

**AIR POWER STUDIES CENTRE**

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**CRITICAL FACTORS IN THE AIR SUPERIORITY  
CAMPAIGN**

**By**

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## **About the Author**

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## INTRODUCTION<sup>1</sup>

Air superiority is the single most important factor in deciding the outcome of a modern conventional war. Military operations on land, sea or in the air are extremely difficult, if not impossible, for the side that does not control the sky. In the words of Field Marshal Erwin Rommel: ‘Anyone who has to fight, even with the most modern weapons, against an enemy in complete command of the air, fights like a savage against modern European troops, under the same handicaps and with the same chances of success.’ Rommel’s adversary, Field Marshal Bernard Montgomery, agreed and stated simply: ‘If we lose the war in the air we lose the war and we lose it quickly.’

It is useful to begin with some definitions. (Please note, incidentally, that the terms ‘air power’ or ‘air superiority’ include the realm of space.) Air superiority is defined as: ‘That degree of dominance in the air battle of one force over another which permits the conduct of operations by the former and its related land, sea and air forces at a given time and place without prohibitive interference by the opposing force.’ Air supremacy goes a step further: ‘That degree of air superiority wherein the opposing air force is incapable of effective interference.’ Our goal in all military operations should be to achieve air supremacy, but at least air superiority. In this essay I will discuss some issues regarding the air superiority campaign that should be considered by air planners. Included also are some thoughts on the role of a regional power in an air campaign, both when in an alliance and when fighting separately.

Gaining air superiority is not an end in itself. Achieving air dominance is useful only if one has the ability and the will to exploit it. After all, no country has ever surrendered merely because it has lost the air superiority battle. Exploitation is therefore essential. The air commander must never think that achieving air dominance is anything other than a means to an end, and that end is to damage, destroy, or otherwise affect an enemy’s centres of gravity, whatever they may be.

One other caveat. Because air superiority is so critical, a commander should avoid distractions before it has been gained. Obviously, emergencies - such as an enemy breakthrough on the ground - are exceptions. Similarly, if surplus air power is available it can be allotted to several different campaigns simultaneously. Such ‘parallel operations’ are virtually unique to air power and are one of its greatest strengths. Nonetheless, the concept guiding the air commander should remain: avoid distractions until air superiority has been achieved. As the words of Field Marshal Montgomery noted above warn if you lose the air war you lose the war.

## THE HISTORICAL QUEST FOR AIR SUPERIORITY

Let us briefly review how the counter air campaign has been conceived and how it has been conducted. Giulio Douhet in Italy and Hugh Trenchard in Britain believed that air power’s ability to ignore obstacles and attack anywhere, at any time, without

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<sup>1</sup> I wish to thank my colleagues in the School of Advanced Airpower Studies whose ideas and comments were helpful in writing this essay, but especially Professor Dennis Drew and Majors Mike Holmes and Brett Williams.

warning, meant that defence against air attack was almost impossible. They thought anti aircraft artillery was ineffective and could be ignored (a mistake as we shall see later), but also doubted the efficacy of airborne interception. Writing in the days before radar, they believed detection and timely interception of enemy attackers was unlikely. As bomber aircraft flew faster and higher in the decade of the 1930s this belief grew even stronger. As a result, many airmen argued that a counterforce battle was unlikely, and the enemy air force could simply be ignored. A rather curious expectation developed that opposing air forces would open a war by studiously avoiding each other as they passed in the air *en route* to bomb targets in each other's country.

The American airman, Billy Mitchell, disagreed with this line of reasoning, maintaining that bombers *were* liable to interception and that their deficiencies in speed and manoeuvrability would put them at a disadvantage when intercepted by enemy fighters. Mitchell imagined a fight for air superiority between attacking bombers and defending fighters that could be long and contentious.

In his book *Victory Through Air Power*, Alexander de Seversky differed from his predecessors in calling for long-range fighter escort for the attacking bombers. Most airmen and aircraft engineers at the time doubted whether it was technically possible to build an escort fighter that maintained the speed and agility of a fighter but possessed the long range of a bomber. Seversky, himself an aircraft builder who designed the P-47 Thunderbolt, disagreed. Others maintained that although the bomber was vulnerable to defending fighter planes, escort would be ineffective. Claire Chennault, later of 'Flying Tiger' fame, argued that escort was a defensive and passive mission that detracted from the inherently offensive nature of the fighter plane. He therefore fought attempts to turn the 'offensive' fighter into a 'defensive' escort.

In World War II the Allied bomber offensive against Germany proved quickly that an air battle would occur, it would be long and bloody, and that long-range escort was essential for daylight bomber attacks. A breakthrough occurred when new aircraft, the P-47 and P-51, arrived in theatre with the range required to accompany the bombers deep into Germany, and when a new command team at the Eighth Air Force changed tactics. Generals Jimmy Doolittle and William Kepner decided in early 1944 that previous tactics emphasising the role of escort planes protecting the bomber stream were misguided. Essentially agreeing with the Chennault school, they instructed their fighter pilots not to worry about their own bombers; rather, to concentrate on the enemy fighters. In other words, they urged an aggressive doctrine of seeking out and destroying the enemy air force - a positive aim - rather than tying themselves to the bomber stream to protect the bombers from attack - a negative or defensive aim. The results of these new aircraft and new tactics were to prove dramatic.

In addition, Allied air leaders realised in early 1944 that if the aim was to eliminate the Luftwaffe, then their bombers had to threaten targets so vital the enemy must defend them. In essence, the bombers became the bait that lured the Luftwaffe into the air where they could be destroyed by Allied fighters. At the same time, preparations for the invasion of the continent, Operation OVERLORD, preoccupied Allied leaders. Because they realised air superiority was essential to the success of OVERLORD, it was necessary to find a vital target quickly, attack it, and draw the Luftwaffe into the

skies. General Carl Spaatz, commander of the US Strategic Air Forces in Europe, believed the target most likely to accomplish that goal was the German oil refinery system. As a result, Allied bombers, accompanied by their new escorts, struck oil targets deep in Germany, targets so vital they *had* to be defended. The air battle that ensued was monumental, a decisive factor in the success not only of OVERLORD but of the entire Allied war effort. It did, however, exact a heavy price. The battle for air superiority cost the Allies over 160 000 men and 40 000 planes. In reality, the trench carnage of World War I, which so many air theorists had promised that air warfare would end, was not eliminated, it was simply moved to 20 000 feet.

After the war air doctrine changed fairly rapidly. Due to the intercontinental ranges now required in the nuclear standoff between the two superpowers, fighter escort was rendered impractical. Therefore, the counter air campaign gave way to a more straightforward issue of detection and interception by enemy fighters. Attacking bombers were forced to rely on speed, surprise, altitude, night and electronic warfare (EW) to penetrate enemy airspace. Indeed, most American postwar bombers had little capacity for defending themselves: the B-52 relied on a lone, four-barrelled gatling gun in its tail, while the B-47 and B-58 had even less defensive armament. In other words, the situation had returned to that imagined by Douhet, and the air superiority battle was simply assumed away.

The Korean War showed the continued need for escort. American bombers were not capable of holding their own against Soviet-built MiG fighters, so jet escorts were essential, as were the aids such as surprise, night and EW noted above. Surprisingly, however, Korea was seen as an aberration. By the early 1960s the idea of using fighter aircraft to gain and maintain air superiority was largely dead. Fighter pilots in aircraft like the F-105 spent more time training to deliver nuclear bombs than they did practising air-to-air tactics. Vietnam changed things. Once again the necessity of air-to-air combat to achieve air superiority was proven. At first, because such skills had been allowed to atrophy, American pilots were at a disadvantage when meeting the North Vietnamese, but the formation of programs like the Top Gun school and Red Flag eventually made up for the deficiencies of the previous decades. It was demonstrated yet again that penetration of an enemy air defence system was difficult and required a number of tactics and technologies to ensure success.

The Persian Gulf war was a watershed. In essence, there were two wars for air superiority. The first was a traditional air battle as in previous wars, but in addition, stealth technology introduced an unprecedented facet into the air superiority campaign. The F-117 was virtually 'invisible' to Iraqi radar, so in a sense, air war had returned to the era before radar where the ideas of Douhet and others regarding the improbability of defending against an air attack still held validity.

Although stealth granted *de facto* command of the air that was gained virtually without a fight, there are two aspects to air superiority - offence and defence. Stealth only ensured the former, allowing certain aircraft to operate against the enemy with impunity. Stealth did not, however, play a role in the second half of the air superiority equation - it did not by itself prevent Iraqi aircraft from attacking coalition forces. Moreover, it should also be noted the F-117 was a purely offensive weapon with little ability to defend itself. As a consequence, it was restricted to night only operations, as were generations of bombers that had preceded it.

## ISSUES TO CONSIDER

These historical accounts indicate various issues regarding the air superiority campaign that need to be considered by air commanders. The first of these is whether it is necessary to attain theatre air superiority or merely localised dominance in a specific time and place. In truth, this question is largely dependent on the objectives of the military action, the expected duration of the action, the capabilities and nature of the enemy, and the geography of the area in question. For example, the degree of air superiority needed to protect a major amphibious assault against a moderate sized country equipped with a sizeable, modern air force is quite different from that needed for an operation involving the evacuation of a small contingent of non-combatants located in a small, non-industrialised country possessing no air force. In the former case it is likely the struggle for air superiority would become contentious, not merely a battle but a campaign. This degree of air dominance usually takes time to achieve and requires constant maintenance thereafter.

A second issue is the relative balance between offensive counter air operations (OCA) and defensive counter air operations (DCA). Several air theorists have pushed the idea that the best defence is a good offence, but this often is politically unacceptable. A country's leaders may not be able to tell their people they have rejected defensive precautions in order to concentrate on hitting an enemy harder than he can hit back. Instead, politicians and the population may insist on an air defence to protect them from air attack. This was the case, fortunately, in Britain in the years immediately preceding World War II, and which resulted in the later success of Fighter Command in the Battle of Britain. Nonetheless, it is generally wise to use air power's inherently offensive characteristics to attack and take the initiative, and OCA does precisely that. The alternative may be a costly and indecisive war of attrition.

There are several types of OCA. The first is suppression of enemy air defences (SEAD), a mission that has gained increased importance as air defences have relied more fully on radar controlled surface-to-air missile systems and anti aircraft gun batteries. Specialised aircraft have thus been developed whose sole purpose is to jam the radars and communications of such air defences, or to track and home on emissions and then destroy them with air-to-surface missiles. SEAD has become one of the most important functions of any counter air campaign. If stealth aircraft are not employed, SEAD is absolutely essential to reduce losses to the attackers.

Another OCA mission is the offensive fighter sweep. First, it should be noted that combat air patrols, a passive form of sweep, are extremely wasteful and inefficient and have rarely been successful. Flying around in circles waiting for an enemy aircraft to show up for a fight is likely to be a long wait. Nonetheless, such patrols under certain circumstances can have powerful political effects, as for example the present coalition air patrols enforcing the no fly zones over Iraq. Actual offensive fighter sweeps, on the other hand, have generally been unsuccessful before air superiority has been gained. The Royal Air Force (RAF) attempted sweep operations over France in 1941 as a way of luring the Luftwaffe into an air battle, but they were a costly failure. There was no compelling need for the Luftwaffe to engage on other than their own terms. A bait was needed - Allied bombers which went after crucial targets - to force the Luftwaffe to defend whether they wanted to or not, and to do so on the Allies' terms. In other words, in the early sweep operations the initiative lay with the

defender. However, once the Allies had gained air superiority over Western Europe in March 1944, aggressive sweep operations to search out and destroy lucrative ground targets (including aircraft), proved to be very successful. To repeat, however, these later operations were only possible and successful after air superiority had been achieved.

A third OCA mission is escort, or what is now termed 'force protection'. This is one of the oldest OCA missions, but it remains one of the most important. Although some bombers like the F-15E carry a formidable array of defensive air-to-air missiles most attacking aircraft will be loaded with offensive ordnance and concentrating on finding and hitting their ground targets. It has therefore become standard practice to accompany these 'strikers' with escort aircraft whose purpose is to watch for enemy interceptors and to drive them off before they can interfere with the strike force.

A final form of OCA is airfield attack, the attempt to eliminate the enemy air force by 'destroying the eggs in their nests', as Douhet would say. We will discuss this subject in more depth below.

The other fundamental mission is DCA, what may also be termed 'defensive air superiority'. Very strong defensive air power in the form of an interceptor force can sometimes win air superiority over a specific area for a period of time. The most telling example of this is of course the Battle of Britain, but the resistance of the Luftwaffe prior to March 1944 is also significant. In addition, the layered, overlapping and highly integrated ground-based air defence network of the Egyptians in 1973 must be remembered. The advantages of DCA, especially one involving a powerful interceptor force, an extensive air defence system, and an effective command and control network to tie it all together, include shorter lines of communication - which generally translate into higher sortie rates and the conservation of resources - the hope of rescuing aircrew members who bail out or crash land, and the psychological advantages accrued in defending one's own territory. Even so, DCA has not had an overly prominent role to play lately, partly because OCA has been so effective. Such a view would be myopic.

Airmen have tended to dismiss the danger from enemy ground defences; yet, historically it has been AAA and SAMS that have been most hazardous to attacking aircraft. This paradox could be called the Agincourt Syndrome. At the battle in 1415 between the French and English the forces of the latter included a large number of archers armed with longbows. The French army, composed mainly of armoured knights, held the bowmen, who were commoners, in disdain. As a consequence, the French attacked their counterparts, the English knights, and ignored the archers. This of course was a disastrous decision, because it was the bowmen who determined the outcome of the battle. Similarly, aircrews today must not ignore the lowly AAA operator in order to concentrate on the more impressive enemy fighter plane. After all, in the Gulf War all coalition aircraft lost - with one possible exception - were downed by ground defences.

Assuming it is decided to carry out a major OCA campaign, what are the target sets mostly likely to achieve air superiority? There are several possibilities.

## **Aircraft**

Because of the risk involved, destroying aircraft in air-to-air combat is the least efficient, though admittedly most glamorous, way of gaining air superiority. However, there are exceptions. The F-15 is perhaps the premier air superiority fighter in the world today with a combined victory margin of 95 to 0. Given such a record, air-to-air combat for Eagle drivers has entailed little risk, but this situation is probably the exception.

Attacking enemy aircraft while they are on the ground is another option. Aircraft are powerful only in the air. While on the ground they are fragile and virtually defenceless. As a consequence, airfield attacks have always held out the promise of the quickest and easiest method of gaining air superiority. Indeed, there have been examples when such air strikes have been amazingly successful. The Luftwaffe destroyed over four thousand Soviet aircraft, most of them on the ground, in the first week of Operation BARBAROSSA. In the first two days of the 1967 Arab-Israeli War the Israeli Air Force destroyed over four hundred Arab aircraft on the parking ramp. Finally, in the Gulf War only thirty-three of the nearly two hundred Iraqi aircraft eliminated fell in air-to-air combat; the rest were caught on the ground. In response to the potential decisiveness such targets present, most air forces have laboured over the past three decades to disperse and camouflage their aircraft and place them in hardened shelters. For the most part this has made the task of destroying an air force on the ground more difficult. However, I will discuss below an antidote to these hardening efforts.

## **Crew Members**

Combat pilots of today are in some ways akin to the soldiers in the age of limited wars several centuries ago. A seventeenth-century ruler was generally reluctant to risk his army in battle because of its cost: typical soldiers took two to three years to train, thus making them extremely valuable commodities. Similarly, the pilot of today may also require two to three years of highly specialised and expensive training to prepare him for combat. They must not, therefore, be expended lightly. To an attacker, this means the enemy's supply of combat pilots is limited and fragile.

## **Command, Control and Communications Facilities (C<sup>3</sup>)**

This was a primary target of coalition aircraft in the Gulf War. In fact, the first targets struck were air defence radars and command and control facilities. The intent was to separate individual Iraqi air defence units from a centralised control and information network and to drive the Iraqi air defences to autonomy. In this, they were successful, so much so that some have claimed the war was essentially won in its first ten minutes. From that point on the Iraqis were so off balance and disorganised they never had an opportunity to recover and offer effective resistance.

## **Weak Links**

Air strike packages are extremely dependent on some highly specialised air assets. For example, tanker aircraft were crucial to the successful prosecution of the Gulf air war. Most aircraft striking targets in Iraq had to be air refuelled either *en route* or on their

return trip. Had the tankers not been there, much of Iraq would have remained a privileged sanctuary except to long-range aircraft like the B-52 and F-111. If prospective enemies are also dependent on air refuelling, their tanker fleet should be considered a high priority target. Electronic jamming aircraft were essential to coalition victory. Had they not accompanied non-stealth aircraft into Iraq the incredibly low loss rate of the coalition air forces would have been significantly higher. Moreover, these assets were in short supply; a loss of even a handful of these aircraft would have had large consequences. Scarce also were airborne controller aircraft like AWACS and JSTARS. These few assets had a disproportionate importance in the Gulf; therefore, it is logical to project them as lucrative targets in a future air war.

### **Other Bottleneck Targets - Like POL**

During World War II Air Marshal Arthur Harris of the RAF's Bomber Command dismissed all talk of bottlenecks as 'panacea targets', and his derisive reference to such targets has lingered. Nonetheless, it is logical to seek those systems or portions of a system that are of inordinate significance to the operation of the whole. There is a story told of the Air Corps Tactical School at Maxwell Field during the 1930s. Students generally attended class in the morning and flew in the afternoon. One day they arrived at the flight line only to discover their aircraft had been grounded. A propeller governor spring had failed on one plane, revealing a design defect that affected other aircraft. However, when supply officers attempted to order new springs it was found that only a single factory in Ohio manufactured them: that factory had been flooded by recent rains and production had halted. The lesson seemed obvious. In order to ground the American air force it was not necessary to destroy every aircraft, but simply to destroy one factory in Ohio. Although this example appears simplistic, the underlying principle at play here - to determine if there were vital cogs in the aircraft industry, or indeed a country's manufacturing industry in general, that would have similarly dire results - is an extremely important one. It is the task of the air planners to find out if such bottlenecks exist.

### **Runways and Airfields**

This is a time-honoured method of shutting down an enemy air force. During the First World War, Trenchard's independent bombing force devoted fully 40 percent of its sorties to enemy airfields. In the Falklands War the RAF employed eleven air refuelling aircraft to put one Vulcan bomber over the Port Stanley airfield. In fact, this Vulcan strike illustrates both the strength and weakness of airfield attacks. Only one bomb of the entire string actually hit the runway and it was quickly repaired. Nevertheless, the implications of this air strike were clear to the Argentines, who quickly redeployed their only Mirage interceptor aircraft in the south to bases far to the north near Buenos Aires, thus sacrificing any chance to contest air superiority over the Falklands.

In the Gulf War dozens of sorties were flown in an attempt to crater Iraqi runways and keep their air force out of the sky. However, airfield attacks for the purpose of closing a runway have only temporary effects while at the same time being quite risky. Therefore, they are justifiable only if it is necessary to shut down an airfield or fix the enemy in place for a short period of time, a period so important it is worth the risk to

the attacking aircraft. Even so, it would be useful to study what other facilities on an airfield are suitable targets to achieve long-term effects, such as refuelling or rearming sites, command centres, or maintenance hangars.

It should be apparent that intelligence plays a crucial role in an air superiority campaign. In a very real sense the essence of an effective targeting strategy is intelligence. We simply must have accurate and current knowledge of an enemy's air order of battle, his tactics, doctrine, dispositions, leadership, capabilities and intentions. The success of the counter air campaign will often hinge on the degree to which we can crack the intelligence nut. Too often in the past the operators and intelligence analysts have tended to isolate themselves from each other instead of working together as a close team. This is a serious mistake.

A third issue to emphasise in the counter air campaign is the important role that surface forces can play in destroying enemy surface-to-air defences and in pinning down or flushing an enemy army. Surface operations can often be extremely effective in support of an air campaign. In 1973, for example, the depth and redundancy of Egyptian air defences made Israeli air operations extremely hazardous over the battle area. As a consequence, General Ariel Sharon's forces crossed over the Suez Canal and swept away four Egyptian air defence sites, thus allowing Israeli aircraft to resume operations at greatly reduced risk. Similarly, friendly artillery, naval gun fire, or longrange missiles like ATACMS can be employed against enemy air defence sites so as to permit friendly air to operate more effectively.

In addition, the presence of substantial coalition ground forces in the Gulf War forced Saddam's forces into an insoluble dilemma. If they concentrated to meet a possible ground attack they were static and thus vulnerable to deadly air attacks. On the other hand, dispersal was impossible in the face of coalition ground forces. Moreover, when coalition ground forces did begin to move after six weeks the Iraqi army was compelled to move as well. When they did so they became even more open to devastating air strikes - much like a turtle that has to emerge from its shell in order to move. It has been said that an army is never more vulnerable than when it turns to run. At such times a vigorous pursuit can turn a victory into a decisive rout; and nothing pursues like air power. In sum, the synergistic employment of air and ground forces should always be borne in mind by commanders.

A fourth consideration impacting future counter air campaigns is the emergence of new technologies. There are several that are worth noting.

### **Stealth**

The value and effectiveness of low observable technology was hotly debated prior to the Gulf War, and sceptics doubted whether it was as good as advertised. All doubts were dispelled in the skies above Baghdad. Despite the nearly thirteen hundred F-117 combat sorties flown, not a single aircraft even received battle damage. When it is realised that Baghdad had the most extensive and intensive air defence network protecting it of any city in the world besides Moscow, that is extraordinary. It is likely that few ever knew an F-117 was overhead until the bombs began to detonate. As a result of their virtual invulnerability, coupled with their 'airshaft accuracy' precision, only the F-117s were allowed to attack targets within Baghdad. Essentially, stealth

carries its own air superiority with it; wrapped in a protective cocoon the stealth aircraft can go wherever it wishes with impunity. In one sense, therefore, the F-117 is an air superiority bomber. Although it would be foolish not to expect a counter to stealth technology at some point in the future, such counters are not imminent. Moreover, when stealth is combined with passive radar air-to-air missiles in the F-22, the result will be formidable indeed. Future aircraft, perhaps of all types, must employ stealth technology to some extent.

### **Precision Guided Munitions (PGMs)**

Stealth, or even first-rate high performance aircraft in general, are so complex and expensive that only the richest or most industrialised countries can field them. This is not so, however, regarding PGMs and penetration bombs that are true force multipliers, because although relatively cheap and within the technological capacity of many countries, their importance is enormous. The Iraqi hardened bunkers were a fascinating case. These bunkers were extremely well built, employing up to ten feet of earth and reinforced concrete. They were apparently built to withstand a nuclear attack - and indeed they might have - but they could not withstand a direct hit from a perfectly placed penetration bomb. Certainly, one can use more concrete and dig more deeply to protect aircraft and facilities, but at some point the situation becomes similar to that of the medieval knights whose armour grew thicker to repel the new gunpowder weapons of the fifteenth century. Eventually, the cost and immobility of the heavier armour, combined with the decreased cost and effectiveness of firearms, made the knight seek protection elsewhere. Similarly, because of PGMs and penetrating bombs, it is necessary to seek practical methods for shielding aircraft, command facilities and other high value targets from air attack. Indeed, it is useful to ask if concrete is becoming obsolete. On the last night of the war an F-111 dropped a specially built 4 700 pound (2 130 kilogram) bomb that could penetrate over one hundred feet (thirty metres) of earth or twenty feet (six metres) of reinforced concrete. How deep can one dig?

### **Media Coverage**

I include this under the category of technology not because journalists have not reported wars in the past; rather, they now have an extraordinary technical capability to witness war and its effects and then to convey those observations to the world at large. It has become almost an aphorism to state that many of our past wars would never have been fought or would have been fought far differently if only the populations of the countries involved had really known what was happening. Would the people of France, Germany and Britain have allowed their governments to continue to wage the trench warfare of the First World War had they watched it in living colour on their televisions every night? In addition, it is not simply that people have become more reluctant to allow their husbands, fathers and sons (and now perhaps also wives, mothers and daughters) to give their lives for their country, but there is an increasing concern, worldwide, for limiting the amount of casualties and collateral damage inflicted on an adversary. Consequently, air commanders must take the media into account, while also striving to limit both casualties and collateral damage. To paraphrase Field Marshal Montgomery, we may be approaching the point where if we lose the media war we lose the war and we lose it quickly.

## **Non-Lethal Weapons**

Relatedly, the concern for low casualties has generated research into an area referred to as 'non-lethal weapons'. This field looks at a whole series of new technologies that concentrate on incapacitating people and systems rather than destroying them. Possible applications include computer viruses to sabotage an enemy's computer network. Another is the use of chemical or biological agents to change substances from one form to another. For example, there are solutions that when added to gasoline turn it into a useless jelly, while others when spread on an asphalt runway convert it to a sticky glue. Other possibilities include the use of lasers, electromagnetic pulses, polymer agents, acoustics and microwaves to distort, damage, confuse or otherwise alter military systems. Although much of this research has not yet been made public, it is likely it will play an increasing role in future warfare.

## **C<sup>3</sup> in the Cockpit**

Another new technology worth considering for the air superiority campaign is the explosion now occurring in the realm of command and control. Space-based communications and information systems have increased by orders of magnitude the amount of data available to airmen; moreover, they can provide this data in a remarkably short period of time. An impressive example of this new capability was seen during the Gulf War when space analysts located in Cheyenne Mountain, Colorado, were able to use satellites to detect Iraqi Scud launches, confirm the location of the launch and probable trajectory, and then relay that information directly to Patriot air defence batteries located in Saudi Arabia. Increasing 'microisation' means that the size and complexity of the electronic equipment required to process, store and display such information is also shrinking dramatically. Thus, the time is rapidly approaching when a pilot can have a direct link to intelligence satellites that will provide him in the cockpit with real-time information. If pilots are given 'mission type orders' or general instructions on the commander's overall plan and what needs to be done to fulfil that plan, then each pilot can use his judgment and the current intelligence provided by satellite downlink to prosecute the attack mission as he deems appropriate. Additionally of course, the power and precision of modern weapons means that every F-117, for example, has the equivalent striking power of hundreds of World War II B-17s. Putting this together: pilots will soon have the capability of becoming theatre commanders - if given the authority to do so.

## **Unmanned Air Vehicles (UAVs)**

A final technology to be considered is the increased use of UAVs in future counter air campaigns. Because public opinion is becoming increasingly reluctant to risk casualties among its military forces, the use of aircraft that put no aircrew lives at risk seems highly desirable. However, the technical difficulties of employing UAVs have been underestimated in the past. Although less costly and less risky than manned aircraft, UAVs also suffer from surprisingly high costs, small carrying capacity and power output, and limited flexibility. Nonetheless, UAVs seem to have a place in modern air war, as the Israelis convincingly demonstrated in their Bekaa Valley operations of 1982. What is somewhat surprising is the less than enthusiastic response to UAVs by so many airmen. Some would argue that is due to what is sarcastically referred to as 'the silk scarf syndrome' - pilots are reluctant to embrace any system

that would put them out of a job. This is not a new charge; some have argued the initial reluctance to embrace ICBMs, cruise missiles and even space itself is a symptom of this supposed syndrome. I would prefer to believe airmen are not that parochial and petty. Although not used extensively UAVs did play a role in the air superiority campaign against Iraq and will no doubt play a greater role in the future.

It should be noted that most of the discussion to this point relates to conventional war against a modern industrialised nation. It is appropriate to ask, however, what one does with air superiority against a foe that does not have an air force and may not even have a large standing army. This was the case in the Vietnam War regarding the Viet Cong (though not the North Vietnamese), and again in Afghanistan. More importantly, it is also true in situations like Somalia. In such instances the standard applications of air power seem to have little relevance, because as noted previously, command of the air is never an end in itself. Unless the power that controls the air is willing to exploit it, air superiority can be meaningless.

What makes situations such as Somalia especially serious is that they are likely to continue to erupt in various places. One could argue that the advent of nuclear weapons after World War II has served not to deter war altogether, but to deter it down to the conventional level. In other words, the use of nuclear weapons signified a threshold that no nation wished to cross. It may now be the case that the overwhelming victory of the coalition over Iraq may have a similar type of effect. The Gulf War demonstrated that even a very large army, battle tested and possessing modern equipment, and fighting on its own territory, had little chance of success against a Western coalition. It is therefore improbable that any potential aggressor would be foolish enough to challenge the West in a similar situation. We should not expect wars to end, however. On the contrary, they will continue and may even increase in number. It is possible, however, that just as nuclear weapons drove war down to the conventional level, so too the Gulf War will drive it down to the unconventional level. If so, there will be an increasing number of peacemaking, peacekeeping and humanitarian missions in the future. Although air power will continue to play a vital role in such operations, it is questionable whether a counter air campaign will be of great importance.

## **ROLE OF A REGIONAL AIR POWER**

In discussing the role to be played by a regional power in an air superiority campaign let us posit two situations. The first case would be an instance when the regional power is in alliance with a larger power or a group of other powers, and the other is when the regional power is fighting alone.

In planning to wage war in an alliance with other powers there are several ways a smaller country could prepare. The first is to specialise. As mentioned above, there are certain assets that are crucial to the success of a counter air campaign, but for various reasons they are in short supply: EW aircraft and those capable of effective SEAD are obvious examples. A country that develops a technical capability in these areas would be a valuable partner in any alliance. Similarly, some tactical capabilities are also important, yet require extensive training. An example would be anti-shipping operations - in which the Royal Australian Air Force is so expert - or low level tactics.

Although most air forces practise low level, some countries have gained a reputation for being particularly adept at it, such as the RAF. As a consequence of this special ability, developed over a period of many years, the RAF was the obvious choice to carry out a series of low level attacks on critical Iraqi targets, primarily airfields, during the early part of the Gulf War.

Similarly, although this may be more difficult to quantify, one should develop a strong reputation for professionalism and technical competence. As the Cold War ends and defence budgets are cut, there will be a temptation to save force structure by cutting back on training, education and spare parts. This strategy often results in short term gains but long term losses. Resist the call for a decrease in training hours. Too often combat has shown that the air force that is better trained will be successful. I have called attention to the outstanding technical capabilities of aircraft like the F-15, but it would be erroneous to claim it is the plane alone that makes the difference. The many hours spent in training over the deserts of Nevada or the farms of Europe are at least as vital as the quality of the technology itself. It is interesting to note that of the tens of thousands of fighter pilots who have flown in the wars of this century, only a small percentage are aces, and most of their victims were the young and inexperienced. As training and combat experience improve, the chances of survival increase dramatically.

Another asset for the regional air force in an alliance is a compatible doctrine, training, language and weapons inventory. The importance of NATO standardisation and rationalisation efforts over the past several decades paid enormous dividends in the Gulf War. One can only imagine the chaos that would have resulted in that war had not the sixteen different air contingents taking part shared a common doctrine and set of operating principles. The various procedural manuals used by NATO over the years provided a commonality that was invaluable in putting everyone on the same sheet of music. By the same token, it was an enormous advantage that so many of the coalition aircraft in the Gulf were of similar types, using similar fuels and lubricants, employing similar maintenance procedures, and capable of delivering similar ordnance loads. Finally, the danger of fratricide - shooting down friendly aircraft - is very real in today's high speed air environment. Thus, compatible equipment and airspace control procedures are essential to avoid 'blue-on-blue' engagements.

In a war alone, especially against a country that has a quantitative superiority, the first caution would be to husband your resources. Attrition of air assets is an area of tremendous importance, because the combat aircraft of today are enormously expensive and require a complex and well organised industrial infrastructure. Unlike the situation in World War II where thousands of aircraft could be produced each month by the major belligerents, most aerospace companies today could not turn out more than a handful of aircraft each month. Moreover, some aircraft (the F-111 for example), although still front-line weapons systems, are out of production, making it virtually impossible to replace them with like models. Procuring a new type of aircraft instead would require new training, new maintenance procedures, new armaments, new tactics, etc. Such concerns are magnified in countries that do not have the capability to manufacture their own combat aircraft but must rely on supplies and spare parts from a foreign country. In the case of close allies this presents no problem, but as Iran discovered after their revolution, it does little good to have a modern, first-rate air force of F-14s if you attack the country that supplies the spare parts. In short,

modern air war is more vulnerable to the grinding effects of attrition than is land warfare.

Second, one should endeavour to maintain an air force-in-being. To some extent, this was the strategy adopted by both sides in the Iran-Iraq war. Because the two air forces were relatively small, expensive, complex and difficult to maintain, they were seldom used *en masse* or against high risk targets. Instead, they were held back as a strategic deterrent. Both sides knew that if they launched major air strikes against high value targets, such as oil refineries, their opponent could do likewise. Apparently, the belligerents tacitly agreed to refrain from strategic air strikes and to use their assets as an air force-in-being to threaten and deter escalation.

Third, the regional power should strive to retain the initiative with an aggressive and flexible strategy. The worst approach should be to remain static and either hope the enemy goes away or will tire of bombing your territory. To the utter amazement of many, this was the strategy of Saddam Hussein in the Gulf War. It was of course a dismal failure because air power by its very nature is an active, offensive, and aggressive weapon. The worst approach is to fetter these characteristics by remaining defensive and quiescent. Although I believe *any* air strategy attempted by Iraq would ultimately have been unsuccessful, it does seem that the one chosen was particularly inept. The end result of trying to wait out the war in what were believed to be impregnable shelters was the destruction of the Iraqi Air Force with virtually nothing to show for it in return. Reconciling the need to retain the initiative, while at the same time heeding the caution above to husband resources, will require much thought and wisdom.

Make every attempt to disperse, hide, disguise and harden key assets. Even rudimentary techniques of concealment and deception can be of great value. After all, an aircraft approaching an airfield at one hundred feet and five hundred knots has only a few seconds to identify and attack a target. In such instances, attempts to confuse and deceive will probably pay disproportionate dividends. There are many instances in the Gulf War, for example, of Iraqi tank commanders placing metal sheets near their vehicles so as to confuse coalition infrared sensors. Another ploy was to place pots of burning oil on the back of their vehicles, making it appear as if they had already been struck and set afire. Such tricks cost little, but can have significant effects.

In the same vein, stress the importance of air base survivability functions. Frequent exercises that test the readiness of engineers, medical personnel and firefighters to respond to simulated attacks by repairing damaged runways, treating injured personnel, putting out fires set by attacking aircraft - all while also wearing chemical warfare gear - are invaluable training devices that will unquestionably pay off in combat.

Emphasise the importance of accurate intelligence and integrate it with the operators. Air power is far more dependent on accurate intelligence than are surface forces. Moreover, the intelligence needed is greater in both depth and breadth. Whereas surface forces must know the location and capabilities of an enemy army, its route of march, the size and proximity of its supply depots, the range and rate of fire of its weapons, an air force needs far more. Although such tactical intelligence on the

enemy air force is certainly necessary, the air commander must also have in-depth knowledge of a strategic nature: where are the enemy's major armaments factories, power stations, transportation hubs, communications networks and the like. At the same time, in modern air war this *breadth* of information regarding an enemy must be supplemented by a greater *depth* of knowledge. In this regard precision weapons have changed the character of intelligence. If it is now possible for an aircraft to place a bomb in a particular office in a large headquarters building, then intelligence must be able to locate the correct office.

Finally, a regional power should strive to develop a military strategy that emphasises the inherent strengths of air power. These are its potent deterrent effect; the technological edge it grants in what is becoming an increasingly technological world; its enormous flexibility and mobility that allows it to perform so many different missions over great distances, in a very short period of time; air power's increasing ability to provide unprecedented capability at monitoring an enemy's movements and communications, and controlling friendly forces on a global basis; a devastating lethality that is also becoming increasingly precise and discriminate; long range, even when not reliant upon air refuelling; and finally, low risk. Because air power can deliver such devastating firepower, accurately, it does not require the tremendous numbers of combatants as with other forms of military force. In today's atmosphere of public reluctance to use force, this is an important consideration.

## CONCLUSION

To summarise, I would list the following as the most important factors to consider when contemplating an air superiority campaign:

- a. Air superiority is essential to all military operations.
- b. Air superiority is not an end in itself; it must be exploited.
- c. You will probably have to fight to gain air superiority and then continue to fight to maintain it.
- d. OCA is usually more effective than DCA.
- e. Target selection is crucial in the counter air campaign.
- f. New technologies are enhancing the effectiveness of OCA.
- g. The role of air power in low intensity conflict, especially in an air superiority campaign, needs far more thought than anyone seems willing to give it.
- h. If you are a small nation, air power is a force multiplier, but you need to be very good.

Air superiority will remain an essential factor in all military operations. Although it will not by itself bring victory, it is almost impossible to achieve success without it.

Hopefully, some of these ideas will be of use to those responsible for planning future air campaigns.