor's Day Parade. (US Air Force Academy photo)

The Irrelevance of Air Power: The Potential Impact of Capability Divergence on NATO Post-Kosovo

Andrew Dorman¹

According to John Keegan “there is a new date to fix on the calendar: June 3, 1999, when the capitulation of President Milosevic proved that a war can be won by air power alone.”² This evocative statement represents a remarkable admission for the *Daily Telegraph’s* [London] defence correspondent, and supports the view of those who claim that Kosovo finally proved that air power can win a conflict on its own. This view is held within the Royal Air Force (RAF). At the Royal United Services Institute Air Marshal Sir John Walker went so far as to boldly state that:

Air Power has won a war! ... Clearly to some it came as a surprise, to others as a shock, to even others as an irritation. Yet a small, un-loved group has been preaching the capabilities of air power in the new technological age for two decades or more and it came as no surprise to them. The capability has been there for some time now. It was the will to apply air power properly that has been lacking.³

Notwithstanding the debate about whether these claims are true, the obvious relief when Slobodan Milosevic agreed to NATO’s demands was clear. This article does not seek either to critique or support the proposition that air power alone won the Kosovo War. Instead, it aims to consider what is probably the most important trend to have emerged post-Kosovo from an air perspective — the increasing capability divergence within NATO. Since the termination of the air campaign a number of commentators have drawn attention to this point, but few have considered the implications of the continuation of this trend either for the United States or for the rest of

The emergence of this division was somewhat surprising. When the air campaign began the level of commitment within NATO was relatively balanced. 112 US and 102 Allied strike aircraft were committed to a short air campaign lasting a few days.⁵ Few foresaw that a much longer campaign, requiring significantly enhanced force levels, would result. Many believed that Slobodan Milosevic would rapidly back down when confronted by a NATO air campaign as he had apparently done when he was eventually confronted by NATO’s air force over Bosnia. However, the failure of the initial attacks forced the NATO members to significantly increase the scale of their air campaign. As a result, the dependence of the other 18 member nations of NATO upon the United States quickly became apparent. The rest of NATO had to rely upon the United States for both a qualitative and quantitative increase in the air effort. At the same time the US decision to restrict the level of its commitment on the ground caused severe problems for the alliance.⁶

This situation has not gone unnoticed on both sides of the Atlantic. George Robertson, now NATO’s Secretary-General and then British Secretary of State for Defence during the conflict, was the first to express his concerns.⁷ Whilst the statistics he used emphasized the quantitative imbalance in force commitment, they hid the qualitative dimension. US forces were frequently required to furnish protection for the other NATO members in order that they too could undertake operations over Kosovo and Serbia. In other words, the 18 were entirely dependent upon the 1. The result of this, according to US Deputy Secretary of State Strobe Talbott, is that: “Many Americans are saying: ‘Never again should the USA have to fly the lion’s share of the

the biggest bill.”⁸ Such a situation is politically difficult to sustain within an alliance, where risk and burden are supposed to be shared, and can only serve to cause divisions within the alliance. Militarily it is problematic as General Wesley Clark, Admiral James Ellis, Jr., and Lieutenant-General Michael Short argued in a combined statement submitted to the Senate Armed Services Committee.⁹

So why has capability divergence emerged as an issue? Partly this is a result of different responses within NATO to the end of the Cold War. Drawing upon its experiences during the Gulf War, and the requirement to down-size in the aftermath of the end of the Cold War, the United States has significantly altered the size and shape of its air forces.¹⁰ It has emphasized the need for precision attack capabilities and the ability to avoid casualties through the use of its technological lead.¹¹ In other words technology should compensate for diminishing force numbers and help to guarantee the US victory in any conflict, preferably at a low cost.

Nevertheless, the Kosovo War did reveal some weaknesses which the United States now wishes to address.¹² The danger for the rest of NATO lies in how these areas are addressed. For example, a number of authors have noted how thinly spread the SEAD [Suppression of Enemy Air Defenses] forces were,¹³ whilst others have acknowledged the success of stealth technology, particular in the second generation B-2.¹⁴ Drawing these two experiences together the logical solution might be to have an increasing emphasis on Stealth technology and thus place less reliance on the SEAD requirement.¹⁵ Whilst this may make eminent sense for the future construction of US forces it would pose particular problems for the rest of NATO who do not currently have a stealth capability and who are generally reliant upon the United States for the provision of SEAD. Thus a measure designed to enhance the protection of US air assets may well increase the vulnerability of its allied counterparts and restrict their future use.

Why should this be a cause of concern for the United States? Although the Kosovo War witnessed the launching of strike sorties against targets directly from the United States using B-2 bombers there is still a military need for the rest

of NATO. The most significant contribution made by America's NATO allies on the military front was the provision of forward bases. The scale of the effort to support the strike sorties in terms of air-to-air refuelling tankers, etc., would not have been possible without these. Moreover, NATO was forced to respond to the humanitarian disaster that emerged. Any sensible opponent will, in future, use unconventional responses to US air power and ethnic cleansing may well fall into this category. This cannot be confronted without forward operating bases and the support of allies.

Secondly, and more importantly, there remains the political dimension. Although the involvement of the United States in a coalition may place limitations on the conduct of the air campaign, with Kosovo being a prime example of this, the political involvement of allies has a number of advantages. During Operation Desert Fox the RAF attacked 11 out of 100 targets with support provided by the US.¹⁶ Their military contribution was not the main issue, it was their involvement that prevented the US from becoming politically isolated. In contrast the strikes against targets in Sudan and Afghanistan left America vulnerable to world opinion. Whilst this may be acceptable as a one off, in the longer term such a policy simply undermines the international system which America wants to sustain. The British involvement in Desert Fox allowed the political fallout to be shared and thus diffused. The consistent unilateral use of US air power in the long term is politically unsustainable and liable to make air power increasingly irrelevant. In part, General Clark admitted this:

The loss of unity would have ended the campaign. Sustaining unity in the face of efforts to destabilise the countries around Yugoslavia, a sustained propaganda campaign, ethnic cleansing, and the efforts of certain nations to halt our actions sent a powerful message to the international community in general, and Slobodan Milosevic in particular.¹⁷

Thirdly, there is a financial incentive for the US to retain compatibility with the rest of NATO. As alluded to in the first point, the

United States cannot afford to sustain its present defence goals alone. It is worth bearing in mind that the Europeans spend over \$160 billion a year on defence. Whilst this neither matches the US defence budget, or represents an equivalent share of gross national product, it remains a considerable sum.¹⁸ Whilst US defence policy continues to plan for two major regional conflicts occurring almost simultaneously, Kosovo highlighted the inability of the US to furnish the support for this force goal in a number of key areas. NATO, therefore, remains important as a force multiplier for the United States. If incompatibility becomes the issue that in de facto terms destroys NATO as a military alliance then the United States will lose out considerably.

The concerns expressed in the United States have already been acknowledged on the European side of the Atlantic. United Kingdom and France have been noticeable in insisting on enhancements to European capabilities. In a speech made shortly after the war Prime Minister Blair acknowledged the unreasonableness of the European dependence on the US.¹⁹ To be fair, these weaknesses had been recognized before the war. The Western European Union had already undertaken a study, which formed the basis of NATO's Defence Capabilities Initiative announced in April 1999.²⁰ These seek to bring NATO collective capabilities into the 21st century.²¹ These give specific prominence to five areas: mobility; sustainability; precision engagement; C3; and survivability — with an emphasis on inter-operability.²²

Nevertheless, the Kosovo experience has led to a re-appraisal of both the direction of defence policy and individual programmes on both sides of the Atlantic. The Anglo-French meeting in November 1999 re-invigorated earlier attempts at improving Europe's defence capability and resulted in the EU agreeing to commit itself to concrete goals at the subsequent Helsinki Summit in December 1999.²³ Unfortunately both these only referred to appropriate air forces to support a self-sufficient corps,²⁴ although the French and British did agree to the use of each other's strategic air, sea and land transport assets.²⁵ The European focus is, therefore, very landcentric.

NATO, as it is presently comprised, can be sub-divided into three broad levels of capabil-

ity.²⁶ At the top level of military capability lies the United States on its own. The next level down comprises the major states of Europe, such as the United Kingdom and France. The third level incorporates NATO's smaller and/or newer members. The new EU initiative, which is supported by the US, raises important questions for the key level two players. Given the continuing financial restrictions in defence, should they prioritize their compatibility with the level three members as part of an EU force or attempt to maintain compatibility in certain areas with the US. In the long term such a stark choice appears unavoidable.

This raises the question of their likely response. The United Kingdom is a good example of the problems confronting the rest of NATO. Britain's traditional close relationship with the United States would imply that it would want to remain compatible with the US. The Gulf War Air Power Survey noted that "The British would add capabilities that just did not exist in other coalition forces ... When the war came, the RAF contribution was second only to that of the US in variety and scale."²⁷ At the same time, Britain has also been one of the chief instigators of the new EU initiative and therefore has a significant amount of political capital invested in it. It is, therefore, a good test case of which direction level 2 states are likely to head. Moreover, the United Kingdom has a long history in the use of air power and would therefore be more likely to take a lead in the adaptation of air power to the new millennium.

So what is the current British position. During the Kosovo War the UK's contribution amounted to 1,618 out of 38,004 sorties. With the strike element comprising 1,008 out of 10,484 sorties.²⁸ Initially 8 Harrier GR7s were deployed with supporting tanker aircraft. This was increased ultimately to 16, together with 12 Tornado GR1s and additional supporting aircraft.²⁹ The Royal Navy also fleetingly provided 7 Sea Harriers, based on a transiting carrier, and TLAM's were launched from one of its submarines. This force level was markedly down on the contribution made during the Gulf War and reflected the changes that the air force has undergone since the end of the Cold War. Overall, the RAF's build-up was slow and disjointed and ex-

cessive reliance was placed upon the United States in areas such as the provision of SEAD support.

This situation is somewhat surprising given the recent Strategic Defence Review's (SDR) had emphasised providing an expeditionary capability. Officially the creation of the Joint Rapid Reaction Force (JRRF) incorporated the ability to deploy approximately 100 combat aircraft, 100 support aircraft, and 60 support helicopters.³¹ A number significantly higher than that deployed to Kosovo. Although the failure to deploy such a force level could, in part, be attributed to SDR still being in the early implementation and the number of commitments elsewhere, the Kosovo experience raises doubts about the RAF's contribution to the JRRF.³² In addition, the new command structure announced at the end of the year raises serious doubts about the RAF's ability to command such a force if it were to be deployed. Whereas the US Air Force is shifting towards 10 Air Expeditionary Forces in order to allow the rotation of forces, the RAF has shifted to a peacetime orientated command structure. It comprises three operational groups:³³

- No.1 Group tactical fast jet forces;
- No.2 Group Air Transport, Air Refuelling and Strategic Reconnaissance, RAF Regiment; and,
- No.3 Group Joint Force 2000, Nimrod MPA, SAR Helicopters — uniquely with a naval commander.

Support for individual operations will be drawn from each of these groups and the normal practice has been to assign a particular air base to a mission and for it to rotate its squadrons through. Thus, the Harrier force at Wittering was tasked with support of the Bosnian air exclusion zone and later Kosovo, whilst the Jaguar force at Coltishall has frequently run the Northern Watch operations.³⁴ The problem of this structure is its ability to oversee the deployment of more than a single squadron to a particular operation. A substantial deployment will result in the RAF having a series of separate support lines to each unit deployed rather than a more operationally efficient composite formation. In addition, the deployment of aircraft remains problematic, with the

squadron of 12 Tornado GR1s taking a week to move from Germany to Corsica.³⁵

More significantly, the RAF remains wedded to its main base concept of operations, a hangover from the Cold War, and thus lags a considerable distance behind the other two Services in forward thinking.³⁶ The lack of an operationally deployable formation headquarters above squadron level needs to be addressed. Here the reinstatement of Wings may be the solution, especially if the issue of squadron size is re-addressed. In some respects the Joint Force 2000, comprising the RAF and Royal Navy's Harriers, could be a forerunner for this. It could be made to evolve into the basis of the first expeditionary air force, especially once the Harrier force is replaced by a single aircraft type.

Solutions to the RAF's technological deficiencies have begun to be sought. For example, the RAF is reported to be seeking conversion of up to 1,000 of its stock of Paveway II laser guided bombs into satellite guided munitions via the US Global Positioning System.³⁷ Other systems have already been ordered, such as a new air to surface missile and the ASTOR aircraft for battlefield management. However, the sustainability issue will remain. The Royal Navy was reported to have used over a third of its stock of Tomahawk Land Attack Missiles and has sought to purchase a second batch of missiles to offset those used, but even if these are replaced on a one-for-one basis, the number capable of deployment at any one time is small in comparison to the number used in both the Kosovo and Gulf Wars.

In stark contrast to the paucity of its air commitment the UK was the leading contributor of land forces, which included responsibility for the ARRC headquarters.³⁸ Britain's land and sea forces have undergone far more significant change since the end of the Cold War than the RAF. In part this reflects national priorities and an unwillingness for the RAF to adapt to the changed strategic environment. The principal lesson of the Kosovo campaign for Britain and the rest of NATO lay in the provision of sufficient ground forces. This is clear from the EU's emphasis upon the ability to deploy and sustain a corps level formation at Helsinki. It is difficult for the European's to imagine undertaking an in-

dependent air campaign on the scale of Kosovo without the active support of the US. Moreover, the US needed the rest of NATO to be involved in the air campaign politically and thus, in the eyes of the Europeans, will have to make compromises in order to be able to work with the Europeans. As Tony Mason has concluded “the ultimate measure of a weapon’s effectiveness is its value as a political instrument, which may not equate to its operational impact.”³⁹

To conclude, this emphasis on the political element is key and needs to be heeded before any state or coalition of states embarks on military action. If nothing else the involvement of the United Kingdom in Operation Desert Fox against Iraq helped divert some of the hostility of the international community away from the United States. The participation of coalition partners, whether in NATO or beyond, is essential in the long term even for the world’s only superpower. If this premise is accepted then the compatibility issue immediately follows. However, it is not as one-sided as currently made out, in any coalition there is mutual dependence of a kind. The United States cannot expect or assume that its NATO partners will remain compatible with it. The British example has shown that there are problems keeping up with American capability improvements. Moreover, the new European initiative on defence. States, such as the United Kingdom, which have been firm allies of the United States, may well be forced into accepting that they cannot [keep pace with] the technological capabilities of the US and remain compatible with the remainder of the EU. The United States, therefore, has an equal obligation to ensure that its armed forces remain compatible with the major states within NATO. A failure to do so will leave it isolated and increasingly unable to use air power in support of its foreign policy objectives. Moreover, a fundamental capability division between the United States and the rest of NATO can only serve to undermine NATO as a military alliance.

Equally the Europeans are in danger of emphasising the wrong weaknesses and, as a result, make some fundamental errors. Post-Kosovo, too much attention has focused on the inability of the European members of NATO to put together a sufficiently large ground force in time. At Helsinki they publicly announced force goals for land

forces, but left the issue of supporting air and sea units unclear. The only aspect of air power they have examined is strategic lift since this links into the deployment of land forces. Such an omission, if left uncorrected, will merely exacerbate the technological divide with America as the various European states concentrate their defence spending on non-air programmes. Whilst some would argue that role specialization may financially be the most attractive option to NATO, with the US providing the air assets and the Europeans the ground forces, such an approach undermines NATO’s philosophy of equal risk for all members and would be very divisive. The result of the trends outlined above would suggest that moves towards a European defence identity will only serve to hasten the capability divergence as the leading military states within Europe are confronted with the choice of either remaining compatible either with the rest of Europe or America.

Notes

¹ Andrew Dorman is a Research Associate at the Centre for Defence Studies, King’s College London, and a Senior Lecturer in the Defence Studies Department, Joint Services Command and Staff College. His publications include (co-edited with Mike Smith and Matthew Uttley) *The Changing Face of Maritime Power* (London: Macmillan Press Ltd., 1999); (co-authored with Adrian Treacher) *European Security: An Introduction to Security Issues in post-Cold War Europe* (Aldershot: Dartmouth Publishing Co. Ltd, 1995); and (co-edited with Thomas Otte) *Military Intervention: From Gunboat Diplomacy to Humanitarian Intervention* (Aldershot: Dartmouth Publishing Co. Ltd, 1995). The opinions expressed in this article are those of the author and should not necessarily be regarded as representing those of the United Kingdom’s Ministry of Defence.

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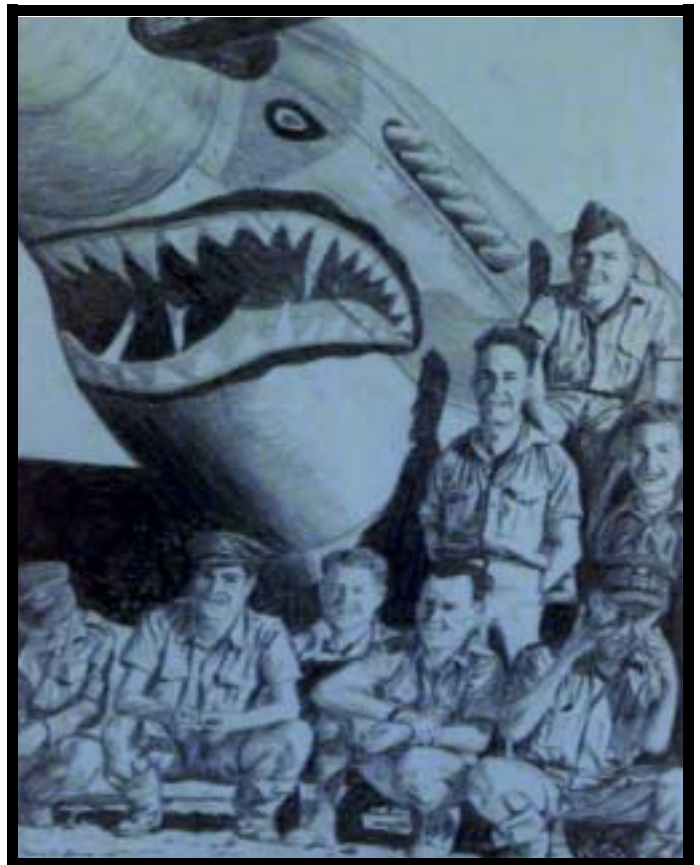
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No. 112 Squadron, Royal Air Force, by David R. Borngman, USAFA 16 February 1995. Courtesy of the USAF Academy Department of English and Fine Arts.

Biography

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See endnote 1 for list of publications.



The Royal Air Force Crest. (<http://www.raf.mod.uk>)

On the Cusp of the Unmanned Airpower Revolution

Lieutenant David Bookstaber, USAF

Something is rattling in the war machine of the United States. Second-rate Yugoslav air defenses shot down a stealth fighter last year. Uncannily, in the same conflict US commanders nearly exhausted the nation's stockpile of cruise missiles, and refused to let even a B-2 enter enemy airspace without jamming escorts. The Kosovo air campaign demonstrated that the possibility, however remote, of losing a manned aircraft over enemy territory was overwhelmingly unacceptable. But that lesson is not new. In recent years despite having Carrier Battle Groups (CBGs) and deployed Air Force squadrons in theater, America has chosen to fire hundreds of cruise missiles in attacks on Iraq, Afghanistan, and Sudan. Evidently, even when they have manned forces on hand, leaders prefer spending hundreds of millions of dollars on unmanned weapons to putting any Americans in the line of fire.

These trends signal the need for a radical change in the structure of US airpower. It is time for unmanned ordnance delivery systems to replace manned aircraft. This will keep air warriors at safe distances in a paradigm shift that could be as revolutionary for airpower as the development of precision artillery was for ground war. Technology has already proven that you don't need a man at the scene to carry out either tactical or strategic air missions. In fact, when the moment of truth approaches, leaders scramble for unmanned alternatives. There are powerful motives for this tendency, and, fortunately, there are unmanned technologies in the wings ready to meet the demands.

Vicious Cycles of Risk

To begin with, large, expensive, manned military systems are prone to a vicious cycle of

ensure that a multi-million dollar pilot in a single \$50-million plane is not on a one-way mission, it is now necessary to furnish a vast strike package of jamming, SEAD [Suppression of Enemy Air Defenses], refueling, and interceptor aircraft. This mass of manned aircraft requires an extensive forward support infrastructure, including elite rescue forces for both man and machine. As the tolerance of the American public for risking its warriors tightens, it becomes increasingly difficult to ensure their security since every manned precaution is also a liability. In fact, our experience in Kosovo suggests that US tolerances are becoming so demanding that practically no amount of support can reduce our warriors' risk to an acceptable level.

Aware of this vicious cycle, the Air Force maintains that it was worth \$40 billion to buy 20 B-2 stealth bombers. In theory, these planes take off from a single base to any point on the globe, rendezvous with a few tankers, and penetrate enemy airspace without escort to drop up to 32 bombs. In this extreme case of investment to reduce risk to warriors, we are told that the ability to put only 2 pilots in harm's way is worth spending \$2 billion on a single airplane — even one that is notoriously hard to maintain and effective only at night! Surely this can't be the most cost-effective means of putting ordnance on target.

This vicious cycle hits Navy airpower even harder because its mobile hardware is more limited and vulnerable. Not only do naval warriors require additional nautical support personnel, but every person and dollar of hardware floating in a hostile theater demands some extra amount of security to protect the investment. Once the US has put a \$4 billion aircraft carrier at sea and loaded it with \$1 billion of arms and 5000 sail-

protection ships. The result is the US Navy's modern Carrier Battle Group which ties up tens of billions of dollars in resources. The mission of the CBG is to maintain air superiority and project airpower with its F-14 interceptors and F/A-18 bombers, yet these aircraft are a tiny part of the support and security machinery of the CBG. Though they are massive and inefficient at projecting airpower, the Navy is trying to maintain twelve CBGs!

The only way to break the vicious cycle we currently face is to remove warriors from ordnance delivery systems. Fortunately, current unmanned weapons technologies promise to do this while saving money. The goals of maintaining air superiority and projecting airpower can be handled completely by Unmanned Aerial Vehicles (UAVs) and long-range missiles. The solution to America's airpower quandary is ripe for the picking.

Promises of Unmanned Weapons

While America's only operational long-range UAV is the Predator, even this relatively unremarkable reconnaissance system was in such high demand during the Kosovo conflict that there weren't nearly enough Predators to go around. These UAVs proved so useful that, had the air campaign run any longer, emergency plans were equipping them with laser targeting devices to guide smart bombs onto the targets they found. Unmanned aircraft have the capacity to fill every role currently handled by manned airplanes — from reconnaissance to SEAD, air-to-air combat, and bombing — while keeping pilots out of danger. In a day in which pilots rarely see their targets and increasingly defer to automated systems, the value of a pair of eyeballs in the cockpit is actually a liability. Designs for combat aircraft without cockpits (UCAVs) promise order-of-magnitude increases in stealth with triple the maneuverability and a third the price tag of manned variants. Whether pictured as glorified cruise missiles in which the motor, guidance, and control systems fly home for reuse, or as fighters minus-the-cockpit, UCAVs are not only more capable than manned aircraft, but also uniquely expendable.

The adoption of unmanned airpower would allow the Navy to replace its CBGs with

arsenal ships; stealthy, armored vessels capable of delivering as much firepower as an aircraft carrier. The benefits in terms of both dollars and vulnerability of such a substitution are astounding: it could cut hardware at sea by at least 90%, and deployed personnel by up to 99%. Aside perhaps from a submarine escort, an arsenal ship stands alone, able to launch missiles and UAVs in all weather and at any time of day to reach targets well over 1000 miles away. In contrast, the new F/A-18 aircraft — the keystone of CBG airpower — have a combat radius of about 400 nm at best, and prefer not to fight during the day or in severe weather.

What Are We Waiting For?

Although these unmanned technologies are widely acclaimed, acceptance by those in power has been unenthusiastic, at best. Northrop Grumman designed a \$500 million arsenal ship requiring a crew of only 50. The Navy decided not to build any, although it recently commissioned a \$4.5 billion Nimitz-class aircraft carrier, is building another, and plans to begin a third in 2001. DARPA committed \$116 million this year to pay Boeing for a demonstration of UCAV technology. Meanwhile, however, the Air Force has spent close to \$20 billion on engineering and manufacturing development of the F-22 air superiority fighter (which will cost at least \$100 million per copy to produce). Plans are in motion for a manned Joint Strike Fighter program to cost \$1 trillion over the next 35 years.

UCAVs are clearly not a priority with decision-makers; arsenal ships, for the time being, are dead in the water. This is a devastating loss for the United States. From a purely financial perspective, arsenal ships and UCAVs are less expensive to buy, less expensive to train on, and less expensive to employ than any of the hardware they replace. Never mind the fact that they drastically reduce the number of American warriors at risk to practically zero for the types of air operations performed recently.

We have become accustomed to the application of military force from increasingly safe distances. In a time when the alternative to using a dozen aircraft for a single bombing mission is a \$2 billion airplane, it is clear that the only way to continue reducing the risk/force ratio is to com-

pletely remove warriors from ordnance delivery systems. Today we can say that there are unmanned alternatives to manned weapons. And while the capabilities of the human being are not changing very rapidly, the technologies behind unmanned weapons are advancing at a fantastic rate. It is clear that in the near future unmanned weapons will so dominate manned variants in every measure that unmanned will be the standard, not the alternative.

In the place of one CBG, we could deploy a dozen arsenal ships. In the place of one B-2 we could deploy a hundred UCAVs. With such compelling numbers, it cannot be long before the services embrace these new technologies to save both money and lives. Indeed, for the Nintendo®-war generation, UCAVs look like an obvious technological step. It would not surprise those accustomed to cruise-missile warfare to see a missile return home after releasing its payload, nor would it surprise a person accustomed to playing computer games or riding in computer-controlled commercial planes to have a remotely-operated aircraft perform a reconnaissance or SEAD mission. The casualties associated with traditional war will no longer be tolerated as it becomes clear that unmanned military platforms are both effective and economically attractive.

*This article can be found at the **Aerospace Power Journal** website: <http://www.airpower.maxwell.af.mil/airchronicles>. It will also be published in the June 2000 issue of the **Armed Forces Journal**.*

Biography

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Predator Unmanned Aerial Vehicle. (US Air Force photo)

The Airpower Taboo: Dialogue Across Perspectives?

Airpower and Urban Operations

Alice Hills

Images of a badly injured American pilot captured in Mogadishu, bombed houses in the Yugoslav city of Nis, and residents in Grozny hiding in cellars to escape bombing by aircraft and artillery provide a stark contrast to the sterility of videos showing NATO precision-guided munitions destroying specific military buildings in Belgrade. Such imagery is generalised and emotive but it is also symbolic of the current debate concerning the employment of air power in contemporary conflict. It not only emphasises that the successful application of air power requires an effective campaign plan, and achievable political and military objectives, but it also highlights the fact that, if demographers and geographers are correct, many of the military operations of the next 25 years will take place in urban terrain.

The advantages and disadvantages of fighting in urban terrain are notorious, with the advantages appearing to belong to the West's unorthodox enemies — not least because such operations are likely to involve the commitment of large numbers of forces, the presence of many civilians, high casualty rates, and extensive collateral damage. Even this list of factors may oversimplify the problems urban operations will present to the West. It is easy to assume that operations, especially combat operations, in urban areas simply involve different terrain and tactics to those the military normally use, but this is to under-estimate the difficulties that cities in particular will present to Western forces. As a recent commentator notes: "However central terrain may be to the solution of tactical problems — a city's complex set of systems and high population densities poses the most daunting problems in urban combat."

Not surprisingly Western forces prefer to

at all possible. Unfortunately, this is likely to prove difficult in the future. The emphasis on expeditionary forces increases the likelihood of urban operations at the same time as urban sprawl blocks many military communication lines. The Ruhr and Korea's western corridor are cases in point. It is increasingly problematic to avoid urban areas, for their populations have increased many fold (especially in Asia and Africa) over the last 30 years and the UN predicts that up to 75 per cent of the world's five billion population will live in urban areas by 2025. Urban operations are also increasingly likely because, as the Gulf War showed, the West's possession of high precision weapons threatens operational and tactical manoeuvre in open terrain; enemies without such weapons, whether state forces or insurgents, are more likely to exploit cities they know. And while precision strikes can target specific military facilities as part of an overall manoeuvre plan, they cannot occupy or hold a city such as Baghdad or Belgrade. And even if Western forces are successful at entering and managing most of a city they may (at least according to the US Marine Corps) then be involved in a "three block war," comprising a simultaneous mix of humanitarian assistance, peace keeping or peace enforcement, and medium level intensity combat.¹

Baghdad, Dili, Freetown, Grozny, Khafji, Kinshasha, Mogadishu, Pristina, Sarajevo — all suggest that it will be difficult to avoid urban operations in the future. It seems sensible, therefore, to consider what the implications of this trend are for British forces; to ask: what are the likely missions? what can we do today in terms of doctrine, technology and training? and what will be needed tomorrow? The answers to such questions are likely to be complex but what can

logue across military perspectives; even if the occupation and control of cities is primarily a land operation, air support will be needed. Air power cannot seize or hold territory, nor can it patrol cities, but its inherent capabilities and characteristics mean that it can provide (or enhance) the operational capabilities needed to control enemy actions. Air power should engage with the fact that urban operations are likely to be a defining characteristic of future conflict. It will be unfortunate if we fail to identify the means by which air power can best be applied across the urban element of the conflict spectrum or if we rely on past experience in our preparations for possible coalition or integrated urban operations in 2025. It will be equally unfortunate if we simply accept the USA's reliance on technological solutions when conceptual and doctrinal issues are also critical.

We need to look beyond the reactive and retaliatory use of precision guided weapons and ask what the trend towards urban operations (especially in major cities or in mountainous regions) will mean for air power. This could be significant. For the role of air power has grown as the West increasingly reacts to unpredictable threats after they have occurred; air power is attractive in such circumstances because it appears to project force rapidly, selectively and with less risk than land power. Urban operations may challenge this understanding. If they do it seems likely that air doctrine will need to develop by using concepts more akin to those of manoeuvre warfare than those currently associated with the exploitation of air power over urban terrain.

Urban Operations

The title "urban operations" refers to many different types of operations and terrain, including policing, raids or combat in high-rise canyons, shanty towns, ports, sprawling industrialised conurbations, on plains or in mountainous regions. While the core competencies of air power (such as flexibility, rapid delivery and, more arguably, precision) suggest its general applicability to most of the coercive or punishment operations likely to take place under the heading of urban operations, the nature of urban operations is, however, likely to confine its role to that of the provision of support to land forces which,

though they may provide humanitarian aid or security, are primarily fighting an asymmetric enemy exploiting manoeuvre warfare to the detriment of the West. (Indeed, it is possible that Western cities could be the scene of such operations in 2025, for it would be short-sighted to assume that the West will always be the attacker — or that current Western norms will always prevail. Thus the support air power can provide to land forces is likely to be essential even though its use may be limited by both military and political imperatives; despite impressive technological developments, it is probable that war in such terrain will be as much about dust, flame and civilian casualties as it ever was. But although there are no easy solutions it is also likely that well-trained all-arms groupings, co-ordinated with joint fires and ISTAR^[*] will provide a suitable basis on which planning for most urban scenarios can take place.

There is currently little evidence that the RAF intends to play an intellectual part in developing a coherent doctrine for this. Yet a fundamental question for both the UK and the USA remains how best to use air assets in the context of urban operations and of the nature of the resulting air-surface balance. The RAF air power doctrine AP 3000, for instance, refers to the effects of the terrain cover available for the concealment of surface forces and to considerations affecting ease of surface movement. There is passing acknowledgement of the fact that lack of terrain cover will make it easier for air vehicles to detect, locate and track surface targets, but there is no acknowledgement of the problems an abundance of cover will present. There is no acknowledgement of the fact that contemporary air power appears to offer few alternatives between bombing for strategic effect and close air support, that the presence of many non-combatants will make precision fire difficult, and that air power does not appear able to coerce either civilians or regimes.

It is almost as if a combination of the intellectual legacy of the Second World War and, more especially, the technological developments

[*] ISTAR is an acronym used by the author for the combined activity of intelligence, surveillance, target acquisition, and reconnaissance.

of the 1990s have hindered thinking about anything except the employment of technology. In the case of the first factor, that the experiences of strategic bombing in the Second World War remain influential in shaping the way we think about air power is understandable because, despite recent technological advances, urban fighting is likely to remain infantry based, manpower intensive, slow, costly and very destructive; flame is likely to remain the most useful weapon. Reliance on these experiences is then reinforced by the fact that although the UK has significant expertise in the low-level tactics associated with internal security in counter-insurgency, the lessons are heavily infantry based, though true combined arms training (in the sense of Russian Storm Groups, for example) is rarely practised.²

The current reliance upon technological means of waging war is the more serious and insidious weakness because it encourages shortsightedness and an over-reliance on US developments in particular. This can be symbolised by the common belief that lessons apparent in the Chechen war of 1999 are of peripheral concern to the UK because it was fought with out-dated weapons.³ Such a belief suggests that not only are we in danger of under-estimating the resolve and ability of unorthodox opponents but that we also tend to ignore the fact that the geometry of urban terrain is an extremely testing environment; the performance of ISTAR assets will be degraded in cities, for example, while reconnaissance and intelligence gathering will be extremely difficult. The current UK tendency to follow the US lead in developing doctrine and technology for urban operations is likely to exacerbate such representative weaknesses, for the US approach is based on the premise that technological (and doctrinal) solutions must be sought so as to ensure low casualty rates among the few troops conducting operations.⁴

Such a reliance upon technology is understandable when future urban operations present many problems associated with scale at the same time as military forces have shrunk. When the Americans recaptured Seoul in 1950, for example, the combined US Army and Korean population was about one million. Today the population of Seoul is 13 million while the American Army has shrunk to half a million. The popula-



US soldiers from the 212th Military Police (MP) Company conduct routine checkpoint duties in an effort to confiscate weapons and contraband in Kosovo. (US Army photo by Spc Sean A. Terry: <http://dodimagery2.afis.osd.mil>)

tion of a megalopolis such as Mexico City (perhaps 20 million), Cairo or Karachi could easily absorb a complete army. At the same time, the US Marine Corps (USMC) estimates that 70 percent of the world's cities are on the littoral and that more than 60 percent of all nuclear reactors are also on the littoral. Unsurprisingly, these figures, taken in conjunction with the fact that recent USMC experiments indicate infantry casualty rates of about 46 percent in urban operations, encourage a reliance on technology even when that technology is unproven. Several industry presentations at a recent conference on urban warfare in London, for instance, focused on technology as a panacea.⁵ The immature technology presented addressed training, sniper detection systems, non-lethal weapons and unmanned air vehicles (UAVs) in particular. A memorable example was that of biobots, such as cockroaches with sensors embedded in their abdomens, as a means of overcoming the difficulty of acquiring accurate intelligence in urban terrain. Too many of the examples were presented as accomplished fact whereas they are unproven. This willingness to look for a technological solution, combined with the technological emphasis of the Advanced Concept Technology Demonstrations (ACTD) conducted by the USMC and US Army to provide near-term solutions to urban combat, suggests a readiness to believe in technological solutions at the expense of considered thought and past experience.⁶

The lure of technology is understandable. Some aspects of control technology, such as the electronic simulation of nerves, for instance, appears to be a potentially rewarding area for research in both military and police urban operations, and it is believed that the Russians have considered using less than lethal chemical warfare (rather than infantry) to clear buildings. But we still need to address the fact that our high technology may be negated by a determined enemy's exploitation of low technology and high motivation. Rocket propelled grenade (RPGs) and snipers remain the most immediate threats to Western forces in contemporary urban operations no matter what Lockheed Martin or Daimler-Benz Aerospace claim. The RPG is still considered the definitive weapon in urban warfare by many of our likely opponents. It can be fired over buildings like a high-projectory mortar, used as an area weapon when fired over troop formations, and as a precision weapon when fired directly at armoured vehicles. In Somalia it was adapted with a metal plate to act as the SAM which brought down two Black Hawk helicopters in 1993. In Chechnya the sniper was a weapon of choice for both Russians and Chechens in 1994-96 because a few well-placed shots caused disproportionately great effects.⁷

Joint Vision 2010

The trend to use sophisticated technological innovations (and, in the USA, ACTDs to leverage in technology) and thereby encourage the belief that there can be clean solutions to urban operations is very strong, as is the idea of molding the unique characteristics and strengths of each service to complement the others so that the whole is more than sum of parts. Both are, in many respects, admirable, and both are encouraged by the continuing influence of US Joint Vision 2010 (JV2010) on UK forces. Although the RAF has not publicly referred to this document in the light of urban operations, it seems reasonable to assume that it will be influential on future doctrinal developments since the RAF appears to allow the British Army to take the UK lead on urban operations, and the director of infantry has stated (at the London conference referred to above) that land forces are using it as the framework for developing relevant capabilities.

The JV2010 force can be taken as an ideal. Unfortunately it is a vision which is unlikely to encourage the conceptual work required to fully develop a potentially realistic and successful urban doctrine. For JV2010 (issued in 1996) is based on a fundamentally flawed premise: that full spectrum dominance can be achieved — and exploited — using the four concepts of dominant manoeuvre, precision engagement, focused logistics, and full dimensional protection, supported by information superiority. Unfortunately there has been insufficient public debate about the relevance of these concepts in light of what we know about contemporary (let alone future) war.⁸ And there is little acknowledgement that urban operations will challenge each concept and that small integrated Western forces will be most unlikely to be able to execute the missions during the coming decades. Dominant manoeuvre in three-dimensional urban operations, for instance, will require greater detailed knowledge of urban infrastructure than is usually available, especially in the developing world, while precision engagement *within* a city may remain merely an aspiration; precision engagement cannot, in any case, take place without the accurate information for targeting and battle damage assessment often missing in urban operations. And restricted fields of fire will mean that many sophisticated direct-fire weapons or those with arcing flight will be of little use.

A JV2010 force is small, depends on almost omniscient C4ISR [Command, Control, Communication, Computer, Intelligence Surveillance, and Reconnaissance], and requires the rapid mobility which air power can provide. According to American analysts, the key contribution air power can offer such a force is “a series of mutually supportive core competencies..., linked by space-based global awareness and command and control,” thus providing the critical airpower and spacepower needed to preserve the West's existing advantages.⁹ But this is aspirational rather than attainable, requiring levels of battlespace knowledge which do not yet exist. Moreover, it is the role of air power and, indeed, the nature of the West's “advantages” in urban operations, which are at issue here, for they are not necessarily self-evident.

Commentators such as Richard Hallion

have gone some way to addressing the issue but it appears that the potential problems urban warfare presents to such a vision remain only partially understood.¹⁰ Hallion considers that “In the wars of tomorrow, a new paradigm for military force will predominate, not the old infantry-armor team. Except for a few scenarios, the need (as opposed to the ability or the desire) to commit friendly ground forces to close combat with an enemy simply will not exist. Air weaponry — such as battlefield missiles, attack helicopters, fixed-wing aerial attackers, and remotely launched cruise missiles — will not only suffice but will be the most desirable means of confronting an enemy.”¹¹

Hallion may be right, such weaponry will be desirable, but, equally, he may mislead if one of those “few scenarios” proves crucial or if one of the aspects of air power he mentions is insufficient or unacceptable. Take the case of fixed-wing aircraft and helicopters. The Russians, for example, used many fixed-wing aircraft to provide support while artillery was moved into range in Grozny in both of the recent wars in Chechnya, and Russian sources have recently claimed that there are now plans to use a small number of their most recent attack helicopters, the Ka-50 or Hokum-A, as part of an experimental combat unit.¹² But although air bombardment, in conjunction with artillery, was effective at inflicting punishment, there is no evidence that any forms of Russian air- or fire-power can necessarily bring the war to a conclusion. Fixed-wing aircraft were only of real value to the success of the latest war in attacking targets outside the city and attack fighter bombers were most efficient only in large free fire zones outside Grozny.¹³ More importantly, the nature of the terrain and the enemy and its fighting methods meant that air strikes could not be targeted precisely anyway. Hallion’s argument is stronger in relation to Russian use of helicopter gunships, which the Russians used against snipers and weapons on upper floors in the 1994-96 war. But even so the helicopters had to fly to and from the engagement area using the shelter of high-rise buildings. Furthermore, Hallion is selectively ignoring the fact that Black Hawk helicopters were brought down in Mogadishu by ingeniously adapted RPGs. The US OH-58 and AH-1 Cobra helicopters

might have proved superbly responsive in Somalia, while the USAF AC-130 Specter gunships undoubtedly provided excellent support to ground forces, but terrain matters; the infrared searchlights of the AC-130s may have allowed the rapid search of fields of fire around bases in Somalia but they are unlikely to do so inside industrialised cities such as those in the southern Caucasus.

Joint Vision 2010 is not the conceptual guide British air power needs to help it develop doctrine appropriate for urban operations. Even if there is dominant battlespace knowledge it is still short-sighted to assume that the precise application of air power, leveraged by space assets, can rapidly halt an initial enemy offensive and, perhaps, deliver a serious psychological blow to the adversary.¹⁴ What JV2010 (and comparable American publications and concepts such as the Air Force’s *Air Expeditionary Force*, the Marine’s *Operational Maneuver from the Sea* and the Army’s *Force XXI Operations*) can do is stimulate thought in order to develop and validate new operational concepts, allowing a shift in focus from the concentration of forces for attritional purposes, for instance, to placing dispersed synergistic forces to achieve strategic or tactical objectives. If the US Marine Corps and Army are correct in their assumption that future warfare will be essentially urban then it is timely for the RAF to consider the role of air power in urban operations now, as a means of discussing how air assets might be best used in a future war.

The Use of Air Power: Current Doctrine

The value of air power’s competencies in urban operations is not at issue: projection, responsiveness, manoeuvre, mass and situation awareness are clearly useful attributes. Precision munitions are undoubtedly an efficient way to strike point targets even if they are ineffective at shaping the progress of land campaigns when infantry are thinly deployed and there is pressure to avoid casualties. But equally clearly, their use will be constrained by their inability to coerce or target in cities or urbanised areas, especially those with high-rise buildings, dense vegetation or mountainous terrain.¹⁵ Even if we disregard the psychological elements associated with manoeuvre- and asymmetric-

war, the urban environment is likely to render many of air power's attributes irrelevant; masking and multi-pathing delude electronic signals in dense terrain, inner-city air currents limit helicopter operations, and so on. In fact much of the intellectual confusion surrounding the proper use of air capabilities results from the continuing gap between the technical possibilities and what is expected of it.

The terminology used to debate this issue has varied over time but there has always been a basic choice between polarised alternatives. The first is the tactical versus strategic argument, which questions whether airpower is best used in conjunction with other arms or as an alternative, independent and offensive operation. The second results from the choice of objectives for attack becoming entangled in a debate about whether the targets should be precise or diffuse.¹⁶

The first is the most important for the development of doctrine because both US and UK concentrate on the tactical level to the exclusion of developing operational or strategic concepts or doctrine. This is both a cause and result of the desire for technological solutions. It may be that the tactical dominates because of the nature of urban operations or because of the current state of technology or because such operations have not attracted sufficient political or service attention. Whatever the case, a result is that air power is confined to partial roles such as offensive or defensive counter-air, anti-surface attack and close air support. The emphasis remains on air responding to requests for precision fire, escort, medevac and so on, even though it is likely that air power needs to be exercised as a whole for the medium to be fully exploited. This is admittedly most unlikely to happen in urban operations because urban conflict is usually resolved at the level of the squad and platoon. The result is that both British and American armies largely ignore air power, except in the context of small-scale stability and support operations, treating urban operations as essentially a series of small-unit combat actions designed to seize individual buildings or rooms. And when air power is needed it tends to be army aviation which is used to adjust artillery fire, provide battlefield command and control, mark and co-ordinate bounda-

ries, evacuate and insert air assault forces at critical points. Ironically, the only purpose built CAS urban training centre ('Yodaville') in either country is, however, the result of a US Navy sponsored initiative managed by the Marine Aviation Weapons and Tactics Squadron 1 (MAWTS-1).¹⁷

The result is a flawed circle. The focus in both the USA and UK is on the tactical level; both militaries agree that future urban operations are likely to be fought primarily by dismounted infantry operating in small, dispersed groups at squad and fire-team level; high casualties are likely; the resultant risks lead to an insistence on technological solutions which reinforce the tactical emphasis. But perhaps this is unsurprising, for urban engagements in Vietnam and Somalia were tactical and there have been no large-scale operational level missions in urban areas since the Second World War.

The result is that doctrine for the operational level of war in an urban terrain is more or less non-existent.¹⁸ To some extent this is surprising, given that current American doctrine remains grounded in attrition war, attacking forces are still to surround and isolate a target city before using large numbers of ground forces, supported by artillery and aviation, to carry out a methodical linear sweep. (Hence the risk of casualties and hence the insistence on technological solutions.) Yet, apart from notable work by the USMC battle lab, there has been remarkably little attention given to conducting large-scale operations on urban terrain or to the joint, coalition and interagency integration requirements likely to be associated with it.¹⁹ The question of whether the fundamental operational principles required for successful urban operations are compatible with the demands of coalition warfare usually keyed to the lowest common denominator has not, for instance, been publicly asked or answered. Political considerations related to the desirability of city fighting, infrastructure issues or the world-wide integration of economic assets are rarely considered. Yet it is likely that it will be a combination of these factors which will drive operations and therefore tactics. Such a development will represent much more than a variant of existing ideas about bombing for strategic effect. Thus strategy for urban operations needs

to be considered now, by all services, for strategies for future operations cannot be developed in isolation from the fact that cities and conurbations are political, economic, and social epicentres.

Preparing for the Future

Two fundamental (and linked) questions remain: how best to use air assets in future urban operations, and what is the nature of the resulting air-surface balance? That air power can inflict punishment on cities is not in doubt but its coercive abilities remain controversial, in Kosovo as in Nazi Germany.²⁰ And there is no suggestion that air power played anything other than a supportive role in Moscow's second Chechen war; Russian operations centred on the use of fixed-wing aircraft and attack helicopters, in addition to towed and self-propelled artillery systems, in an attempt to use firepower to avoid close infantry combat. The tactics may have paid off in Grozny because most Russian casualties appear to have been caused by sniper bullets fired from up to a mile away.²¹

Of course Chechnya is unique and the weaknesses (and strengths) of forces from the Russian Federation are very different to those of the Western forces. However, taken as a whole, Russia's recent experiences in Chechnya suggest that, while air- and fire-power are very useful at softening opposition, especially outside cities, it cannot make a decisive contribution to the successful conclusion of war within cities — or to the aggressive street fighting likely to remain at their heart.²² It probably remains the case that air power is best used in the open countryside surrounding urban areas, where tactical strike aircraft (perhaps tied to unmanned sensor assets), high precision weapons, and helicopters can threaten the more conventional forms of enemy operational and tactical manoeuvre before sustained urban operations take place. In this way, air and space power may play a pivotal role by bringing overwhelming firepower to bear on urban operations, perhaps through precision strike and perhaps by achieving direct operational-level effects against key adversary nodes. It would, however, be short-sighted to assume that F-117, F-16, Tomahawk Land Attack Missiles, and future generations of smart weapons can be used

with minimum destructive effects against non-combatants and the civilian infrastructure of cities or that, if they are used, they can ensure the capitulation or defeat of an opponent.

In other words, air power's role is likely to remain supportive and enabling during urban operations, rather than decisive or strategic, because success — for the West as much as for Russia — will continue to demand a physical ground presence which air power cannot provide.²³ However, air power's role within three-block wars may expand if industry promises can be delivered: if overhead 3D imagery systems developed for ISTAR can detect underground bunkers and weapons sites, if UAVs can track friendly forces, or if Predator imagery can be combined with a JSTARs platform. The US Air Force UAV Battlelab, for instance, is refining the operational concepts that allow Predator UAV sensors to overlay real-time video onto highly accurate satellite imagery provided by high resolution systems. Precision munitions such as the Joint Direct Attack Missile (JDAM) could also be useful because they are likely to prove capable of traveling through urban canyons to hit their targets. And the existing US Marine light/attack helicopter attack squadron (HMLA) claims to be uniquely suited to accomplish all six functions of Marine aviation in a three-block war: precision fire, medevac, command and control, confined area insertion and extraction, forward reconnaissance, and escort.²⁴

But the inescapable fact remains that the current consensus of opinion, even in the US, is that urban terrain negates technological advantage, slowing tempo, creating casualties and breaking the will to fight of liberal democracies. In other words, the West's technological superiority will not ensure success because its enemies need only avoid defeat. Moreover, amongst the lessons from Chechnya identified by American Army analysts at the Foreign Military Studies Office, Fort Leavenworth, is the fact that, paradoxically, the really effective use of technology (in the immediate future at least) may be at a much lower level than expected. The Chechen's weapons of choice included a multitude of IT gadgets, such as cellular phones and commercial scanner systems, which acted as force multipliers; mobile TV stations were used as weapons to

override Russian transmissions, and the Internet was used to raise overseas funds and assistance. Of equal value to Chechen fighters were the RPGs, flame throwers and snipers referred to above. In other words, the typical use of air assets in urban operations, and the air-surface balance, is unlikely to change in the near future.

The circumstances in Chechnya are unlikely to be repeated but they serve to dramatically emphasise the military and political limitations of air power in an asymmetric war: the destruction of their materiel failed to shatter the Chechen's cohesion or will to fight in either 1994-96 or 1999.²⁵ Attritional or high tempo forms of urban war by an authoritarian government in its own territory may succeed in the short to medium term but political settlements are required in the long term. This is likely to be as true of Chechnya as it was of Afghanistan. In the early 1980s, for instance, the Soviets considered future war to be a high tempo event in which force and firepower could be carefully choreographed. Afghanistan emphasized the flaws in this approach and the eventual Soviet withdrawal was prompted by political, rather than military, factors. Interestingly enough, air power's contribution to that war was crucial; fixed wing operations carried out most of the operations designed to destroy Afghan society or for bombing and strikes, while helicopters were associated with very successful tactical ground operations.²⁶ Significantly, however, the closeness of mountains to almost all major cities and airbases in Afghanistan allowed the mujahidin to approach within mortar and rocket range at night. This meant that the Soviet Army never solved the problem of urban security.

Manoeuvrist Approaches

What do these representative experiences and trends mean for current UK doctrine? The fact that AP 3000 states that "it is axiomatic that any exploitation of air power is inherently manoeuvrist" suggests it may mean trouble. For urban operations will present difficulties for a manoeuvrist approach expressed in terms of tempo and with core functions of find, fix and strike.²⁷ Air power proponents pride themselves on the fact that air power's characteristics of reach, speed of response, ubiquity and flexibility are

relevant to manoeuvre at all levels of war but they may underestimate the environmental constraints of urban terrain. A culture "encouraging freedom and speed of action" may have difficulty in adapting. At the same time its norms and methods may become predictable and exploitable by an opponent.

The manoeuvrist approach to war dominates British military culture. To some extent it should be ideal for urban operations because it encourages an exploitive attitude of mind. Ironically, it appears especially suited to the exploitation of technology — which remains a more plausible way to develop the favoured indirect approach than many of the suggested alternatives, such as siege warfare.²⁸ Its flaw is that it is a style of warfare intended to destroy the enemy's cohesion and will to win through a series of rapid violent and unexpected actions that create a turbulent and rapidly deteriorating situation with which he cannot cope.²⁹ Unfortunately such an approach, directed towards a decisive point or centre of gravity, is notoriously difficult to execute on unorthodox enemies. Its successful execution depends (partially at least) on getting inside the enemy commander's decision-making cycle, but this may be impossible if cultural orientation is especially difficult, opponents do not prove amenable to coercion or Western rationality, there are many commanders (as amongst the mujahidin), or if the political economy of a conflict is misunderstood. Furthermore, an enemy may be better at exploiting such an approach (and more unscrupulous) than we are, and it is unclear as to how a Western commander will be able to force such an enemy "to make decisions at a faster rate than he can cope with."³⁰

It continues to be assumed (especially by the proponents of air power) that the indirect approach can gain advantage from the speed of its associated culture of decision making, though such means as synchronised information systems, robotics and high-speed combat vehicles, even though high operational speed, let alone manoeuvre, is much more than this. And operational speed, as any commander present at Calais or Caen knew, is slowed by urban terrain. In the same way, the links between technology, command and control in the future, and the practical problems of manoeuvring in urban terrain may

also be different from what is expected. Such basic reminders are important because although air manoeuvre capabilities may improve significantly in the next 25 years, making a significant increase in tempo possible, the effect of urban operations will be to degrade the effect of such core capabilities in a digitised military.

Implications for Air Power and Dialogue

Air power is thus relatively ineffective at coercion in urban operations but is likely to remain attractive to planners because of the continuing political pressure for seemingly quick or cheap solutions to difficult security policy problems. Bureaucratic interests may also be influential. A major reason for the independence of air power originally was that it made a unique and vital contribution (through strategic bombing) to war. But integration is now a strong trend, air is effectively an arm of surface forces, and is likely to remain supportive of land forces in the near future. Technological developments will not reverse this process for, if technology means anything, the advent of unmanned vehicles and smart missiles may give the army the capability to strike at strategic centres without requiring a traditional air force. While technology may have caught up with ideals of strategic bombing, the nature of war appears to have changed so as to make such theories less relevant.

Despite this strategic air power continues to be seen as capable of reducing the costs land and theatre air forces must pay on the urban battlefield, while theatre air power, especially when combined with simultaneous pressure from ground forces, appear a potentially powerful tool. Until recently air-land battle doctrine assigned air power a supporting role during intense ground engagements but contemporary urban operations suggest it is timely to revisit the potential of theatre air power. This may be in order to develop strategies for controlling urban territory, including cities. Or it could be in order to exploit enemy ground vulnerabilities, perhaps by looking at the susceptibility of armies to air attack. It may involve reconsidering whether joint air operations in cities require special tactics, techniques or procedures. It will certainly involve acknowledging recent experiences, such as the fact that

air strikes in Mogadishu were useful only as suppressive fire, for they failed to destroy buildings which were usually reoccupied by Somali militiamen within minutes.³¹

Because of the experience represented by operations in Somalia, Chechnya and the former Yugoslavia, attack helicopters and offensive air support capabilities have attracted significant attention, though a recent review of urban operations literature concluded that calls for improved doctrine have only been partially met.³² One area which has received attention, and which may prove critical if predictions of three-block wars prove realistic, is that of close air support (CAS). CAS was certainly vital in Mogadishu, especially as a force multiplier in the face of rules of engagement (ROE) which were very restrictive for mortars and other indirect means of fire. There may therefore be a real need to exploit it as a force multiplier. The only fire support element available in Mogadishu was the attack helicopter company that was part of the quick reaction force but, as the US Task Force Rangers learned, air support cannot be used with impunity. CAS still needs considerable work to make it a useful force multiplier.

Perhaps the most significant factor about such developments is that they emphasise that air power cannot be developed in isolation; it must build on a dialogue across perspectives. It was the experience of the US Army Rangers in Mogadishu that proved valuable for CAS in urban terrain in the developing world while the various experiments of the USMC have suggested ways in which CAS can be developed. Such dialogue should be used to stimulate consideration of the fundamental role of air power in future urban operations, rather than its technological expression. In the same way doctrine must take a broader — and more integrated — approach to urban operations.

Conclusion

British thinking about the role of air power within urban operations remains fixed on the tactical level and is over-reliant on technology, American experience and contemporary political constraints. This is short-sighted given that urban operations probably represent a defining characteristic of future war. Considerable

conceptual development is required but some trends are clear. Analysis of air power in urban terrain now tends to focus on operations in the former Yugoslavia at the expense of those in Somalia or Chechnya, yet all the operations of the past decade suggest that air strikes in particular are not especially effective at coercion in cities, that fixed-wing aircraft are best at attacking or providing support outside cities, and that helicopter gunships, suppressive fire and CAS are potentially more valuable. To adapt AP 3000: "In such scenarios, air power remains highly relevant, but air operations for strategic effect may cascade to other platforms such as attack helicopters or support helicopters used to deploy special forces."³³

Air power may be best seen as a key lever, though the constraints of urban operations suggest that its ability to affect essential missions, such as those associated with reconnaissance and observation, are constrained, ISTARs or not. Yet tactical weaknesses are, in the long term, less significant than the weaknesses evident in the current reliance on a potentially formulaic manoeuvrism which under-estimates how urban operations may negate technological superiority or resources. One way to lessen this danger is to encourage dialogue across perspectives, whether bureaucratic or cultural, and to consider the ways in the strategic or operational use of urban operations can be exploited. Limitations in thinking about the potential roles of air forces in future operations should not be self-imposed.

The opinions expressed here should not be regarded as representing those of the Ministry of Defence of the United Kingdom.

Notes

¹ Lester W. Grau and Jacob W. Kipp, "Urban Combat: Confronting the Specter," *Military Review*, July-August 1999, 9.

² Command and control is difficult in urban operations, so there is a need for tactically self-sufficient sub-units. The Soviet/Russian solution is the motor rifle battalion, reorganized and reinforced to form a storm detachment. Combined arms storm groups are also formed at company level.

³ There was no air-to-air threat in the war of 1994-96 either. The Russian air force was confronted with only an antiquated ZSU-23/4 air defence artillery yet, despite the occasional effective use of precision-guided weapons against key targets, it was unable to significantly effect the outcome of the fighting. See Timothy L. Thomas, "Air Operations in Low Intensity Conflict: The Case of Chechnya," www.amina.com/article/thomas.mil.htm.

⁴ It is also likely that as technical capabilities increase so will politicians demands – while awareness of the destructive nature of urban warfare lessens.

⁶ The USMC, which launched its "Urban Warrior" series of experiments in September 1997, claimed the field of urban operations as its own but the Army then incorporated urban combat into its "Army After Next" study. The ACTD project between the two forces was developed in response to criticisms that rivalry had led to unnecessary and expensive duplication in both R&D and exercises.

⁷ For Somalia see Mark Bowden, *Black Hawk Down: A Story of Modern War* (New York: Atlantic Monthly Press, 1999). For Chechnya see Timothy Thomas, "The Battle for Grozny," *Slavic Military Studies*, 10:1 (1997), 50-108; Timothy L. Thomas, "The Battle for Grozny: Deadly Classroom for Urban Conflict," *Parameters*, Summer 1999, 87-101; Lester Grau, "Changing Russian Urban Tactics: the Aftermath of the Battle for Grozny," *INSS Strategic Forum*, July 1995, 38, www.edu/inss/strforum/forum38.html; Carlotta Gall and Thomas de Waal, *Chechnya: A Small Victorious War* (London: Pan, 1997), 204-227.

⁸ This is not the case in the USA. See, for instance, Robert E. Podlesny, "MOUT: The Show Stopper," *Proceedings*, February 1998, 50-55.

⁹ Glenn A. Kent and David A. Ochmanek, *Defining the Role of Airpower in Joint Missions* (Washington, DC: RAND, 1998). Kent and Ochmanek consider current doctrine to be an unnecessary constraint, stopping airmen from "thinking expansively about how they might play a greater role in missions traditionally relegated to surface forces."⁽⁴⁾ For challenges to JV2010 see also Podlesny, *ibid*.

¹⁰ See, for instance, Richard Hallion, "Airpower and the Changing Nature of Warfare," *Joint Force Quarterly*, Autumn/Winter 1997-98, 39-46.

¹¹ *Ibid.*, 46.

¹² "Analysis: Russia's fighting tactics," *BBC World News, Europe*, <http://news.bbc.co.uk/hi>, 25 November 1999.

¹³ The use of air power (and artillery) in Grozny 1994-96 was often counter-productive because it turned the local Russian population against their own government; many Russians lived in the centre of the city where the heaviest fighting took place and so many casualties were Russian. The use of the same weaponry in 1999 may, however, achieve Russian ends, though it currently appears inconceivable that the USA or UK could follow such a policy.

¹⁴ To paraphrase claims by the Department of Defence at www.defencelink.mil, 15.

¹⁵ In the case of Kosovo it appears that NATO achieved political success as a result of a combination of political and military factors, primarily Russian incentives to Mr. Milosevic and the threat of using the rebel Kosovo Liberation Army as a ground force, rather than to air power alone. It is unlikely that either 1991 or 1999 were turning points in air warfare.

¹⁶ See G. J. Ashworth, *War and the City* (London: Routledge, 1991). From 1911, when the Italians made use of planes to bomb a settlement in their campaign against the Turks in Libya, through the publication of Douhet's *Command of the Air* in 1921 and Spaight's *Air Power and the Cities* in 1930, to the Second World War, the potential for attacking cities from air has received serious attention.

¹⁷ See Floyd J. Usry and Matthew T. Sampson, "MAWTS-I Urban CAS Initiatives," *Marine Corps Gazette*, May 1999, 33-36.

¹⁸ Yet strategic decisions by Stalin and Hitler ensured the strategic significance of Stalingrad and Berlin.

¹⁹ *The Coalition Warrior* of the MCWL innovation and experimentation process is designed for 2001.

²⁰ Thus suggesting that air power should be considered decisive only in combination with land and political factors. By January 1945 it was primarily the threat of Russian occupation which drove Germany to accept unconditional surrender. See also Albert Kesselring, *The Memoirs of Field-Marshal Kesselring* (London: Cornhill, 1988), 281. In 1999 the decisive effects of air power must be balanced against those of the threat of ground invasion by KLA forces and inducements from the Russians. A different kind of coercive failure occurred when the Apache attack helicopter, promoted as the most potent weapon in the US arsenal and intended as a coercive gesture towards Serb positions, failed to fly combat missions in Kosovo because it could not cope with the region's 10,000 ft mountains without fitting additional fuel pods that would have reduced its weapons payload and ability to defend itself. See also Robert A. Pape, *Bombing to Win: Air Power and Coercion in War* (Ithaca: Cornell University Press, 1996). Mogadishu showed how vulnerable helicopters are in urban space. They may be most effective as air platforms firing remotely at targets designated by soldiers in the direct fire zone.

²¹ *Daily Telegraph* [London], 11 December 1999.

²² Thus suggesting that it offers little to the American (or British) way of war – or necessarily to the Russians, given the Chechens use of defence-

²³ The US Army intends that this presence will be provided by the 2025 Urban Warfighter System. See Robert F. Hahn and Bonnie Jezior, "Urban Warfare and the Urban Warfighter of 2025," *Parameters*, Summer 1999, 74-86. The use of air power to perform policing duties during post-conflict operations may amend such intentions. But while experiences in Panama and Haiti have encouraged the US military to take post-conflict operations seriously, this has not been the case in the UK where they have received even less attention than urban operations.

²⁴ See Harry J. Hewson, "Light/Attack Helicopter Operations in the Three Block War," *Marine Corps Gazette*, April 1999, 25-27. Hewson emphasizes that the USMC "trains and fights as an air-ground, combined arms team." However, he then discusses the future capabilities of the HMLA in the context of technology being "a driving factor in determining the capabilities of the Marine Corps in the urban environment" (27).

²⁵ The causes of the wars are likely to be typical of many future conflicts in that long-standing grievances, personal ambition, criminal interests, and terrorism played a part. According to Mr. Putin, the Russian prime minister, the first war was about Chechen independence and the second is about the suppression of international terrorism. *Financial Times*, 2 December 1999.

²⁶ See Scott R. McMichael, *Stumbling Bear. Soviet Military Performance in Afghanistan* (London: Brassey's, 1991), 80-96.

²⁷ RAF, *Air Power Doctrine*, AP 3000, 3rd edn. (1999), 1.2.13.

²⁸ See Robert H. Scales, "The Indirect Approach: How U.S. Military Forces can avoid the Pitfalls of Future Warfare," in *Future Warfare: Anthology* (Carlisle Barracks, PA: U.S. Army War College, 1999).

²⁹ *British Defence Doctrine*, JWP 0-01 (London: MoD CS(M)G, 1996), G.8.

³⁰ *Ibid.*, 4.8.

³¹ See Bowden, *Black Hawk Down*; Charles P. Ferry, "Mogadishu, October 1993: A Company XO's Notes on Lessons Learned," *Infantry* 84: 6 (1994) 31-38.

³² Russell W. Glenn, *Marching Under Darkening Skies: The American Military and the Impending Urban Operations Threat* (Washington, DC: RAND, 1998), 5-8. Service participants at a conference in Washington DC in 1998 considered joint urban doctrine to be little more than lip service to the needs of operational level doctrine. See also Peter A. Costello, "A Matter of Trust: Close Air Support Apportionment and Allocation for Operational Level Effects," (Maxwell AFB, AL: Air University Press, 1997); Bob Stephan, "The role of aerospace power in Joint Urban Operations," paper presented at SMI conference on urban warfare, London, 3-4 November 1999.

³³ AP 3000, 2.6.9.

Biography

Dr. Alice Hills is a Senior Lecturer in Defence Studies at the United Kingdom's Joint Services Command and Staff College, and a Research Assistant at the Centre for Defence Studies, University of London.



"Death" by Tris Sevdý, USAFA '74. Courtesy of the USAF Academy Department of English and Fine Arts.

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