



# Air and Space Power Review

## Platinum Jubilee Edition

Volume 24 Number 1

Summer 2022



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# Foreword



**By Group Captain Paul Sanger-Davies**

MVO MPhil MA BA(Hons) MCIPD RAF

Director of Defence Studies (RAF)

**This Platinum Jubilee Edition celebrates the sterling service provided to our Royal Air Force by Her Majesty The Queen, and allows us to reflect upon the evolution of Air and Space power over seven decades of Her Majesty's reign.**

Our premiere Air Power historian, Sebastian Cox, gives an overview of this evolution and we explore each epoch through articles by E Colston Shephard reviewing The RAF's Coronation Day, Air Commodore Henry Probert examining our Independent Deterrent, and Air Chief Marshal Sir Neil Cameron on emerging Air Power thinking during the 1970s. Our leading Air Power academic, Dr David Jordan, provides a prescient reflection on the Falklands Air War, with Air Chief Marshal Sir Richard Johns analysing the role of air power in crisis management.

The utility of Air Power is discussed within the Post Cold War context by Wing Commander (Retd) Dr Craig White, with Dr Sebastian Ritchie comparing the decisiveness of UK Air Power over Iraq and Kosovo. Covering an increasingly contemporary perspective, Group Captain James Beldon discusses the ever-increasing utility of lethal autonomous weapons, whilst Group Captain Rayna Owens analyses how we protect and defend UK national interests in space.

This superb spectrum of articles demonstrate how far we have progressed on our journey to the stars.

Per Ardua Ad Astra



Her Majesty The Queen visits RAF Marham, 2010.  
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Her Majesty The Queen and HRH The Duke of Edinburgh at RAF Valley with HRH Flt Lt William Wales following a tour of the UK Military Flying Training School (UKMFTS), 2011. (© Crown Copyright)

# Preface

By Mr Sebastian Cox

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**Biography:** Sebastian Cox has been the Head of the Air Historical Branch (AHB) since 1996. Having previously worked at the RAF Museum, he has been a member of the AHB staff since 1984. He holds degrees from Warwick University and King's College London, is a Fellow of the Royal Historical Society, and was awarded an OBE for services to RAF history in 2017.

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## Introduction

On the accession of Her Majesty Queen Elizabeth in 1952 the Royal Air Force had some 6,000 aircraft at its disposal with around 1,700 in operational squadrons. The personnel strength of the service stood at nearly 264,000 men and women including 25,775 officers of whom 998 were officers of the Women's Royal Air Force and 103 (all men!) were in the rank of Air Vice-Marshal and above. There were seven home Commands, two overseas Air Forces – in the Far East and the Middle East – as well as the 2nd Tactical Air Force in Germany. In Bomber Command alone there were seven main operating bases with frontline squadrons and altogether across Bomber, Fighter and Transport Commands there were 28 Main Operating Bases in the UK with several more with resident RAuxAF flying squadrons. Operational squadrons were also based in Hong Kong, Malaya, Egypt, Aden and Malta as well as a considerable presence in Germany, although 85 per cent of the RAF was based at home. The Korean War was at its height with RAF pilots flying combat missions with both the United States Air Force (USAF) and the Royal Australian Air Force (RAAF) before the conflict resolved into the uneasy truce which continues in the Korean peninsula to this day. The Service was also heavily committed to operations against the Communist insurgency in Malaya.

Across the following seven decades the RAF has been a constant presence around the globe. Although under successive governments the Service gradually withdrew from its network of fixed bases in the Middle and Far East, agreements and alliances as well as successive conflicts and crises have seen its servicemen and women operate from every inhabited Continent on Earth in the intervening period, whether flying on operations, exercises or in response to crises or natural disasters. As the world political scene has changed so have the areas of the world which have seen the familiar RAF roundel. Some have faded with the passage of time and some are more surprising than others. From the 1950s onwards, each decade of Her Majesty's reign has seen active operations. In that decade Britain's long-standing relationship with the Sultanate of Muscat and Oman, which pre-dates the advent of air power, saw RAF armoured cars and aircraft as varied as Avro Ansons, Venoms and Lancasters supporting the Sultan against both internal and externally fomented tribal unrest. The RAF helped to establish the Sultan of Oman's Air Force and deployed a detachment of support helicopters in the 1970s to assist with further operations against insurgents in the Dhofar region of Oman. That positive relationship continues to this day. A particularly brutal campaign in Kenya in the 1950s against the Mau Mau insurgency saw RAF aircraft deploy in support of the army and police. In the 1960s the RAF operated Shackletons from what is now Madagascar, flying on the Beira patrol, and in the same era deployed Gloster Javelins to Zambia all designed to undermine or deter the white-minority government in Rhodesia (now Zimbabwe). Operation *Firedog*, the lengthy counter-insurgency campaign in Malaya, came to an end at the start of the decade but was followed by a three-year commitment to managing so-called Confrontation with President Sukarno's Indonesia, including suppressing the rebellion in Brunei and Sarawak on the island of Borneo. A harbinger of a more serious conflict to come was the rapid deployment of British forces to Kuwait in 1961 to deter a threatened Iraqi

invasion, a threat which was to rematerialize with more serious consequences exactly three decades later. At the end of the decade Britain's withdrawal from Aden in 1967, after 128 years' of British rule, saw the RAF base at Khormaksar close and the Service's near fifty year association with the area come to an end.

Throughout the 1950s and 1960s Britain's commitment to NATO and the Cold War saw the RAF maintain its presence in Europe through RAF Germany and sustain the nation's nuclear deterrent via the iconic V-bomber force until the commitment transferred to the Royal Navy in 1969. That this deterrent policy, both conventional and nuclear, was both successful and necessary has assuredly been proven by recent events in Ukraine. The 1970s was the decade in which economic pressures saw the RAF largely withdraw from its bases 'East of Suez'. British defence policy largely re-focused on NATO. That the Service was still capable of deploying air power globally was amply demonstrated by its response to Argentina's invasion of the Falkland Islands in 1982, covered in greater detail elsewhere in this edition. The concentration on NATO and the withdrawal from permanent global bases meant that the conflicts which arose outside the continent of Europe, starting with the first Gulf War in 1991, inaugurated an era of expeditionary warfare which provided new challenges to the Service with lengthy tours in the Middle East and Afghanistan increasingly the norm. While the two wars with Iraq in 1991 and 2003 saw intensive conflict and notable contributions to the US-led coalitions it is easy to forget that throughout the intervening decade the RAF maintained a considerable presence flying constantly on the northern and southern watch operations over Iraq. This was followed by the equally lengthy commitment to operations in Afghanistan following the 9/11 attacks. Thus, in the decades since 1991 RAF squadrons have returned to areas of the world which would have been all too familiar to their grandfathers and great grandfathers including flying combat missions over Iraq, Afghanistan and Libya, countries in all of which their forebears served for lengthy periods.

In the seventy years of Her Majesty's reign the Royal Air Force itself has undergone considerable change reflecting a spectrum of the changes within society itself. Significant milestones along the way have seen the changing place of women in society mirrored by the demise of the Women's Royal Air Force and the full integration of women into the Service and their acceptance into every combat role. Likewise, the wider societal recognition that the persecution of the LGBT community was morally wrong has seen the restrictive and harsh treatment meted out to gay servicemen and women replaced by a more enlightened and inclusive attitude: arguably, however, it could be viewed that it took too long for those changes to filter through to the armed services as a whole. While the Service has reduced in numbers over the years to a level roughly consistent with its size between the two World Wars, it has maintained its reputation amongst the world's most effective and advanced air forces. It has helped maintain the peace and, when the Government judged it necessary, gone to war. It has served Queen and Country and has done it with pride and with honour, wherever and whenever required.



1950

# The RAF's Coronation Day

This paper was first published in *The RAF Quarterly* in July 1953 and is reproduced here in its original form. The author was, at the time, Aeronautical Correspondent to *The Sunday Times* and late editor of *The Aeroplane*.

By E Colston Shephard

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## Introduction

All ranks and every command of the RAF, at home and overseas, were represented in the great procession through Central London which followed the crowning of Queen Elizabeth II. The Service provided elements in the Guards of Honour at Buckingham Palace and at Westminster Abbey. Several thousand officers, airmen, cadets and apprentices lined parts of the route. Eleven RAF bands took their various parts. All the Marshals of the RAF, except the Duke of Windsor, were in the procession. The Chief of Air Staff rode with the Chiefs of the other Services; the Vice-Chief of Air Staff with the other principal Service ADCs. In the Abbey, Marshal of the RAF Lord Portal of Hungerford, in charge of the Sceptre with Cross, was in close attendance on the Queen during most of the ceremony. The final salute of the day was given by fighter aircraft of the RAF and the RCAF, flying in wings line astern across the front of Buckingham Palace while Her Majesty stood on the balcony.

A distinguished part in the proceedings from start to finish was borne by the RAF. At the beginning of the day, the Queen's Colour was paraded at Buckingham Palace and the RAF Central Band helped to provide the music there. At the end of the day two RAF bands and a great column of men and women 1,886 strong, followed by two more bands, led the now rain-soaked procession back to Buckingham Palace.

All told, nearly 8,000 officers, airmen and airwomen were on duty in Central London. Of that number, 4,540 were engaged in lining the route and a further 624 were held in readiness for disposal by the police if required. The whole turnout was a credit to the Service in appearance and bearing and to the thorough training in drill and endurance which had prepared it for its share in the day's duties. This applies equally to the 114 officers and other ranks of the WRAF who appeared for the first time in their smart new service dress caps and were marching, at the end of the long, damp journey, with all the precision, briskness and vigour which had throughout evoked admiring comment. In the same leading wing were the bigger contingents of the RAF Volunteer Reserve and the RAuxAF and a small detachment of Princess Mary's RAF Nursing Service. Its rear was brought up by a unit of the RAF Regiment which displayed its customary skill in ceremonial both in the procession and in its guard mounting with the Queen's Colour at Westminster.

The day had begun in reasonable good weather and the procession to the Abbey, including senior officers from the Air Ministry, AOCs-in-C, and RAF members of the Air Council all mounted, besides the Marshals of the RAF in carriages, was warmly cheered, especially by the thousands of children on the Embankment. When Her Majesty had been crowned and the big parade set out on its longer route, rain was falling heavily. To the RAF section at the head, led by No 1 Regional Band from Cosford and No 2 Regional Band from Wyton, came the first of the cheers from the immense drenched crowds, as it led the way up Whitehall, along Pall Mall, up St James's Street and westwards along Piccadilly to Hyde Park Corner and thence through Hyde Park to Marble Arch and Oxford Street. From the middle of Oxford Street, for about forty

minutes it led the way through the open-order ranks of other RAF men lining the roads, almost to the edge of Trafalgar Square.

In the second wing were small parties from overseas, from Rhodesia, Germany, the Far East, Malaya, the Middle East and Malta – including a few locally-enlisted airmen – and then bigger contingents from No 90 (Signals) Group, Home Command and Maintenance Command. The third wing consisted of three big parties from Transport Command, Technical Training Command and Flying Training Command with a sprinkling of cadets from the two latter commands. The three combatant commands made up the fourth wing – 150 officers and airmen each from Coastal, Fighter and Bomber – and their broad columns of smartly-marching men set a splendid standard for the rest of the procession. Behind them came the RAF College Band from Cranwell and the RAF Regiment Band from Catterick. Much farther behind, in the carriage procession, were the nine Marshals of the RAF, among them Lord Trenchard. They shared the drenching with the younger men, for no carriage hood was raised.

While this fine parade was in progress under low clouds, the fate of the fly-past had been in doubt. When rain ceased in London, the cloud base remained low, both on the line of approach and near the saluting base. With the prospect of some slight improvement in the late afternoon, the fly-past was first set back half an hour. Then, for the sake of safety, the ambitious plan of flying three wings in arrowhead formation at the head and the rear with a wing of the RCAF in box formation between them, was abandoned. This form of salute had been magnificently accomplished in rehearsal. Now it had to be changed so that the wings flew in line astern, still with the Canadian wing in the centre of the stream. The intervals between wings was also greatly increased. Whereas the whole parade of 144 Meteors of the RAF and 24 Sabres of the RCAF was originally due to pass across the Mall in fifteen seconds, the procession on the day occupied three minutes in passing the saluting base, an interval of thirty seconds being allowed between wings.

Fighter Command provided all the Meteors in the fly-past. They came from Squadrons 1, 41, 54, 56, 63, 64, 65, 74, 245, 257 and 263. The RCAF Sabres were from Squadrons 410, 439 and 441. The wings, flying independently from Duxford, Tangmere, Biggin Hill, North Luffenham, Wattisham, Horsham St Faith and Waterbeach, made their rendezvous near Canterbury and thence passed over Dungeness to Bexhill, where they turned north for their first checkpoint at Biggin Hill, closing up as they approached. Course from there to the Mall was held with the help of a succession of orange flares set on the ground and also of a responder beacon placed in Regent's Park beyond the Mall. In its modified shape, the fly-past was beautifully done. Each wing in excellent formation passed over the prescribed spot in the Mall, some 600 yards east of Buckingham Palace. Her Majesty and the Duke of Edinburgh sighted each wing while it was still well to the south of Westminster and followed it until it disappeared to the north. The young Duke of Cornwall, with his parents, evinced a keen interest in each renewal of the air salute.

For all concerned in these celebrations, duty was made more arduous by unpleasant weather, yet training and fine spirit gave to the share taken by the RAF a competence, vigour and zest which contributed much to the satisfaction of the crowds and, no doubt, to the gratification of Her Majesty. The Service, on this showing, deserved to lead the procession and to conclude the salutes. Air Vice-Marshal Lord Bandon, who commanded the fly-past, and Air Commodore B C Yarde, who was in command of the procession contingents, earned the warm congratulations they received; and every officer, airman, cadet, apprentice and boy entrant, on the march, on guard, lining the streets and playing in the bands, behaved worthily.

1960

# Britain's Independent Deterrent

This paper was first published in *The Hawk* in December 1960 and is reproduced here in its original form. The author was, at the time, a student on No 50 Staff Course at the RAF Staff College, Bracknell. Following a long career in the RAF, reaching the rank of Air Commodore, he became Head of the Air Historical Branch, a post he held from 1978 to 1989.

By Flight Lieutenant H A Probert MBE MA RAF

The author's rank is reflected at the time of the original article's publication, which has been reproduced in its entirety.

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'I know not what course others may take; but as for me, give me liberty, or give me death!'

*Patrick Henry*

## Introduction

**T**he decision of the British Labour Government to make the atomic bomb sparked off a controversy which may yet have many years to run. The atomic bomb and its successor, the hydrogen bomb, have, in conjunction with their means of delivery, formed the nuclear deterrent around which British defence policy has been built. This deterrent policy has always been fairly generally accepted, but from the start there have been those who, for varying reasons, were opposed to our possessing a nuclear deterrent. Some were pacifists who wished us to renounce arms entirely; others, while not pacifists, considered that the appalling destructiveness of nuclear weapons placed them in a category quite distinct from the so-called conventional weapons, and therefore urged that Britain should have nothing to do with them. These 'nuclear abolitionists', though growing in number, remain a small minority compared with those who accept that nuclear weapons, horrible as they are, form the ultimate safeguard of the Western World.

The American atomic bombs dropped on Hiroshima and Nagasaki in 1945 gave the world a convincing demonstration of the new destructive forces that had been unleashed. Although we can never be certain, many people believe that the USSR was deterred from launching a full-scale attack on the West during the years immediately after 1945 only by the knowledge that the USA possessed atomic bombs and the means to deliver them. Since then the USSR has herself developed nuclear weapons, and both the USA and USSR have been deterred from attacking each other by the knowledge that the other could retaliate with devastating power. The British decision to enter the nuclear arms race was based primarily on the assumption that the possession of nuclear weapons was one of the criteria of a great power. What was more natural than that Britain, whose bombers had played a vital part in winning the war and whose military prestige stood high, should wish to continue in the van of military techniques? Not all were convinced, however, that our decision was wise. Apart from those who objected to nuclear weapons on principle, there were many who saw little point in duplicating the American effort at great cost to ourselves. They realised the value of the nuclear deterrent for the Western World, but believed that as long as the USA possessed the deterrent and remained our ally, we could safely leave that part of the Western defences in her hands; our smaller resources could be more usefully devoted to the conventional forces needed for small-scale wars.

The critics of our independent deterrent failed to carry the day; as a result we now have a substantial force of V-bombers, capable of delivering hydrogen bombs to a large number of targets in the USSR. Military science, however, never stands still, and while our V-bombers should remain an effective means of delivery for at least another five years – maybe up to ten – they will eventually need replacement. Until recently British policy was staked on the development of Blue Streak; with its abandonment we now face the apparent necessity of

buying an essential part of our means of delivery from the USA. It is therefore being widely asked whether there is any point in retaining our costly nuclear deterrent any longer, and the object of this article is to examine the case for Britain's independent nuclear deterrent to see whether it is, as so often claimed, vital to our defences.

### **Britain's Position in the World**

In the 1956 Statement on Defence it was said that 'our forces must make a contribution to the Allied deterrent commensurate with our standing as a world power'. This theme that Britain is still a world power, or a first-rate power, has underlain nearly all our military thinking since 1945, and it was certainly one of the main assumptions on which the decision to make nuclear weapons was based. Is it, however, realistic to consider ourselves a great power, with or without nuclear weapons? A great power is surely one which cannot merely exert great influence on world events but can successfully defend its own vital interests without outside assistance. During the nineteenth century we were by that definition a great power, but although we can still influence world events to some extent we can no longer, even with our nuclear weapons, defend all our vital interests unaided. Dr Kissinger has truly pointed out that none of America's allies could conduct a war against smaller powers without either American protection or Russian acquiescence. The over-riding factor in the military situation today is the balance of power between the USA and the USSR. Our population and resources are in no way comparable with theirs, and whether or not we have a nuclear deterrent cannot affect this balance. It is therefore irrelevant to argue in favour of retaining the deterrent on the grounds that it alone prevents us from being relegated to the ranks of the second or third rate powers; whether we like it or not, we no longer have that major influence on world events that would entitle us to the status of a first rate power.

### **Britain's Position in the Western Alliance**

It is often contended that our possession of nuclear weapons would give us more influence in the general direction of allied strategy in wartime and in the determination of peace terms. Such talk seems a little unrealistic when we contemplate the likely effects on this country of a nuclear holocaust. We come on to rather firmer ground, however, with the suggestions that our nuclear power gives us greater influence over allied policy in peacetime than we should otherwise possess. While military power – in nuclear or any other form – is by no means the sole criterion of a nation's influence within an alliance, there can be little doubt that the possessor of strong military forces is listened to with greater respect than he who restricts his forces to the barest minimum and whose determination to support the alliance may consequently be suspect. That our statesmen have in recent years played a leading role in the counsels of the West is largely because they have not been forced to go naked into the conference chamber. Our allies see our independent deterrent as the measure of our resolve to undergo the most appalling physical horrors rather than submit to Communist domination.

We often hear it said that we are making an important – even essential – contribution to the overall Western deterrent, and our ego is flattered when we hear that General Power, the

Commander of the United States Strategic Air Command, regards the V-force as an essential part of the Western deterrent, with an important place in the joint operational plans. 'With Britain's closer proximity to Russia', he said, 'we rely on the V-bombers to provide an important part of the first wave of the allied retaliatory force'. It would be strange if the V-force, being available, were not included in the joint plans, and we could hardly expect General Power to deny its value. Yet are we to believe the SAC is too weak to pose on its own an insupportable threat to the USSR and that the V-force would make the difference between success and failure if it came to the point where nuclear weapons had to be used? In the 1955 Statement of Defence we note that 'the primary deterrent is the atomic bomb and the ability of the highly organised and trained United States strategic air power to use it', and this theme is continued in the subsequent Defence White Papers. Dr Kissinger considers that the USA finds bases in Britain more useful than the British strategic air forces, and Air Vice-Marshal Kingston-McCloughry reinforces this by saying that the USA expects the Commonwealth to provide base facilities for her deterrent strategic air forces, but does not press us to provide any substantial force. 'Whatever strategic air forces we provide', he goes on, 'arise out of our own national considerations'.

It is therefore hard to justify, from a purely military point of view, our contribution to the Western nuclear deterrent. If perfect harmony existed and could be guaranteed to continue between the members of the alliance we should indeed do better to leave the nuclear weapons entirely to the USA. Unfortunately such harmony is never likely to be achieved, and within an alliance whose members have many conflicting interests our nuclear power largely determines our degree of influence.

### **Independent National Defence**

As we turn to the purely national considerations behind our deterrent policy, we must first ask ourselves, 'Under what circumstances would we ever be ready to use our nuclear weapons?' The concept of mutual deterrence is based on the fact that neither side can defend itself effectively against nuclear attacks; neither side will therefore risk attacking the other because it knows it will receive a nuclear attack in return. This country, being small and relatively close to Russian bases, is particularly vulnerable to Russian attack. Very few hydrogen bombs would be required to deal a devastating blow, and when the Minister of Defence stated in 1957 that the Government had decided not to try to protect the whole country but only the bomber bases, he was admitting that there were no means of protecting us. If we used our nuclear weapons against Russia our country would almost certainly suffer irretrievable damage. One of the arguments often used to support our independent deterrent is that we have overseas interests which are vital to us but not to the USA, and since we cannot expect the USA to commit her nuclear weapons to the defence of such interests, we ourselves must be able to deter attacks on them. Can we, however, honestly regard our deterrent as credible in such circumstances? If a deterrent is to deter, the opponent must be convinced that the physical threat will be used in certain given circumstances, and it is reasonable to assume that Russia would believe us willing to face the consequences of using nuclear weapons only if our

homeland were directly threatened. We are therefore driven to conclude that our independent deterrent stands a reasonable chance of deterring only an attack on our homeland or on our immediate neighbours in Western Europe, which are so close to us that our fate must be linked inextricably with theirs.

We have so far assumed that Britain has the power to deliver nuclear weapons to the USSR and therefore pose a threat to her. It is possible to define precisely the extent of this threat, but our strategic bombers could certainly destroy sufficient Russian cities to inflict very serious damage on the USSR as a whole, although we could probably not strike her a mortal blow. Our deterrent power is aptly illustrated in the simile coined by Mr R T Paget MP, who suggested that the country possessing the hydrogen bomb has the power of the bee as represented by its sting – if the bee uses it, it dies; yet we all handle bees much more carefully than if they had no stings. The threat we pose should therefore make the USSR reluctant to attack us, but it has a further advantage: the damage Britain could inflict would place Russia in an unfavourable position relative to the US which remained undamaged, so if Russia decided to attack this country and thus provoke us into striking back she would almost certainly feel impelled to attack the USA at the same time. In any case her radar defences could hardly be expected to distinguish between British and American aircraft or missiles; in any nuclear exchange she would have to assume that both Britain and America were involved. As long as we have an independent deterrent, therefore, we can virtually guarantee that the American deterrent is also staked on any issue between the USSR and ourselves that we regard as vital.

It may, however, be asked whether there is any need for this form of guarantee that America will associate herself with us in a nuclear war. Surely if the Western Alliance means anything, it means that an attack on one member will be regarded as an attack on all. Furthermore, the presence of American armed forces – and particularly of Strategic Air Command bases – in Britain and Western Europe must automatically involve the USA in any European war, so the American deterrent is as effective in Europe as it is in America. This line of argument is a compelling one, but it does presuppose a continuing identity of interest between the USA and ourselves. In 1959 Mr Shinwell pointed out that, although generally we were on good terms with the USA, 'some day there may be some mischief at work, some misunderstanding may arise, some point of disagreement may occur, and we might find ourselves isolated'. Mr Sandys said in 1957 that 'so long as large American forces remain in Europe, and American bombers are based in Britain, it might conceivably be thought safe to leave to the United States the sole responsibility for providing the nuclear deterrent. But when they have developed the 5,000 miles inter-continental ballistic rocket, can we really be sure that every American administration will go on looking at things in quite the same way'?

One of the lessons the USA learnt from the Second World War was that she could no longer isolate herself from the affairs of the Old World – with the development of long-range strategic air power the Atlantic and Pacific Oceans ceased to be the insuperable military barriers behind which America had so far sheltered. To be secure she must be able to contain any nation in the

Old World which might threaten her, and she could do this only by closely associating herself with her friends in Eurasia. Her strategic air forces could pose an effective deterrent threat to the USSR only if they could operate from bases within striking distance of the Russian centres of population. Now, however, it is becoming possible for the USA to pose a deterrent threat to the USSR either from her own soil or from the ocean; with the ICBM and the submarine-launched missile she may be able to dispense with her overseas bases. General Gavin suggests, in *War and Peace in the Space Age*, that the conservative school of military thinking in the USA wants to do just this. A reversion to isolationism – albeit in a new form – will soon therefore be theoretically possible.

How likely is it that the USA will in fact retreat into her shell, relying entirely on long-range missiles to deter any attack on her? We know to our cost how extreme was the isolationism practised by the USA before the Second World War, and we hardly need reminding that she refused to enter either world war until provoked by overt acts of hostility against her. The temptation to divorce herself once again from the quarrels and rivalries of the Old World may again become strong when it is no longer essential for her to be militarily involved in them. We must bear in mind that the USA would suffer appalling devastation were she ever to use her nuclear weapons against Russia, and in this connection a quotation from Mr Bernard Brodie, writing in *World Politics*, is apposite: 'When the United States thinks of deterrence as something to be practised concerning territories away from the USA, whether or not her population is reasonably protected becomes all-important. If it is not, the United States leaders may be reluctant to come to the defence of allies if they are threatened or attacked – despite present treaty commitments'. What it comes down to is: 'Would the United States Government and the American citizens risk the destruction of their cities on behalf of Europe?' – to use Mr Gaitskill's words. At present, with bases in Europe, they would have little choice, but once the chance of opting out of Europe was offered them, they might well decide to extricate themselves from a position in which their survival was automatically linked with the fate of Europe. They could certainly use the threat of withdrawal as a means of forcing unwelcome policies on the nations of Western Europe. Admittedly an American withdrawal from Europe remains unlikely but it is less unlikely now than it seemed some years ago when the ICBM was thought to be in the distant future. It is not pleasant to have to cast doubts on the reliability of the Anglo-American alliance, but no alliance in the world has ever been subjected to the strains that would be imposed by the threat of nuclear destruction, and while we might hope that the USA would be willing to undergo such destruction on our behalf, we have no right to expect it of her. Our independent deterrent is the guarantee that should America withdraw from Europe – and she might – we should not be left defenceless.

In discussing the national considerations we must mention one further argument that has often been used to defend our independent deterrent. Air Vice-Marshal Kingston-McCloughry pointed out that the USA and her potential were less vulnerable to Russian attack than the United Kingdom; it was particularly important for us that the Soviet bomber bases should be among the first targets attacked. 'Unless Britain makes this contribution', he wrote, 'she could

not be sure that the exact targets of cardinal importance to her would be given the necessary priority in the first few hours of total war'. As Dr Kissinger commented, such an argument is a sad reflection on the Western alliance. Much more important, however, is that it misses the whole point of our deterrent strategy. Our deterrent – or any deterrent, for that matter – has failed once the physical threat has to be used; we hope that by threatening to cause severe damage to the USSR we can deter any attack on ourselves, but if Russia did decide to attack us despite this, nothing we could do in the way of attacking particular targets could avert catastrophe.

### **The Division of our Limited Resources**

So far we have thought entirely in terms of deterring a major Russian attack on this country. We cannot, however, ignore the many other military threats we have to meet – threats which, although much more limited in nature, are far more likely to materialize. Since we are unlikely ever to be willing to use our nuclear weapons except in defence of our homeland and its immediate approaches, our deterrent is useless as far as meeting these other threats is concerned. Many of the critics of our independent deterrent have suggested that in trying to equip ourselves with the forces for both total and limited wars we have so divided our resources that we have effective forces for neither. As a result our politicians are not being given the room for manoeuvre they need. Lord Montgomery was unhappy about the present state of affairs when he said to the RUSI in 1958: 'If the deterrent is regarded as an independent national thing ... we cannot also afford proper conventional forces'. He was not, however, prepared to go the whole way and advocate leaving the deterrent entirely to the USA in order to concentrate on conventional forces. Some would have us do this, contending that the military forces within the Western alliance should complement rather than duplicate each other. They suggest that the USA would prefer to see us making a first-rate conventional contribution to the alliance, and point out that there would be nothing invidious about sheltering under the American wing; we should merely be doing what the Americans themselves did during the nineteenth century, when they relied in effect upon the British fleet for their protection. However, we do well to remember, as Mr Watkinson reminded us in this year's defence debate, that our independent deterrent costs only about 10 per cent of our total defence budget. Certainly this amount of money, if devoted instead to conventional armaments, would increase the power of our limited war forces, but as Mr Sandys put it in 1959, the increase in conventional strength would be negligible compared with our loss of military power and influence. If the national considerations in favour of the independent deterrent are valid, we have no choice but to accept the cost of that deterrent and the consequent limitation of our conventional forces to those we can pay for from the balance of our defence budget.

### **A Dangerous Example**

There is one other result of our possessing an independent deterrent that we must take into account. The arguments we have used in its favour are equally compelling to other nations. France has already joined the 'nuclear club', and Mr Grimond, who has frequently pointed out

that our policy encourages other nations also to make nuclear weapons, estimates that at least eleven other countries are capable of doing so. A Labour MP, Mr Osborne, while accepting that once one nation possessed nuclear weapons it was better that a second should have them as well, argued strongly in the 1955 defence debate that the world would be much safer if no further nations possessed them. 'We should try to prevent the proliferation of these hideous weapons under sovereign national control', he urged. We can but agree that the fewer the nations possessing nuclear weapons the better; the risks of nuclear war occurring by accident, by miscalculation, or even by design will grow as nuclear weapons spread – and particularly as they spread into the hands of the less responsible members of the international community. How likely is it, however, that our abandonment of nuclear weapons would prevent any further spread? It might prove successful in Europe, although this is less likely now that France possesses atomic weapons. We cannot conceive of it being successful as regards China, and such folk as Colonel Nasser and General Kassem would probably be only too delighted to get their hands on some nuclear weapons. To relinquish our deterrent would certainly be a striking moral gesture and would be so acclaimed in many parts of the world: like so many moral gestures, it is highly doubtful whether it would serve the cause of peace.

### **Can Our Deterrent Remain Independent?**

Before concluding, we must deal briefly with the contention that our deterrent cannot be truly independent if we have to buy an essential part of its means of delivery from another nation. Since, it is argued, the main object of preserving our own deterrent is to prevent ourselves being completely at the mercy of American policy, it becomes pointless if we depend on America to provide it. Let us remember, however, that Sky Bolt is a joint project, on which British as well as American scientists are engaged; in the unlikely event of a change in American policy causing our exclusion from the project we should therefore be capable of continuing it on our own, although at greater cost. In any case, as had already been pointed out, our possession of nuclear weapons and some sort of means of delivery – provided it is not completely obsolete – ensures in effect that the American deterrent is also staked on any issue that we consider vital. There is therefore no reason why, as long as we can deliver strategic nuclear weapons, our deterrent should be regarded as anything other than independent.

### **Conclusion**

The case for our nuclear deterrent does not rest on outworn conceptions of our status as a great power, nor can we honestly contend that our nuclear striking power is an indispensable part of the overall Western deterrent. What our independent deterrent does is to give us a degree of political influence within the Western alliance immeasurably greater than we should have if we abandoned it. Even more important, we must always reckon with the possibility of an American withdrawal from Europe, a withdrawal that would indeed be made more likely if we gave up our nuclear striking power. Our independent deterrent is therefore the keystone of our national defence, and it would be the height of folly to abandon it. Admittedly it is expensive and whatever means of delivery we decide upon to succeed our V-bombers will be even more costly, but the price we must pay is the price of our liberty.

1970

# Thinking About Air Power

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By Air Chief Marshal Sir Neil Cameron GCB CBE DSO DFC ADC RAF

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‘The art of war, as it is certainly the noblest of all arts, so in the progress of improvement it necessarily becomes one of the most complicated among them. The state of the mechanical, as well as some other arts, with which it is necessarily connected, determines the degree of perfection to which it is capable of being carried at any particular time.’

*Adam Smith, 1723-90*

## Introduction

**T**here are some, no doubt, who would take issue with the eminent professor of moral philosophy that the art of war is the noblest of all arts, but few who know anything about it would argue with his precept that it is a complicated business much affected by the sweep of technology and the changing world scene. This article is about the art of using the air for warlike purposes, or air power as it has come to be known.

During the past two years or so Moscow has woken up to the fact that the offensive use of air power can have a dramatic effect on events, not only in the sophisticated environment of Europe but also throughout the rest of the world, where the introduction of even a small force of aircraft (and usually by proxy) can tip dramatically the balance of events. So the Soviet Air Force is now sent on a programme of improving its quality – it always has had quantity – and the types of aircraft, radars, and missiles that are becoming obsolete as improvements are made are proving very useful in ensuring the maximum Soviet influence throughout the world as and when an opportunity presents itself.

This is the situation which now faces the West. It means working to keep ahead of the Soviets in the qualitative sense and at the same time assessing what can be done to counter Russian sorties into the maelstrom of the Third World. Thinkers in the defence world must consider whether one possible aim of Soviet strategy is to lure the bulk of our forces into the heartland of Europe whilst their own naval and air forces reach out further afield, at a time when limitations on natural resources are becoming apparent and of greater strategic significance. Could the conventional political and military lines in Europe be outflanked and what can and should we be doing about it?

## The Unanswered Questions

In looking at the way ahead for air power the tendency has been to accept the present Central Europe scenario as a situation which will continue as far as one can see into the future and so plan accordingly; but is this a fair assumption? We need to ask some deeper, more probing questions if we are to explore fully all the capabilities which military power may need. For example, could the West accept a progressive annexation by the Soviet Union of more and more of the world's natural resources? Can we ignore the possibility that the Warsaw Pact could be fragmented by internal pressure, particularly from the Eastern European states, leading to new alignments? Whether or not that happens can we be certain that the Atlantic Alliance will survive in its present form? Can we be sure that none of the nations of Europe

will ever again be obliged by sheer necessity to intervene outside their own continent? What influence might China have on all these uncertainties? Have we thought enough about the consequences of the spread of nuclear technology?

## **The Extra-European Challenge**

There is no end to the questions, and no one is in a position to give definitive answers. But one reasonable major assumption for the future is that a static super power confrontation in Europe will contrast with an increasingly dynamic confrontation elsewhere. Is it the Soviet intention to test the West in a series of small wars or crises in various parts of the world? Or is the major purpose of the Eastern Bloc's enormous military potential in Europe to divert our attention from the rest of the world? If this kind of challenge does materialise, it will be characterised by geographical diversity. The West will need many qualities to counter this probing successfully. Not least will be the acumen to recognise the threat for what it is, and any action resulting will require political will and determination. The more measurable qualities of mobility and ubiquity will also be at a premium; the characteristics of air power in their widest sense fortunately provide just these qualities. In the Middle East, for example, in 1973, considerable tactical air resources were injected into the area of conflict by both super powers. In Angola, proxy military forces were introduced by Soviet long-range strategic air transport.

Oddly enough, there is some parallel with the era of pre-revolutionary wars 200 years ago. It can be argued that the thermo-nuclear element of confrontation has taken the world away from the type of conflict practised in two world wars, and back to the kind of cautious manoeuvring and relatively minor campaigns by small professional armies that were seen in Europe towards the end of the eighteenth century. As Michael Howard recently put it, 'To pile up such minor successes until their aggregated weight and financial exhaustion compelled the adversary to make peace seemed preferable to staking all on a battle in which advantages accumulated over several years might be thrown away in as many hours; especially since the political objectives for which the wars were fought were seldom such as to justify so bloody a solution'. The armies of those times were seeking local decisions, but they were compelled to do so at the lowest possible risk because the stakes were high. The stakes were the armies themselves, extremely expensive and indispensable elements of power. Now the risks must be kept low because the stakes are nothing less than national survival.

Without overstating the case, what all this probably means is that, whereas in the recent past weapons systems have been determined by the requirements of war in the Central Region of Europe and modified by actual wars outside it, we cannot be sure that such a situation will persist. It may be that extra-European conditions could, or even should, have more influence on our systems in the future. I have already suggested that the demarcation in Europe may not be our only concern in the longer-term future. For example, it is not inconceivable that the West could be drawn into some sort of African or Middle East imbroglio during the next

twenty years; perhaps we have already seen such an example in the recent French airlift of Moroccan troops to Zaire.

## **Concepts and Technology**

If our plans are to remain valid through the next quarter of a century or so, we need to do two things. We need to develop robust concepts for future air power, and we need to know what will be the most significant areas of technological progress so that we can understand their military implications. Of course, concepts and technology overlap: each tends to drive the other. But let us accept that concepts give us the directions for air power to look, that technology (and the constraints upon it) will tell us what might be practicable, and that doctrine defines how we apply the result. We can then attempt a useful analysis, although a perfect analysis is precluded by the uncertainty of the evidence. In any case if we really could produce firm answers from such analyses, then we would expect a potential opponent to be able to reach the same conclusions and to rearrange his military affairs accordingly. Even apparent certainties would thus prove fugitive. Perhaps all we can hope to do is to suggest the areas in which we are most likely to need flexibility, and those in which we are most likely to find it.

## **Concepts**

If we look first at concepts, we see that they must depend in the first place on what capabilities are going to be needed and where. Clearly in this kind of thinking the European confrontation is of considerable importance. There is a kind of balance in Europe which, if disturbed, might be tipped very quickly and perhaps irreversibly against the West because of the massive Warsaw Pact air forces and mechanised ground forces held at very high states of readiness. Even if the Alliance had the necessary reserves of ground forces to match a surprise offensive, it is difficult to see how enough of those reserves could arrive in time to help conduct the forward defence to which the Alliance is committed. It would be the vital function of air power to intervene to restore the balance in these circumstances. Alliance air power must then be capable of a highly effective reaction in war, not only without the benefit of a lengthy period of preparation, but perhaps with little or no opportunity even for innovation or adaptation. When Napoleon said, 'Go, Sir, gallop, and don't forget that the world was made in six days. You can ask me for anything you like except time', he was thinking in terms of days or even weeks: we must think in terms of hours. Yet because we are members of an alliance that is explicitly structured for defence, surprise will be one of the most lethal weapons in the armoury of the opposition.

## **The Advance of Technology**

Some months ago Dr Malcolm Currie, the former US Director of Defence Research and Engineering, said, 'We should compete in areas which can neutralise the massive Soviet investments and render them impotent. We must compete in an arena in which technological content over a range of the most challenging and difficult technologies will be dominant, and then make up our minds nationally to win the competition'. He went on to identify tactical missiles and precision munitions as one such arena.

As air strategists we need to think about what this implies. Because modern technology has led to large increases in costs as well as in performance, front lines now comprise smaller numbers of fewer types of aircraft. The fact that an aircraft like Jaguar can carry up to ten times the bombload of a Second World War fighter-bomber has to be considered in the context of this great numerical reduction in resources: the loss of one Jaguar would have a greater material effect than the loss of ten aircraft in World War II. This is a theme I shall return to later when I discuss attrition.

Complexity and cost have made it much more difficult frequently to re-equip air forces. Before World War II, design teams would visit annual air shows to weigh up one another's products and then go off to design something new for the following year. Now the gestation period is more like ten years, and once in service aircraft tend to stay there a long time. Some of our present aircraft, the Vulcan for example, took ten years to plan and develop and have now been in the front line for over twenty years; we can expect at least that length of service from the new generation of aircraft, the Tornado among others. This means that we are designing weapons systems for crews who have not yet been born, with squadron commanders who are now celebrating their sixth or seventh birthday.

So far I have been arguing for open-mindedness when discussing the future of air power and pleading that we get away from what has become known as replacement thinking. I would now like to look at the tools which are likely to be available as a result of new technology.

## Electronics

In the whole field of technological development, electronics seems likely to have the most profound influence on the future development of air power. Micro-electronics and micro-processing are already producing miniaturised systems with an extraordinarily high density.

Only twenty-five or so years ago, 'computer' meant at least a small room full of cabinets, and as recently as ten years ago a computer had to be at least the size of a large typewriter. Now many are literally pocket-size, and the central element – the chip on which are printed the integrated circuits – can be examined only under a lens. Just as remarkable has been the rapidly falling cost of computer capacity, which had been reducing at something like 20 per cent a year. The scale of this 'computational plenty', the low cost and the savings in weight are already profoundly affecting the air environment and the possibilities for the future are enormous.

The result of all this is that complex but expendable equipment will be feasible. By combining miniaturised electronics with the extreme precision with which it will be possible to measure differences of time, very accurate and reliable guidance and navigation systems can be built. These small, relatively inexpensive systems will have particular uses in weapons and weapon

delivery, and their development is likely to have three important consequences. First, their reliability will increase their lethality. Second, the computer element of the system will be tiny, and although the sensors may not be miniaturised to the same extent, the whole system will be much smaller. The opportunity to choose between more fuel, more explosive and more weapons will be extended. Third, accuracy will be even less a function of range than it is today, and the lethality of longer-range weapons will be greatly increased.

These three advantages of weight, reliability and accuracy represent three variables for future designers to employ in producing weapons for particular needs, and some targets that have so far been thought unsuitable for conventional weapons may be more vulnerable as a result. A fundamental review of targeting policy will be necessary as the full range of highly accurate weapons becomes available.

## **Radar**

It also seems certain that the full potential of radar has not yet been exploited. One can foresee the further development of very long-range radar, and also accuracy and discrimination over shorter distances. With its ability to locate and identify point targets, it may complement or even surpass optical systems, particularly in operational conditions and in low visibility.

The disadvantages inherent in other fields of beam energy may well be overcome, such as the attenuating effect of atmospheric particles on laser and infra-red beams and the enormous power needed for high energy beam effects, although there is no real sign of it so far. Lasers may have particular application at altitudes where atmospheric attenuation is not significant. The massive power sources for destructive beams may be available where they are most needed – in the defence of large, fixed targets exposed to attack by, say, ballistic missiles. Some interesting conclusions may be drawn from the current controversy about Soviet capabilities in this field, and, whatever those conclusions are, their application to future strategic weapons systems may well also have an effect on theatre weapons and, of course, the strategic balance.

## **Electronic Countermeasures**

Developments in ECM will also influence almost all aspects of future warfare and they will be particularly relevant in the air. Efforts to counter enemy electronic systems, on the other hand, hold less prospect of success because they cannot be fully applied until the enemy electronic capabilities are identified. Because of the closed nature of Soviet society, and the open nature of our own, this may not be until after the start of hostilities by which time the Soviet Union may hold the advantage. The critical factor will be the flexibility that can be built into our ECM and ECCM equipment so as to cover a wide band of possibilities, and the speed of analysis of new threats necessary to exploit this flexibility. But nothing can really change the 'leapfrog' nature of electronic warfare, so we must put ourselves in the best possible posture to fight the electronic war.

## Aircraft and Engines

In aerodynamics, we can expect the refinement of airframes capable of high speed and very high altitude performance. More emphasis seems likely to be given to a search for very high general aerodynamic efficiency, from which both manoeuvrability and low-speed flight would benefit. A primary goal must be to change the fundamental performance characteristics of aircraft to eradicate their dependence on lengthy operating surfaces and to improve their combat agility.

There are many signs that more efficient aero-engines are feasible and it is possible that the energy of fuels may be improved by using additives. Payload and range would then increase the general efficiency of aircraft, bringing valuable improvements in military capabilities and providing much higher specific excess power for critical phases of flight such as combat manoeuvre, and for take-off at full war load. Another attractive development would be the use of supplementary thrust sources such as small rockets to avoid incurring the usual weight penalties over the whole flight and such devices may come to play a part in a general trend towards shorter airfield operating requirements. Finally, a combination of engine and airframe developments leading to new possibilities in the control of air flow over aerodynamic surfaces must be thoroughly researched.

## Wither Air Power?

It is against the background of an uncertain strategic situation and these probable technological developments, that we must try to draw certain conclusions about the air environments of the future and the application of air power.

The first conclusion is that, as the enemy is likely to have the initiative, and be moving to the offensive, we must beware the pre-emptive strike and work to retain our full capability while our forces are on the ground or being deployed ready for use. This must tell us something about the future characteristics of airfields and aircraft. There are three areas in which progress must be made. First, we need to reduce our dependence on extensive operating surfaces and this is an urgent requirement. Second, because that will not be done overnight, and because it may be difficult for some types of aircraft such as strategic transport, we need to improve our resilience by presenting a more dispersed target to the enemy by means of new airfield layouts or the use of a greater number of airfields. Third, we need to present a harder target to the enemy, partly by improving our ability to recover from attack but most important of all by building up both our active and passive defences.

The next conclusion is that we must make the most of our small but effective force. This requires a largely new approach to force planning and systems serviceability which will act as a force multiplier. This will be greatly helped by the major developments taking place in command and control. Dramatic advances in signal processing methods (in particular the very rapid, secure and ECM-resistant transmission of information), coupled with new sensors and the improvements in data processing, could offer to future commanders a wealth of information to

aid decision-making and a means to dispose their forces that would have been inconceivable thirty years ago.

Complementary to these conclusions we must ask ourselves whether the term air superiority has any real meaning in the sophisticated air environment of Central Europe, particularly if the battle were to remain conventional. It may be that we will have to be content with causing the maximum disruption to the Warsaw Pact Air Forces. Outside the European scenario it still seems perfectly feasible for a well organised air force to gain air superiority over the adversary. In 1967, for instance, the Israelis achieved air superiority against the Arabs with a pre-emptive strike. By 1973, the Arab air bases had been hardened and this included a dense, ground-based air defence system, and the Israeli Air Force, after a decisive defensive operation against Syrian armoured forces on the Golan Heights, turned to defence suppression and to attacks on more diffuse targets in an attempt to disperse and thus dilute the defences. A ceasefire was agreed before a real state of air superiority was achieved, though the Israelis must have been close to it.

But in Central Europe the particular complications of the scenario, including the strategy of both sides, make it unlikely that a battle of attrition would take place giving air superiority to one side or the other before nuclear weapons began to figure in the equation.

## **Attrition**

There are some who would argue that defences are now so powerful as to make the attrition rate insupportable for manned aircraft attacks. Certainly the Warsaw Pact has deployed a massive air defence screen to protect airfields and other vital points. The experience of the Israeli Air Force in the Yom Kippur war is usually quoted to support this thesis, but how do the facts stand up under examination? The attrition rate for Fighter Command during the Battle of Britain was about 5 per cent, and that of the German bombers 8.6 per cent. The rate for the daylight USA B17 raids over Germany later in the war was 9.1 per cent – high by any standards – and during the last few weeks of World War II in Europe the attrition of the German fighter force had risen to a staggering 30 per cent. The 1967 war, acknowledged to have been an outstanding success for Israeli air power, cost the Israelis an overall rate of 1.4 per cent, with 4 per cent on the first day when they launched their pre-emptive attack. So what of the Yom Kippur war? Attrition during the critical first forty-eight hours was 4 per cent – the same as for the Six-Day war; but the overall figure was only 1.1 per cent – 0.3 per cent *less* than June 1967! Defence suppression played a vital part.

Another point is that a dense air defence system absorbs men, material and financial resources that would otherwise be deployed elsewhere. According to Albert Speer, in 1944 several hundred thousand men, over 10,000 guns, one-third of the output of the optical industry and half that of the electronic industry were employed in the air defence of Germany.

The argument on the balance between offence and defence has raged for as long as air power has been in business. Accepting the fact that we are faced by a formidable defensive system, we must identify the weak points and attack them to break down the system. Radars are clearly a vital part of any system and these are vulnerable to ECM and to direct weapon attack. One distinguished US airman has already suggested that the 'Aces' of the next war will be those who knock out the greatest numbers of radars! Command and control centres will also be vulnerable, and modern sensors and intelligence-gathering methods must quickly establish their location, and much can be done in peacetime.

In the present air defence scenario of Central Europe, it will be necessary to clear a path through the Warsaw Pact defences so that our air forces can get in amongst the airfield complexes and other vital installations further to the rear. Even their airfields will continue to be vital but difficult targets, and, to ensure they can be effectively attacked without prohibitive losses, offensive air forces must use every possible innovation. Clearly, with the sort of terminal accuracies predicted, the stand-off munition is going to be the weapon of the future, and a great deal more emphasis must be placed on its development.

## **The Cruise Missile**

That particular line of thought deserves further expansion because it leads to discussion of a weapon system of the future – the cruise missile. The concept of a relatively small, highly accurate and inconspicuous vehicle, evading enemy defences, particularly dense terminal defences, has very clear attractions. However, in two phases of the cruise missile's operating profile there are vulnerabilities. The first will be during the prolonged flight of the missile across hostile territory to the target area. The missile will no doubt be a difficult target for the defence to acquire, but once acquired, the automatic progress of the missile and the total absence of any capability to respond to specific threats seem to make it vulnerable to interception.

The second weakness of the cruise missile may lie in its vulnerability before launch. Submarine deployment is one possibility, but this is likely to be an expensive concept and one with little or no reload capability. This may not be important for nuclear-armed missiles, but it almost certainly rules out conventional warheads. If on the other hand the missile were to be ground-launched, there is the decision of whether to make it a static or mobile system. If the missile launch platform was static it would soon be registered, and be vulnerable to several forms of attack including sabotage. If it was ground mobile there would be three problems. First, although a pattern of constant peacetime mobility might seem attractive at first sight, the need to guard against sabotage would tend to make it more conspicuous, increasing its vulnerability from the air and attracting protest from the local inhabitants. Second, there is the danger that last-minute dispersal designed to overcome these objections could be mistaken for deliberate provocation. Third, the avoidance of such provocation by delaying dispersal until actual warning of attack was received would leave the missiles unlikely to get away from the depot fast enough to avoid a pre-emptive strike.



If the cruise missiles were based on an air launched system, dispersal during peacetime exercises of aircraft armed with these weapons would soon become a familiar pattern and arouse no comment; yet it would give a very high level of survivability and in a crisis it might well offer a useful balance between protection of the force and a signal of warning to a potential aggressor. In addition, aircraft can disperse very rapidly and in an extra dimension when attack is imminent. Having thus survived the enemy's initial strike, they retain a wide range of options; at one extreme they could make use of bases and support facilities which have survived attack and at the other extreme they could launch an immediate counter-strike. Lastly, aircraft can choose from a variety of directions of attack giving the cruise missile the best chance of penetrating enemy defences.

However, by whichever means it may be launched, the cruise missile lacks the vital element of human judgement by which the manned aircraft is able to adapt to changing circumstances as the mission develops. It is likely that the cruise missile and the manned aircraft will complement each other admirably by allocating the cruise missile to the bombardment of difficult fixed targets such as airfields, thus releasing manned aircraft for the more transitory objectives.

## **ENVOI**

Air forces have a vital part to play in any future war. This is true equally in the Central Region of Europe and the Third World. Flexibility has been and still is the first and most important principle of air power but it is also one which practitioners have consistently failed to exploit. Even more disappointingly, there has been an absence of flexibility in air power thinking throughout the whole history of air power. In this article I have tried to highlight the dangers of basing future planning irrevocably on present scenarios, particularly that of the confrontation in Central Europe, and the danger perhaps because of economic pressures of taking the Royal Air Force out of one of our traditional roles. This has to be avoided but we must examine the air environment of the future with an open mind, taking full account of international developments and technical possibilities.

We must now take great care to work out a balance between the value of the manned aircraft and that of the missile. I am in no doubt that each must complement the other. The most likely direction of change is towards the missile doing more and more of the terminal work whether in air defence or attack. This in turn may lead to changes in the structure of aircraft as progressively they adopt the missile carrying role.

I have tried to show that one feature common to most of the foreseeable developments in air power is a new approach to the disposition of air forces. If this teaches us that we must rearrange our airfields to reduce the vulnerability of their installations and to become more independent of long stretches of concrete, then I want us to do this effectively and in good time.

In this article I have set out not only to draw attention to the conceptual and technological challenges which confront us but also to show how the great reserves of brain power in this country, and particularly in the Royal Air Force, can be applied to them. Adam Smith was right to point to the complicated aspect of the state of war, but he could never have imagined the degree of perfection, to use his own words, to which air power is capable of being carried at the present time.



1980

## Corporate Lessons?

# Reflections on Some of the Myths, Anti-Myths Omissions of Britain's Falklands Air War, 1982'

By Dr David Jordan

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**Biography:** Dr David Jordan is Executive Director of the Freeman Air & Space Institute, King's College London, and has been a member of the Defence Studies Department since 2000. He has variously been academic director for both the air and space aspects of the Advanced Command and Staff Course and RAF Division courses at the Defence Academy, and has served as the air warfare historian to the Higher Command and Staff Course.

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**Abstract:** Although the Falklands conflict ended forty years ago, it is only in recent years that the release of contemporaneous source material has allowed correction of some of the myths and misperceptions relating to the war. The air campaign has been a particular field of contention. This article does not claim to be comprehensive but provides a short review of some of the key issues pertaining to the air war, beginning by considering the nature of the outbreak of the war and the challenges which faced the employment of British air power. It then considers use of Vulcan bombers to attack the runway at Port Stanley airfield in the broader operational context before briefly examining the part played by British carrier-based aircraft and the nature of Argentine air power. It offers a commentary upon aspects of the air war which have been largely missed out from the narrative to date, before concluding with reflections on some of the lessons which emerged from the war, noting that the Falklands conflict demonstrated the risks of a mismatch between the ambition to exercise national power on a wider stage and the capability to actually do so.

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## Introduction

On 2 April 1982, Argentina invaded the Falkland Islands, a British dependent territory almost 8,000 miles away from London, and a mere 400 miles from the Argentine coast. This was the culmination of a long and increasingly bitter dispute over the sovereignty of the islands. Despite much diplomatic effort by both parties to solve the matter, the short war which followed restored British possession of the islands. Although the war was predominantly a land and naval conflict, air power played a distinct and significant role. The history of the Falklands air war was, for many years, dominated by coverage of the Fleet Air Arm's Sea Harrier fighters, the RAF's Vulcan bomber raids against Port Stanley airport and the work of 'Bravo November', the only one of four Chinook helicopters to survive the sinking of the container ship *Atlantic Conveyor*, and which went on to play a notable part in the advance of British forces towards Port Stanley and the ultimate liberation of the islands.

While these aspects of the air war were significant – and in the case of the Sea Harriers, exceptionally important – it has become clear from the release of the Official History and most of the contemporary files that much of the air war has been subject to misunderstanding and misrepresentation, with other parts overlooked.<sup>2</sup> The most recent scholarship, notably that by John Shields, Santiago Rivas and Mairao Sciaroni, has helped to craft a more nuanced and comprehensive picture.<sup>3</sup> Nevertheless, even forty years after the conflict, the traditional narrative of the air war which was established in the years following 1982 remains well-established. This article seeks to reflect on some of the 'myths and anti-myths' of the air war, considering how the history of the air war has evolved and some of the misperceptions and misreporting that have emerged.

The article first considers the nature of the outbreak of the war, and the challenges which faced the employment of British air power – particularly carrier-based air power – as a result of past decisions that placed money ahead of capability. It then moves on to address perhaps the most persistent 'myth', that associated with the use of Vulcan bombers to attack the runway at Port Stanley airfield under the auspices of Operation Black Buck. Next, it draws attention to recent research regarding the use of the Sea Harrier and Harrier force, highlighting the role not only of the British carrier-based aircraft, but the role of Argentine air power; it suggests that the popular narrative established after 1982 is too simplistic and creates a misleading impression of how complex counter-air campaigns are, something that is only now being redressed by recent scholarship. The article then provides some commentary upon aspects of the air war which have been largely missed out from the narrative to date. Finally, the piece considers some of the lessons which emerged from the war and their implications for British air power, and for the nation's military power more generally, concluding that the Falklands conflict demonstrated the possible risks of a mismatch between the ambition to exercise national power on a wider stage and the capability to actually do so.

## Responding to a (Not-So) Unexpected War

Successive British governments had been well aware that the issue of the sovereignty of the

Falkland Islands was an obstacle to good relations with governments in Buenos Aires, which believed that Las Malvinas (as the Argentines term the Falklands) were Argentine territory, colonised by the British and under illegitimate occupation. While the British position was a firm rejection of the Argentine contention, by the 1980s there had long been a desire to find common ground to remove this significant obstacle to UK-Argentine relations. The challenge for British governments was that the inhabitants of the islands were (and remain) proud of their British connections and proved resolute in resisting any diplomatic efforts which might end with the transfer of sovereignty to Argentina. The illiberal nature of governments in Argentina did nothing to encourage support amongst the islanders for a transfer of Sovereignty. British governments respected the islanders' perspective, regarding sovereignty as a matter of self-determination. No matter how frustrating the failure to reach a settlement with the Argentine government was, the islanders' views took precedence. By the middle of 1981, frustration at the Foreign and Commonwealth Office (FCO) over the matter was high. It appeared that the Argentine government might accept a concept referred to as 'leaseback', under which sovereignty would transfer to Buenos Aires, but Britain would administer the islands for many years, with governance finally transitioning to Argentina at some, as then undetermined, date. The islanders were unimpressed with any notions of sovereignty being transferred. The Minister of State at the FCO, Nicholas Ridley, raised the idea during a visit to the islands in November 1980, but on his return to Britain, his attempt to persuade the House of Commons that leaseback was the way forward, was assailed from all sides.<sup>4</sup> It seemed leaseback had been killed off, but it appeared to be the only viable option available to secure a negotiated outcome.

In June 1981, Ridley convened a meeting of FCO officials to discuss the issue. Anthony Williams, British ambassador to Argentina and John Ure, Assistant Under-Secretary of State at the FCO, both observed that the Argentines were frustrated over the lack of a solution.<sup>5</sup> The Governor of the islands, Rex Hunt, made clear the islanders' opposition to Argentine sovereignty. The archives give the impression of an air of gloom amongst those at the meeting: British public opinion would not support going against the wishes of the islanders (although this was not the intention of the government), but it was obvious that the position was worsening. Aware that the matter provoked nationalist sentiment in Argentina, Ambassador Williams outlined his view that the Argentines would become more intransigent, even venturing that the likelihood of a 'mad General or Admiral' invading the islands was increasing, and although the move to this dramatic situation would take perhaps five or six years to eventuate, the process towards it, once started, 'might be difficult to stop'.<sup>6</sup>

Less than a year after this meeting, Britain had fought and won a war against the 'mad' General who had indeed taken military action against the islands, although 'desperate' might have been a fairer word than 'mad'. The military government in Buenos Aires faced numerous problems: the economy was in a mess, the regime's abysmal record on human rights had not gone unnoticed and public support was in decline. Mass arrests and 'disappearing' of dissenters could not stem this tide. Already seized by the idea of achieving sovereignty by 1983,

the 150th anniversary of Britain taking control of the islands, the Argentine junta saw obvious political benefits of invading Las Malvinas, which became irresistible.

Part of the attraction for the junta lay in the belief that there would be little that the British could, or would, do in response. The defence of the Falkland Islands was not a high priority for the UK, particularly in a period when the main threat came from the Soviet Union. Britain's economy had been in a poor state for some years, and defence spending had been the inevitable target for cutbacks in public expenditure. From the late 1960s, a series of defence reviews had reduced commitments outside the NATO area and focused defence efforts upon Europe. In 1981, the Secretary of State for Defence, John Nott, launched another review, driven by the need to bring an unsustainable defence budget under control.<sup>7</sup> The Royal Navy bore the brunt of the defence cuts, most notably the decision to reduce the number of aircraft carriers from three to two.

By 1981, Britain's recent history when it came to aircraft carriers was perhaps most charitably described as 'unfortunate'. In 1966, the Royal Navy's projected new carrier programme, the CVA-01, had been cancelled as part of a series of defence cuts imposed as part of attempts to address Britain's chronic economic problems. The Defence White Paper announcing the cancellation declared:

Experience and study have shown that only one type of operation exists for which carriers and carrier-borne aircraft would be indispensable: that is the landing, or withdrawal, of troops against sophisticated opposition outside the range of land-based air cover.<sup>8</sup>

The implication was clear: that the only operation which the carriers were required for was not one that the United Kingdom would carry out, at least not alongside the United States.

After a short hiatus the Royal Navy concluded that it could not operate without some sort of organic air cover. Fortunately, an option existed in the form of exploiting the vertical/short take off and landing (V/STOL) capability of the Hawker Siddeley Harrier which had entered RAF service in 1969. A maritime version of the Harrier was ordered to provide some air cover based aboard 'through deck cruisers'. While these were presented as being an anti-submarine warfare (ASW) asset, cynics referred to the new ships as 'see through cruisers', since they were evidently small aircraft carriers in all but name. The decision to order three of the new ships brought an end to the subterfuge over nomenclature, with the vessels being classified as ASW carriers (CVS). The air wing would consist of a handful of Sea Harriers and Sea King helicopters.

Although the Sea Harrier was relatively limited as an air defence aircraft, with a basic radar, two AIM-9 Sidewinder missiles and two 30 mm cannon, it was thought that this would be quite enough as the *Invincible*-class carriers would operate as part of coalition forces, with the implication being that these would include US Naval air power. It would be the USN carriers

which provided airborne early warning (AEW) and long-range attack capability for this naval force. The new carriers, therefore, offered significantly less capability than their predecessors, but were seen as being adequate for the task. Three ships were ordered to allow two to be at sea, or readily available for deployment at any time, with the third being in overhaul or refit. Nott decided that only two carriers were required. Despite protests that the cuts to the Royal Navy went too far, Nott was unmoved.

Nott also decided that the patrol ship HMS *Endurance* should be withdrawn from service, leaving the South Atlantic without a permanent naval presence. Nott argued that *Endurance* was of little utility as a deterrent since the ship possessed little in the way of credible capability. While *Endurance* had not been withdrawn by early 1982, the decision to remove a permanent naval presence was seen by the Argentine junta as another sign of Britain's lack of interest in defending the islands. The presence of a small garrison of Royal Marines, Naval Party 8901, did not act as any form of deterrent to the Argentines. The only potential alternative to the presence of *Endurance* would have been to extend the airfield at Port Stanley and to station aircraft there on a permanent basis. This would have been a significant expense, almost certainly requiring the RAF to buy more combat aircraft to meet the commitment and diametrically opposed to the intent of using the review to cut costs.

The lack of any form of deterrent capability in or around the Falklands was not seen as an issue as despite the difficult relationship with the Argentines and the concerns expressed at the Foreign Office conference on the future of the islands, there was no evidence that the 'mad general' scenario was going to be fulfilled in the near future, if at all.

The focus of British intelligence agencies was largely on the threat presented by the Soviet Union, and information regarding the Argentines and their intentions was at best imprecise; indeed, Nott did not recall receiving specific intelligence information about the islands until it was far too late to make contingency plans to defend them.<sup>9</sup>

Doubts over British resolve seemed confirmed when a party of Argentine scrap metal merchants made an illegal landing on South Georgia on 20 December 1981, before returning in 19 March 1982.<sup>10</sup> Although the British government made protests and sought to remove the scrap dealers by dispatching a party of Royal Marines to evict them from the islands, the measured reaction to the incident confirmed suspicions that the Argentine forces would not meet with a vigorous response if they took the Falklands and presented Mrs Thatcher's government with a *fait accompli*.

Alarming reports of Argentine shipping movements began to be received in both Port Stanley and London in the final days of March 1982, and it became very clear that the 'mad General' scenario discussed at the FCO meeting in 1981 was about to become reality. Military planning for a response to an invasion began immediately, but the realisation that the distances



involved in despatching armed forces were formidable led to an air of pessimism that anything other than diplomacy could be tried. The Prime Minister, Margaret Thatcher, was not given to indecision, and her initial view was that Britain had to respond, if necessary with force, to evict the Argentines. Some of her advisers felt this to be unrealistic. This was not the case with Admiral Sir Henry Leach, the First Sea Lord who, on the evening of 31 March, returned to London from an event in Portsmouth and found signals on his desk reporting the deteriorating situation in the South Atlantic. Still in full dress uniform, he went to the House of Commons, and found Mrs Thatcher, Defence Secretary Nott and various other officials in the Prime Minister's office debating what to do. Leach informed the Prime Minister that he felt that there was no option for Britain other than to respond militarily, that the Royal Navy could provide the means of response, which could extend to launching an assault to evict the Argentines if diplomacy failed. His cautionary words that 'Britain would be a very different place, a country whose word would mean nothing' were a robust response not forthcoming appealed to the Prime Minister. Although Nott expressed some reservations regarding Leach's analysis, the decision to prepare a Task Force was taken. Yet some of the practical difficulties were still not understood by the Prime Minister. Leach later recalled:

Amongst a whole host of questions that the Prime Minister put to me, one was, 'How long would it take to assemble the taskforce'. To which I replied that apart from merchant ships..., '48 hours'. She followed that up with a really remarkable question: she said, 'And how long will it take them to get down there?' And I said, 'Three weeks'. And she said, 'Three weeks? You mean three days!' I said, 'No, it is 8,000 miles' and I don't think she had any appreciation of how far off it was and hence how far away from any form of base, and this was a matter of some significance.<sup>11</sup>

The challenges presented by the distance away from the United Kingdom or any forward operating base were significant, particularly for the Royal Air Force.

How, then, was British air power employed during the war?

### **The Empire Strikes Back: British Air Power at War<sup>12</sup>**

The Falklands are approximately 8,000 miles from the United Kingdom, and the nearest RAF airfields to the South Atlantic were to be found in the former British colony of Belize and on Ascension Island, 4,400 and 3,400 miles from the islands respectively. Belize was too far from the Falklands to be of any great utility. Ascension Island was more promising. The airfield had been built under the auspices of the Lend-Lease agreement between the UK and US during the Second World War. British government lawyers pored over the agreement to confirm that the airfield could be used without an American veto, swiftly concluding that it could.<sup>13</sup> Ascension fulfilled the vital role of staging post, and as a base for refuelling tankers, maritime patrol aircraft and as the launch point for attacks by Vulcan bombers, it was essential. Nonetheless, the only means of delivering air power able to operate near the Falklands was via aircraft carriers.

Although Nott's 1981 Defence Review envisaged the withdrawal of HMS *Invincible* and its sale to the Royal Australian Navy in around 1983, he did not intend to leave the Royal Navy without carriers. Something of a post-war myth seems to have evolved in popular narratives about the Nott Review, in which it is held that had the Argentines invaded later in the year, there would have been no carriers to bring air power to bear during the war and that without carrier-based air power, there would have been no possibility of retaking the islands.

In reality, Nott's plan would not have had this effect. The carrier HMS *Hermes*, which had begun life as a conventional aircraft carrier, had been retained in service, initially as a 'Commando Carrier' to support amphibious operations, and then refitted to operate both Sea Harriers and ASW helicopters as an anti-submarine carrier, presaging the role that the *Invincibles* would perform.<sup>14</sup> Under Nott's plan, *Invincible* would be sold when the second CVS (HMS *Illustrious*) entered service in late 1982, while *Hermes* would continue until the third CVS (*Ark Royal*) joined the fleet two years later. *Hermes* would then be retired, and the two-carrier fleet would progress with two almost brand-new ships.

*Hermes*'s great advantage in terms of operating in the South Atlantic in 1982 lay in its being larger than *Invincible*, and thus able to carry more aircraft. This increased the number of Sea Harriers which could be deployed. Although *Invincible* and *Hermes* in fact went to war with more Sea Harriers aboard than had been envisaged, this required the displacement of some helicopters to other ships in the Task Force. More importantly, the small Sea Harrier force available meant that almost all of it had to be despatched to support operations in the South Atlantic.

In the absence of AEW, and with only twenty Sea Harriers immediately available to deploy, the Task Force had to ensure that its key air defence fighter was carefully handled to reduce attrition. This contributed to a desire to avoid exposing the Sea Harriers to unnecessary risks before the Task Force came within range of the Falklands and had major implications for another aspect of the use of air power, namely the decision to use the Avro Vulcan to strike the airfield at Port Stanley.

This decision is perhaps the most persistent and in some ways pernicious myth regarding the war. Portrayed by detractors of the Royal Air Force as being a sign of the RAF's desperation to get involved (despite being heavily involved from the outset), resulting in a series of attacks which burned a great deal of fuel for the sum total of five raids getting a single bomb on target. The nature of the raids has been covered by this author and John Shields in a previous piece in *RAF Air Power Review*, but it is worth examining the reality – the 'anti-myth' – of the background to the raids again to drive home the point that Operation Black Buck was a far more 'joint' approach and that the most enthusiastic proponents of using an aging long-range bomber were initially senior Royal Navy officers who converted a sceptical Chief of the Air Staff to their position.<sup>15</sup>

## Hitting Back

The reality of Operation Black Buck lies in the fact that planning for the use of air power in any fighting with Argentina began on 31 March 1982. British planners appreciated the limitations caused by the distance between the UK and the islands, their initial appreciation concluding that reaching the islands using anything other than carrier-based aircraft would be extremely difficult. Only Ascension Island could be used to support land-based air attacks against the Falklands, and this would demand extensive air refuelling just to get a small number of bombers – probably just one – to the islands. Even more tanking would be required to get back to Ascension, and it seemed that the only answer would be to have the attacking aircraft land somewhere in South America. This, of course, was not credible, and the planners concluded that: ‘in the likely event of denial of use of airfields in South America, air attacks on Argentine targets are not feasible.’<sup>16</sup> The one feasible – and unintended – benefit which derived from the RAF possessing the Vulcan, even if the type was in the process of being retired, was the doubt sown in the minds of the Argentines after mischievous reporting suggested that there might be raids against the Argentine mainland. A rather harassed sounding British ambassador to Chile, John Heath, reported:

We have been approached today by a number of reporters...for comments on a story allegedly printed in the ‘Daily Star’ which talk of a secret Anglo-Chilean deal under which Punta Arenas would be used by RAF Vulcans in return for sales of RAF Hunters to the Chilean Air Force...

...No doubt you will wish to consider whether a word in the right place might discourage similar trouble-making.<sup>17</sup>

As their analysis of the situation unfolded, the Chiefs of Staff agreed that the airfield at Port Stanley was a major threat to operations and that some effort must be made to impede Argentine use of the airstrip, both as a means of flying in supplies, and, more importantly, as a possible base for air attacks against the Task Force. Concluding that the airfield ‘constrains all our operations’, the Chiefs of Staff considered various means of disrupting the Argentine use of the airfield.<sup>18</sup> It was concluded that bombing the airfield was the best option, although the Chief of the Air Staff, Sir Michael Beetham, pointed out that the chances of shutting the airfield completely were very low.<sup>19</sup> He also suggested that while there were some benefits to employing the Vulcan, the Sea Harrier would be a much better choice for attacking the runway, given its significantly more modern avionics. Beetham was also worried that the Vulcan’s relatively basic weapons system meant that there was a risk of bombs landing in Port Stanley itself, rather than within the confines of the airstrip.<sup>20</sup> The need to conserve the Sea Harriers trumped this concern, though, and as Sir Henry Leach pointed out, it was vital to keep the Sea Harriers in reserve to cover the landing operation.<sup>21</sup> The Vulcan was thus chosen as the tool for making the first major riposte to the Argentine forces in the Falklands under the auspices of Operation Black Buck.

Although the first attack was delayed until 1 May 1982, thus coinciding with the arrival of the Task Force within range of the islands rather than preceding it as the Chiefs of Staff had originally planned, a single bomb struck the runway centreline. While it did not close the runway to transport flights, the airfield was denied as a forward operating location for Argentine combat aircraft, and the crater caused by the bomb ensured that the air resupply flights were unable to carry anything other than a relatively light load of cargo as they would otherwise have broken through the top of the in-filled crater as they landed. This might not have been important had the Argentine navy been able to maintain supplies by sea, but after the sinking of the cruiser *Belgrano* on 2 May 1982, the Argentine fleet did not venture out to sea, leaving the Falklands garrison reliant upon the limited aerial resupply.<sup>22</sup> It is important to note that the Chiefs of Staff, thanks to Beetham's explanation of the limitations of the Vulcan, were under no illusions about the chances of closing the runway for the duration of the war. This was reflected in the realistic nature of Air Operation Order 3/82, making clear that Operation Black Buck was to 'impede' enemy operations.<sup>23</sup> Through two bombing raids and two Suppression of Enemy Air Defence sorties, the Vulcans did exactly that.<sup>24</sup>

## Controlling the Air

Impeding air operations from Stanley also formed a part of the important effort to ensure that some degree of control of the air was achieved. Without AEW, the risk to the carriers was increased, prompting Admiral 'Sandy' Woodward, commanding the Task Force, to position *Invincible* and *Hermes* as far to the east as he could, at maximum range from the Argentine mainland bases as was practicable. This meant that the Sea Harriers were limited in the amount of time that they could stay on patrol. Some commentators rather waspishly suggested that the carriers were so far to the East that the crews should have been awarded the Burma Star rather than the South Atlantic Medal, although this was intended as banter.

Nevertheless, the need to ensure that the risk to the carriers was reduced as much as possible meant that they were compelled to operate further away than was ideal because of the lack of AEW capability. Although there had been some thought given to the provision of a helicopter-carried AEW system, there had been little progress on the matter, since it did not appear to be a priority. As noted above, thinking held that AEW capability in a war against the USSR would come from the US Navy carriers which the CVS would be operating alongside, while the radar aboard anti-air warfare ships would be sufficient in all other scenarios. This, of course, was disproven during Operation Corporate.

The greatest concern for the British Chiefs of Staff regarding air power lay in the small number of Sea Harriers available. By 21 May 1982, the day of the British landings at San Carlos, two of their number had been lost in a presumed mid-air collision, while a third was shot down by ground fire during an attack on the airstrip at Goose Green. All three pilots were killed.<sup>25</sup> The Sea Harriers had already demonstrated their capabilities on 1 May, shooting down three

Argentine aircraft and damaging two others.<sup>26</sup> More success occurred on 21 May, with seven Argentine aircraft being lost.<sup>27</sup> Nevertheless, concern over the potential fragility of the Sea Harrier force in the face of an Argentine counter-air effort (which did not, in fact, materialise) remained.

In a bid to maintain force size, eight more Sea Harriers were despatched aboard the container ship *Atlantic Conveyor* (sunk by an Exocet on 25 May), as part of the newly-formed 809 Squadron, but these aircraft only flew across to *HMS Hermes* on 18 May. In recognition that this uplift in aircraft numbers might prove inadequate, a contingency plan using the RAF's Harrier GR3s had been drawn up, with the aircraft of Number 1 Squadron being fitted for the carriage of the AIM-9 Sidewinder to allow them to act as fighters.<sup>28</sup> The difficulty here was that the RAF Harriers were used in a purely air-to-ground role, and the pilots had little opportunity to hone their air combat skills before deploying, although some useful training with the French was possible. As it transpired, the lack of a serious Argentine counter-air effort meant that losses to the Sea Harrier force were not as high as feared, and the Harriers were used in their normal offensive support role.

The integration of the Harrier GR3s aboard *Hermes* was not as smooth as it might have been. The pilots of 1 Squadron found that the planning process aboard the carrier was not as effective as that they were used to and that their presence was resented by the ship's captain, who regarded the deployment of the Harriers as 'an RAF publicity stunt'.<sup>29</sup> Also, the number of engineering staff embarked for 1 Squadron was inadequate to meet demand, placing additional burdens upon an over-stretched (but uncomplaining) team of RN aircraft maintainers who had to assist in the generation of Harrier sorties. This created a level of unnecessary tension, as well as creating difficulties in mission planning; although the after-action report by 38 Group was pessimistic in tone, concluding: 'it is remarkable that No [Number] 1 Squadron achieved any success at all'; the Harrier GR3s did make some notable contributions to the air war, most notably in providing air support at a critical moment during the Battle for Goose Green.<sup>30</sup>

In some ways, then, the British were fortunate. The Sea Harrier performed far more effectively than some critics had suggested, but the small force size meant that there was little resilience in a critical asset for defending the Task Force. The task was made a little easier – although it was still far from straightforward and called upon all the skills of the Sea Harrier force – by the nature of the air opposition faced.

### **The Opposition – A Missing Factor?**

There is little doubt in the popular perception that the Task Force faced a brave, determined group of Argentine pilots, but they were arguably also a disorganised enemy which failed to use its limited assets to contest control of the air adequately.<sup>31</sup> As John Shields's research in particular demonstrates, the Argentines created needless logistical and technical difficulties for themselves by their basing policy for combat aircraft and a woeful failure in finding the Task Force, thus leading to many sorties simply not locating their intended targets.<sup>32</sup>

Perhaps the greatest challenge facing the Argentines was that they had not expected to be forced to fight for control of the islands. The Junta's vision for de-escalation of the crisis ended with the British reluctantly accepting the change of sovereignty over the islands. While the Malvinas had been a long-standing irritation for successive Argentine governments, no planning had been made to fight the British for control. As observed above, the notion that the United Kingdom would send forces some 8,000 miles to fight over a disputed territory in which they had shown little interest for decades seemed implausible. The junta was left having to fight the air war that it could, rather than the air war which it might have liked.

The Argentine air services, the *Fuerza Aérea Argentina* (FAA) and the *Comando de Aviación Naval* (COAN), possessed ten different combat types in 1982. Intelligence assessments suggested that the squadrons were well-manned, with well-motivated and proficient aircrew.<sup>33</sup> The 1981 annual report from the British Air Attaché in Buenos Aires observed that although FAA and COAN had a number of equipment weaknesses, 'they would make dangerous enemies.'<sup>34</sup>

The mainstay of Argentine air capability was the McDonnell Douglas A-4 Skyhawk. Over 90 had been bought from 1966 onwards, with 16 being employed by the COAN as the main aircraft aboard their carrier, *ARA Veinticinco de Mayo*.<sup>35</sup> By 1982 attrition had reduced the Skyhawk fleet to 49 airframes and only eight of these were in COAN service. All the Argentine A-4s were verging on obsolescence, as a combination of lack of finances and sanctions against the military government had impeded attempts to upgrade the aircraft. The sanctions against the Junta had a knock-on effect in terms of availability of spare parts from the United States, and a number of ejection seats were beyond their specified life, a situation which may well have been responsible for the deaths of several pilots both before and during the conflict as the seats did not function as intended.<sup>36</sup> In numerical terms, the next most important Argentine attack asset came in the form of the 39 IAI Daggers – the Israeli copy of the French-designed Mirage V.<sup>37</sup> While the Daggers were not affected by sanctions, many pilots were relatively inexperienced on type. More problematically for the Argentines, the separation between the responsibilities of the COAN and the FAA meant that the bulk of their attack aircraft were operated by the service which had no responsibility for anti-surface warfare. The FAA Skyhawk and Dagger pilots largely had to learn 'on the job'.

The FAA could also call upon the English Electric Canberra bomber. The Canberra had entered RAF service in the early 1950s and had been a major export success. The Canberra's capabilities had seen the Argentines attempt to purchase the type in 1955, with one eye on the possibility of tensions with neighbouring states escalating into war but concerns that the type might be used against the Falklands or British interests in Antarctica led to the procurement stalling.<sup>38</sup> Twelve second-hand examples were finally procured in the early 1970s, at a time when the RAF were retiring the Canberra in favour of more modern aircraft better able to cope with the likely air defences which would be encountered in a war with the Soviet Union.

The last significant combat aircraft available to the Argentines was the Dassault Super Etendard, the only aircraft in their inventory which could carry a precision attack weapon, in the form of the Exocet anti-shiping missile. In late 1979, the COAN ordered the aircraft to replace the A-4Q as the Skyhawk force numbers declined.<sup>39</sup> The first five aircraft and five Exocet missiles were delivered in November 1981, but the outbreak of hostilities with Britain saw the next batch of five aircraft, along with another five missiles, embargoed by the French government. Tactical training on the aircraft, and particularly in the use of the Exocet was, at that point, relatively limited.<sup>40</sup> In response to these sanctions, the COAN chose to use one aircraft as a spare source to ensure that the remaining airframes would be combat-ready.

The embargo forced the COAN to withdraw one of the five aircraft from use, and to employ it as a 'Christmas tree' to provide spares for the remaining airframes. The Super Etendard/Exocet combination appeared to offer a significant threat to the British Task Force when it arrived off the islands, but the question was whether the small force would be able to make a telling blow with its limited number of weapons. The British government was not prepared to take the chance, and embarked upon an extensive effort to ensure that supplies of more Exocets would not reach Argentina from third parties sympathetic to their cause.

The final aircraft type to be considered when examining the capability of the Argentines to escalate from a *coup de main* occupation of the Falklands to fighting the British is the Dassault Mirage III fighter. They were based near the Argentine capital Buenos Aires and when the conflict began had two primary duties. Argentine concerns that the RAF's Vulcans might hit mainland targets were sufficient to persuade them that 4 Mirage IIIs should be retained for the air defence of the capital, while another 12 were forward deployed. Three of these twelve were retained purely for homeland defence, while the remaining nine were sent to Rio Gallegos from where they would be used over the islands.<sup>41</sup> The Mirage force faced a number of challenges. Its size meant that it lacked resilience, and not all of the aircraft had been modified to use the Matra R550 Magic infra-red homing missile (a French-made equivalent to the AIM-9 Sidewinder used by the Sea Harriers). Those which were unmodified had to rely upon the older Matra R530, a weapon which the Israeli Air Force had employed in combat and found utterly wanting against opposing fighter aircraft. To compound all of these problems, the Mirage IIIs did not have an air-to-air refuelling capability, ensuring that there was little opportunity to loiter over the Falklands in a bid to contest control of the air with the Sea Harriers. The failure to consider the benefits of at least upgrading Port Stanley airfield as a forward operating base was the final limiting factor in reducing the Mirage III's utility.

In addition to the limitations of the various Argentine aircraft, one of the greatest challenges faced was that of obtaining precise targeting information prior to the arrival of the Task Force in San Carlos water. That at least concentrated the British ships in a known location where they could be attacked, but prior to that, the Argentines were at a significant disadvantage. They possessed only a small number of maritime patrol aircraft (MPA), in the form of the Lockheed P-2 Neptune and the Grumman S-2E Tracker, the latter being carrier capable.

Argentine doctrine laid down that the P-2 and S-2, as maritime patrol aircraft, were dedicated only to maritime warfare, which was the responsibility of the navy alone. This ensured that there had been almost no cooperation between the COAN and the FAA to ensure effective integration of the targeting assets (the MPA) and the attack aircraft (predominantly from the FAA). Only two P-2s were airworthy at the start of the conflict, and by 15 May, they had proved so troublesome that the COAN withdrew them from service as a combination of reliability problems and concerns about their vulnerability to the Sea Harrier drove the COAN to conclude that the Neptunes were more trouble than they were worth.<sup>42</sup> Following the sinking of the cruiser *General Belgrano* by *HMS Conqueror* on 2 May, the Argentine Navy chose to remain in port, which at least allowed five S-2Es to be transferred to Rio Grande in a bid to restore the missing reconnaissance and targeting capability. This did not, in reality, avail the Argentines of much.

The Trackers flew three missions on 20 May to the northwest of the Falkland Islands. The sole success occurred on one of these three sorties, when radar emissions from the British fleet were intercepted. Unfortunately for the Argentines, the S-2s were operating at the limits of their endurance and were unable to get within radar range to obtain information which might have allowed an attack against the Task Force to be launched.<sup>43</sup> This lack of capability was understood by the COAN, which managed to obtain two Embraer EMB-111A Banderiante patrol aircraft from Brazil in early May. Although they had greater range than the Tracker, the Banderiantes were only ready for operations on 22 May, the day after the Task Force had entered San Carlos water and landed the British amphibious force. The opportunity to find the British and to attempt to inflict losses on the invasion force before it had landed had been lost.<sup>44</sup> The FAA and COAN were compelled to attack the amphibious force as it put men and materiel ashore, with the concomitant problem that this required delivering unguided ordnance in the face of heavy fire from the ships and with the constant risk of the Sea Harrier combat air patrols intercepting the attacking aircraft; while the landings placed the British ships in a known location, they also mitigated the lack of AEW to an extent, since the Sea Harrier pilots had a very good idea of where they would be likely to find enemy aircraft to engage and could be vectored against targets by the effective fighter direction provided by the RN's warships.

No Sea Harriers were lost in air-to-air combat, and their losses were not as great as had first been feared. The experience of 1 Squadron, with numerous instances of damage to airframes from ground fire and the loss of four aircraft, hinted at 'what might have been'. The decision to deploy the Harriers was, therefore, not a publicity stunt or a mere token, but a sensible piece of planning which bore some fruit. Although the GR3s were not required in the emergency air defence role, their presence removed some of the burden from the Sea Harrier force and brought experienced ground attack pilots to the operational theatre. It was a great pity that a lack of 'jointery' ensured that the Harrier pilots felt that they were mis-tasked and a reflection upon the fact that the series of defence cuts in the late 1960s and up until 1981 ensured that almost no thought had been given to maximising the potential of the Sea Harrier and Harrier GR3 by conducting operations from the RN carriers. Speculation as to what might



have been achieved with greater understanding between the RN and RAF – a casualty of the bitter internecine warfare between the two services in the 1960s – is pointless, but it does not seem unreasonable to suggest that another ‘anti-myth’ of the war, demonstrated by the Sea Harriers and Harriers, was that Field Marshal Montgomery’s contention that ‘knitting together’ of forces to deliver effective air power was far from misplaced, and that the lesson was ‘unlearned’ during the Cold War period as the RN and RAF fell into bureaucratic wrangling over budgets and capabilities.<sup>45</sup> A further illustration of the danger of inter-service disputes and parochialism was provided by the Argentines with their clear delineation of service responsibilities, leaving the FAA attack pilots little opportunity to practice attacking enemy shipping.

### **A Missing Link - Air Mobility**

Another of the key factors which is largely omitted from consideration of the air war is that of air mobility. The RAF’s use of its VC10 and C-130 Hercules force is largely missing from current considerations of the British air effort in 1982, while the work of the Victor air-to-air refuelling tankers is usually dealt with in terms of support to Operation Black Buck. This is unfortunate, as a number of key lessons emerged from the experiences of the RAF air mobility force and the work of the helicopters of all three British services. A proper analysis of the latter elements is still lacking 40 years after the war, and history is served largely by accounts of the work of the one RAF Chinook (the famed ‘Bravo November’) to survive the loss of the *Atlantic Conveyor* and a few memoirs.<sup>46</sup> The key lesson from the war in terms of support helicopters is arguably that the demand for their services is always far greater than anticipated, a trend which has eventuated throughout Britain’s use of military rotorcraft.<sup>47</sup>

There has also been a tendency to take the work of the air transport force (ATF) for granted, yet the efforts made were impressive. The ATF formed an integral part of Britain’s response to the Argentine invasion, with the first movement being on 31 March, with a Hercules flying to Gibraltar with equipment for the Royal Fleet Auxiliary (RFA) *Appleleaf*. The plan changed while the Hercules was airborne, and it flew on to Ascension Island to transfer its cargo to *RFA Fort Austin*. By the end of the conflict, the ATF had carried a payload second only in weight to that flown to Berlin during the airlift in 1948-49 during the course of 600 sorties. The air bridge, flying from RAF Brize Norton (VC10s) and RAF Lyneham (Hercules), staged through Gibraltar, Senegal and Gambia, illustrating the vital importance of diplomacy to obtain the rights not only to use facilities but to accommodate ‘slip’ crews to operate the aircraft. Within a matter of days, the ATF had set up a routine service from the UK to Ascension, although the experience was far from routine. The volume of traffic to Ascension was considerable, and Wideawake Airfield became packed with aircraft to the point that there was almost no available ramp space on occasion.<sup>48</sup>

The ATF suffered from the fact that defence cuts, particularly those in 1975, had seen a reduction in the transport force and from that, the available flying hours and the number of crews.<sup>49</sup> Number 38 Group, controlling the ATF, was forced to seek former Hercules aircrew from

training establishments and ground tours and to post them back to RAF Lyneham to bolster the number of personnel available to meet the demand for cargo flights.

This demand increased as the Task Force approached the Falklands, and the Hercules force commenced regular air dropping of supplies to various ships of that force. This was at the extreme range of the Hercules, requiring the fitment of long-range fuel tanks in the cargo area, which reduced the amount of supplies which could be carried. This drove the decision to fit the Hercules with air-to-air refuelling probes. The first sortie using air-to-air refuelling (AAR) took place on 16 May, with a plan to move from 3 crews qualified in AAR with 2 probe-equipped aircraft at the start to 6 crews and 3 aircraft on 5 June, with up to 20 aircraft being available by the end of June.<sup>50</sup> This presented a problem as it increased the flying hours for the Hercules fleet and an increased risk of fatigue as the crews flew longer sorties. The demand for air dropping of supplies to the Task Force increased, and the two Air Despatch (AD) crews based at Ascension were working for almost the entire day preparing the supply bundles. A third AD team was despatched, and the decision to 'trawl' for Hercules aircrew to increase the number of personnel proved to be a wise and necessary step.

The Air Mobility Force's VC10s conducted 55 aeromedical evacuations, conveying 237 stretcher cases and 448 'walking wounded' back to Ascension Island thence to the UK during the course of the war, as well as flying supplies to the Task Force and medical supplies. Some of the latter were the source of an embarrassing moment when a VC10 taking over a sortie from one which had gone unserviceable did not offload parts for Shrike Missiles which were intended to be transferred to a Hercules and then dropped to *Hermes* for use by 1 Squadron. This meant that a flight carrying medical supplies for the hospital ship *Uganda* landed in Montevideo, capital of neutral Uruguay. In another example of the importance of diplomacy, the potential difficulties caused by this error were dealt with, but the Shrike parts remained in Uruguay, while the RAF tightened procedures so that a similar error could not occur again.<sup>51</sup>

If seeking to draw conclusions from the use of air mobility assets during the Falklands conflict, the most obvious is perhaps the way in which both fixed – and rotary – winged assets seem to have been taken for granted to a degree in terms of the historiography. We might also reasonably note that while the Falklands was, perhaps, exceptional, issues pertaining to the demand placed upon air transport and the difficulties in chartering civilian airlift were notable and still have resonance today. The risk of reducing the air transport force because of no immediately obvious need to expand capacity at short notice remains one to ponder. Finally, we can also contemplate the importance of diplomatic clearances necessary to ensure that the air transport effort could operate smoothly. The diplomatic aspect was also of considerable importance in addressing the unwelcome arrival of the Vulcan flying Black Buck 6 at Rio de Janeiro airport after its refuelling probe broke, necessitating a diversion; the fact that the Brazilian authorities were prepared to allow the aircraft and crew to depart rather than interning the aircrew and impounding the aircraft illustrates the skill with which the negotiations were conducted.<sup>52</sup>

## Final Thoughts

Although the phrase ‘you fight with what you have, not what you’d like’ has many variations is attributed to a range of individuals and almost verges on cliché, it is apposite when considering the events of 1982 and the way in which air power was employed. The Argentine air services found themselves carrying out operations that they were not configured to conduct against an enemy they had never really expected to fight. The British, while better configured for operations in the South Atlantic, still had to rely upon improvisation and adaptation to deliver successful air operations.

The Argentines’ ability to confront the Task Force was limited from the outset, and the decision not to deploy their aircraft carrier after the sinking of the *ARA Belgrano* brought many complications. Even had the carrier been used, the COAN force structure was arguably too small to deliver the required outcomes, lacking aircraft and, even more critically, sufficient Exocet missiles to be able to inflict attrition on the Task Force. The need to generate large numbers of attack sorties against the Task Force, and particularly its amphibious vessels meant that the FAA had to be brought in, despite having no training in the anti-shipping role. Both sides found themselves lacking in terms of information. The Argentines were largely unable to locate the Task Force before it arrived off the Falklands thanks to a lack of maritime patrol aircraft, while the British found themselves unable to defend their ships as well as they would have wished as a result of a lack of early warning. While expedients were adopted to mitigate this issue, they were not sufficient. The deficiencies in provision of early warning were subsequently mitigated by the UK with the employment of the Sea King AEW2 (and later ASaC 7) and the procurement of the E-3 Sentry with an AAR capability that provided much greater flexibility in terms of employment and basing than the Shackleton AEW2 could ever have done. Forty years later, though, the UK finds itself again in a position where observers worry whether the planned purchase of three E-7 Wedgetail aircraft and the relatively short service life intended for the RN’s Crowsnest AEW system will leave the country deficient in a vital capability again, even if the potential of uncrewed systems and satellites to act as a force multiplier must now be factored into considerations.

The conflict also illustrated the vital contribution to logistics. The Argentine logistic plan became almost entirely reliant upon aircraft delivering supplies to Port Stanley. The crater caused by Black Buck One, while given a temporary repair, made it impossible for the small transport force operated by the Argentines to bring in enough supplies. While the UK was in a much happier position in terms of airframe numbers, the distances over which the Air Mobility Force was compelled to operate were brought into sharp focus. The provision of AAR capability for the Hercules was a vital addition, but the increase in endurance the probes gave to the aircraft presented a challenge in terms of crew fatigue. The need to have a large enough mobility force to meet demands and a sufficient number of personnel – be that aircrew, maintainers or air despatchers – to operate it was demonstrated most clearly. Forty years on, while the RAF possesses a much greater range of capability thanks to the C-17 and A400M Atlas, airframe numbers have reduced, with the retirement of the remaining Hercules

aircraft potentially creating a situation where the UK finds itself with insufficient assets to meet demand. While the Falklands demonstrated the value of charter aircraft, particularly in the form of the Shorts Belfast (retired from RAF service and sold in 1976 thanks to defence cuts), later experiences which saw nations competing for charter aircraft illustrated the fact that there is a delicate balance to be achieved and possessing a degree of robustness in the transport fleet while not necessarily looking efficient on a balance sheet can be a vital factor when fighting a war.

The war also demonstrated the value of joint planning – recognised by the subsequent formation of Permanent Joint Headquarters – but also of the potential synergies which using carrier and land-based aircraft could bring. This was a lesson which had been demonstrated very clearly during the Battle of the Atlantic, but the poisonous relationship that developed between the RN and RAF in the post-war era over maritime aviation, coupled with budgetary pressures which saw the reduction in the size of the maritime patrol fleet, meant that efficiency and effectiveness were not as they might have been during Operation Corporate. Some of the issues were down to personality – the controversial role of Captain Middleton aboard *Hermes* being most obvious – and a failure to think about the command structure. The lack of an experienced air component commander in theatre to coordinate operations brought unnecessary frictions and highlighted the wisdom of creating a joint command structure subsequently.

Also, when thinking about some of the lessons, it is worth observing that the Falklands conflict demonstrated the importance of training and determination alongside effective planning. While the courage of the Argentine pilots is beyond question, their air effort culminated some days before the end of the fighting, while, despite growing fatigue amongst the Sea Harrier and Harrier crews aboard the two carriers, the British air effort continued.<sup>53</sup> Many of the improvisations forced upon the British by circumstance were successful because of the efforts of those flying and maintaining the aircraft involved. Finally, perhaps the greatest lesson – which can be seen from the experience of both sides, albeit in different contexts – is that the grander the scale of the ambition, the greater the scale and range of capabilities that is required, even in circumstances where working with allies and partners alleviates some of the gaps in capability or capacity that might otherwise result. Nations which have ambitions to use power on a wider stage need to make sure that these ambitions are suitably resourced – and for the United Kingdom, the experience of the Falklands is a clear illustration of this, even allowing for the passage of forty years since the fighting ceased.

## Notes

<sup>1</sup> The term 'myths and anti-myths' is based upon the title of John Terraine's *The Smoke and the Fire: Myths and Anti-Myths of War, 1861-1945* (London: Sidgwick & Jackson, 1980).

<sup>2</sup> See Sir Lawrence Freedman, *The Official History of the Falklands Campaign, Volume 1: The Origins of the Falklands War* (London: Routledge, 2005) and *The Official History of the Falklands Campaign, Volume 2: War and Diplomacy* (London: Routledge, 2005), which is the definitive

account of the war, demolishing a number of popular/populist myths which developed in the aftermath of the conflict.

<sup>3</sup> See John Shields, *Air Power in the Falklands Conflict: An Operational Level Insight into Air Warfare in the South Atlantic* (Air World, 2021); Santiago Rivas, *Wings Of the Malvinas* (Hikoki Press, 2012) and *Skyhawks Over the South Atlantic: The Argentine Skyhawks in the Falklands/Malvinas War 1982* (Helion & Company, 2019); Mariano Sciarioni, *A Carrier at Risk: Argentinean Aircraft Carrier and Anti-Submarine Operations against Royal Navy's Attack Submarines during the Falklands/Malvinas War, 1982* (Helion & Company, 2019) and *Handbrake! Dassault Super Etendard Fighter Bombers in the Falklands/Malvinas War* (Helion and Company, 2022).

<sup>4</sup> House of Commons, *Debates* (hereafter 'Hansard'), Volume 995, Columns 128-134, 2 December 1980.

<sup>5</sup> Margaret Thatcher Foundation, <https://www.margaretthatcher.org/document/118468>, 'Draft record of meeting of FCO officials, Falklands Governor Hunt and UK Ambassador to Buenos Aires' 30 June (accessed 9 April 2019).

<sup>6</sup> Ibid.

<sup>7</sup> See Andrew Dorman, Michael Kandiah and Gillian Staerk (eds), 'The Nott Review', Seminar held 20 June 2001, (Institute of Contemporary British History, 2002, <http://www.icbh.ac.uk/witness/nott/>); Andrew Dorman, 'The Nott Review: Dispelling the Myths?', *Defence Studies* 1:3 (2001), 113-121 and John Nott, *Here Today, Gone Tomorrow: Memoirs of an Errant Politician* (London: Politico, 2002).

<sup>8</sup> Command Paper 2901, *Statement on the Defence Estimates, 1966* (London: HMSO, 1966), 10.

<sup>9</sup> See, *inter alia*, The National Archives (TNA) CAB 292/22, 'Transcript of Evidence by Lord Carrington to the Falkland Islands Review Committee, 29 September, 1982'; CAB 292/26, 'Transcript of Evidence by John Nott to the Falkland Islands Review Committee, 4 October 1982' and CAB 292/62, 'Falkland Islands Review Committee, Notes of an Oral Evidence Session', 29 December 1982.

<sup>10</sup> See, for example, 'Scrap Metal Merchant's Show of Defiance helped Spark 1982 Conflict', *The Times* February 17 2010, <https://www.thetimes.co.uk/article/scrap-metal-merchants-show-of-defiance-helped-to-spark-1982-conflict-70nfdhqqc23> (accessed 29 March 2022).

<sup>11</sup> Sir Henry Leach in 'The Falklands War', seminar held 5 June 2002 (Centre for Contemporary British History, 2005), 29.

<sup>12</sup> The second Star Wars film (in the original numbering sequence of the canon), 'The Empire Strikes Back' had been released in 1980 to much popular acclaim, and the phrase was adopted in some quarters as a jokey description of the British response.

<sup>13</sup> TNA, PREM 19/615, American Base on Ascension; memo from West Indian and Atlantic Department, 6 April 1982.

<sup>14</sup> *Flight International*, 22 March 1980, 893; *Flight International*, 7 February 1981, 336.

<sup>15</sup> John Shields and David Jordan, 'The Most Daring Raid?', *Royal Air Force Air Power Review*, Vol 21 No 2, (2018).

<sup>16</sup> TNA, FCO 7/4472, note by Capt JT Lord RN for ACDS (Ops) of 1 Apr 82.

<sup>17</sup> TNA, PREM 19 622, telex from John Heath, ambassador to Santiago 27 Apr 82. The RAF Hunters refers to the Hawker Hunter FGA9, a 1950s-vintage fighter-bomber which was still in

RAF service in 1982 for tactical weapons training and with a secondary point air defence role. Hunters were also a key part of the Chilean Air Force order of battle.

<sup>18</sup> TNA, FCO 7/4472. *Chiefs of Staff Meetings*, 20 April 1982.

<sup>19</sup> See MRAF Sir Michael Beetham, in 'The Falklands War', seminar held 5 June 2002 at JSCSC Shrivenham (Transcript in Andrew Dorman, Michael D. Kandiah and Gillian Staerck (eds), *The Falklands War*, CCBH, 2005), 3; John Shields and David Jordan, 'The Most Daring Raid?', *Royal Air Force Air Power Review*, Vol 21 No 2, (2018), 92-95.

<sup>20</sup> Ibid.

<sup>21</sup> TNA, FCO 7/4472. *Chiefs of Staff Meetings*, 20 April 1982.

<sup>22</sup> Shields and Jordan, 'Most Daring Raid', 105.

<sup>23</sup> TNA, AIR 20/13046. Operation *Corporate* (Falklands Conflict): Vulcan aircraft operations, including Black Buck operations. The second issue of the Operation Order was released on 27 May and the mission aim became, 'to impede the conduct of Argentine Operations in Falkland Islands Area', rather than just the airfield. TNA, AIR 20/13049, Operation *Corporate* (Falklands Conflict): Vulcan aircraft operations, including Black Buck operations.

<sup>24</sup> Shields and Jordan, 'Most Daring Raid', *passim*.

<sup>25</sup> Lt Cdr John Eyton-Jones and Lt Al Curtis in the collision on 6 May, and Lt Nick Taylor during the attack on Goose Green airstrip.

<sup>26</sup> Shields, *Air Power in the Falklands*, 246-247.

<sup>27</sup> Ibid, 247-248.

<sup>28</sup> See David Jordan and John Shields, 'In at the Deep End: RAF Harrier Operations During Operation Corporate, 1982', *RAF Air Power Review*, Vol.21 No.2, 110-129.

<sup>29</sup> See Bob Marston, *Harrier Boys, Volume One – Cold War Through the Falklands, 1969-1990* (London: Grub Street, 2015), 95; Jerry Pook, *RAF Harrier Ground Attack Falklands* (Pen & Sword, 2007), particularly Chapters 17 and 19; 'Squire, Peter (Oral History)', Imperial War Museum sound archive, <https://www.iwm.org.uk/collections/item/object/80025717>, Reel 6; also Shields, *Air Power and the Falklands*, and Jordan and Shields, 'In At the Deep End', *passim*.

<sup>30</sup> TNA, AIR 20/13126, Operation *Corporate* (Falklands Conflict): reports and articles; Harrier aircraft operations; Major General Julian Thompson, comments at RAF Historical Society Seminar 'The RAF in the Falklands Campaign', *RAF Historical Society. Journal 30 – The RAF in the Falklands Campaign* <https://www.rafmuseum.org.uk/documents/research/RAF-Historical-Society-Journals/Journal-30-Seminar-The-Falklands-Campaign.pdf>, 115 (accessed 17 March 2022).

<sup>31</sup> Shields, *Air Power in the Falklands*, Chapters 3, 4 & 5.

<sup>32</sup> Ibid.

<sup>33</sup> TNA DEFE 58/273, Strike Command Intelligence Branch: Operation *Corporate* (Falklands Conflict): Results of Actions Against UK forces; Argentinian Air Defences, May 1982 – October 1985.

<sup>34</sup> TNA, DEFE 68/473, Argentine force capabilities.

<sup>35</sup> R.A. Burden et al, *Falklands – The Air War* (London: Arms and Armour Press, 1986), 39, 116; Santiago Rivas, *Wings of the Malvinas: The Argentine Air War Over the Falklands* (2010: Manchester, Hikoki Publications, 2012), 28. The A-4Q was a refurbished A-4B.

<sup>36</sup> TNA, FCO 7/4566, Falkland Islands conflict: military planning.

<sup>37</sup> A number of sources demonstrate that the FAA pilots referred to their aircraft as the Mirage V, or M5 Dagger, which can cause some confusion over the nomenclature. In Israeli service, the aircraft was known as the Nesher.

<sup>38</sup> TNA, FO 371/103202, *Argentine Air Force 1952*; TNA, FO 371/114053, *Supply of Canberra*.

<sup>39</sup> Burden, *The Air War*, 34; R. Scheina, "Super Etendard; Super Squadron", *US Naval Institute Proceedings*, Volume 109 (1983), 135.

<sup>40</sup> TNA, DEFE 69/1112, *Air Matters*.

<sup>41</sup> Rivas, *Wings of the Malvinas*, 27, 206; Burden, *The Air War*, 144.

<sup>42</sup> Burden, *The Air War*, 48.

<sup>43</sup> Rivas, *Wings of the Malvinas*, 272.

<sup>44</sup> *Ibid.*, 276.

<sup>45</sup> Montgomery was, of course, talking about the 'knitting' of the Army and the Air Force, but the point translates to air power in the maritime arena.

<sup>46</sup> For example, Richard Hutchings, *Special Forces Pilot: A Flying Memoir of the Falklands War* (Barnsley: Pen & Sword, 2008) and Harry Benson, *Scram!* (London: Preface Publishing, 2012). The use of ships' helicopters is even less well served, but see Chris Parry, *Down South: A Falklands War Diary* (London: Viking, 2012).

<sup>47</sup> See John Dowling, *RAF Helicopters: The First Twenty Years* (London: HMSO, 1992). It is perhaps indicative of the coverage of military rotary winged aircraft in the UK that a second volume of history of the RAF's helicopters has not yet appeared.

<sup>48</sup> Air Historical Branch [AHB], *Narrative of RAF Operations During the Falklands Conflict 1982*, 3.16.

<sup>49</sup> TNA, CAB 121/181, 'Statement on the Defence Estimates 1975: Memorandum by the Secretary of State for Defence', I-26-I27.

<sup>50</sup> AHB, 'Narrative', 3.39.

<sup>51</sup> *Ibid.*, 3.20-3.25.

<sup>52</sup> See, *inter alia*, TNA FCO4/4123 'Release of Vulcan Aircraft', 5 June 1982; PREM19/633, 'FCO Telegram 23 to UKDEL Versailles (0335Z), Falklands Diplomatic Sitrep, 5 June 1982; PREM19/651, "MOD Letter to No.10', 11 June 1982.

<sup>53</sup> See Shields, *Air Power in the Falklands*, Conclusion, particularly 210-219.



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# The Role of Air Power in Crisis Management

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## Introduction

**M**y task today is to talk about air power and crisis management. As COS of STC the opportunity for me to do so is timely because today we are exercising from High Wycombe operational command of a number of air operations which represent a significant national contribution to the containment of crisis.

My professional interest in crisis management quite obviously represents a pragmatic rather than philosophical or conceptual approach. So pragmatism, and what does or does not lie within the art of the possible, will be the flavour of my address. To this end I shall start with some words on the characteristics of air power which are fundamental to an understanding of its practical application. From there I shall move on to draw some lessons from hard earned practical experience before concluding with some words on current and future operations.

First, the concept of air power which has always been rather difficult to define. But for me it is a purely military concept and I have no difficulty with the accepted doctrine of my service that 'air power is the ability to use platforms operating in or passing through the air for military purposes'. The definition neatly takes the middle ground between those who view air power an auxiliary to ground and naval forces, and those who would argue air power is an all-encompassing concept. If one substitutes within the definition the word of 'sea' for 'air' and the word 'on' for 'in', the analogy with sea power becomes immediately obvious. I would argue that both are concerned with power projection, a concept easily recognisable in Victorian and Edwardian times when the battle fleets of the Royal Navy were responsive to political direction that reflected the national will. Thus, while sea power used and still uses the oceans of the world to project power, air power today similarly uses the ocean of the air in which we all live as its employment medium. But the air is manifestly a very different environment in which to fight than either on land or at sea. Thus to start with a statement of the obvious, aircraft are faster and have greater reach than ships or land systems from which one can safely deduce that height, speed and reach represent the primary strengths of air power. And it is these characteristics that we have to understand if we are to evaluate with some precision the potential contribution of air power to crisis management.

The responsiveness of air power is quite clearly as important in crisis management as it is in war because it permits the rapid deployment of military force to deter aggression and to provide timely support for an ally. Similarly air power permits the concentration of military force in time and space where and when required. When committed to operations, aircraft operating over a spectrum of heights permit first observation and then, if necessary, direct fire against enemy forces whether or not they are at the front line, well to the rear of it, or on or below the surface of the sea. Moreover, the reach and endurance of aircraft in recent years has been greatly extended by use of air-to-air refuelling – this is not only important in terms of distant targeting but also in working round potential political rather than physical restrictions such as the refusal of overflight clearance by neutral countries. Finally, and importantly, aircraft can perform a wide variety of actions, and can be adapted quite easily to meet changing

circumstances. One obvious example would be our Tornado GR1As which can be used for low level recce at day or night, and for air-to-surface attack in both the nuclear and conventional roles. They also, of course, have an air-to-air self defence capability.

That said and as a day-to-day exponent of the utility of air power, it would be wrong of me to ignore the inherent limitations of air power which is an impermanent form of military force. The effects of direct action with conventional weapons can be transient and to sustain the effect may require repetition. Moreover, while we are now very competent in our use of air-to-air refuelling as a force multiplier through the extension of both the range and endurance of our aircraft, we have not yet solved the problem of how to re-arm and re-crew an aircraft in flight. Quite obviously aircraft payloads are generally more limited than those carried by ships or vehicles. So aircraft are at their most cost effective when used for tasks that give a high value pay off. For example, a small payload deployed quickly may be of far more value in stabilising a critical situation than one many times larger deploying at a far slower speed. And finally, despite the effort of some aircraft manufacturers to prove otherwise – and I here have in mind as an example the A-10 or Warthog – aircraft are significantly less robust than tanks or ships. Hence relatively low levels of battle damage can have catastrophic effect, albeit this inherent vulnerability can be offset by the exploitation of height and speed to increase an enemy's targeting difficulties.

Beyond these practical limitations there are two other considerations which merit mention. The first is cost. Modern, highly capable aircraft do not come cheap, nor for that matter does the training of their crews. But their increase in capability often permits a reduction in the number of platforms required for a task. It is thus imperative to balance cost *per se* against cost effectiveness. Air power is a product of technology and the nature of the central balance between offensive and defensive capabilities will always reflect the overall direction and rate of technological development. This is particularly evident in the much-decreased sensitivity of air power to light and bad weather conditions – indeed the concealment offered by bad weather and darkness is increasingly turning to the advantage of air power as we introduce to service more advanced all-weather navigation and targeting aids.

So much then for the balance sheet of air power characteristics. But what do we mean by crisis? To my mind a crisis is a situation of danger or suspense which, if left to run its course, could lead to further, perhaps, catastrophic consequences. But 'crisis' in the medical context can also mean a turning point which I believe usefully widens the focus of our attention beyond containment to include the cure.

In the difficult and uncertain circumstances of the world today, air power has much to offer to help preserve and strengthen international security. We in the RAF take considerable pride in our many contributions to disaster relief. The speed of reaction and the skill of our tactical transport crews earned well deserved plaudits for their contributions to famine relief in the Ethiopian highlands in 1984-85. Our Hercules sqns took on a similar role within a coalition

force in the early stage of Operation *Provide Comfort* – the provision of relief of the Kurds fleeing the wrath of Saddam Hussein – and their efforts were of course supplemented by our support helicopters which redeployed into Turkey while in transit back to UK from the Gulf War. Suffice to say that such operations are mounted in the hope of generating goodwill, removing suspicion and promoting stability and security. The fostering of stability and security will also be enhanced by the Open Skies agreement which permits aircraft to roam freely over the territory of signatory states and the sharing of the information gathered. Thus, air power by its existence offers a most useful contribution to the preservation of peace – first through the promotion of international relations and secondly through the provision of reassurance that should help avert threats to peace, both real and imagined.

But air power clearly offers no more of a panacea for guaranteed peace than do diplomatic and economic leverages. A demonstrated military capability may be enough to convince a would-be aggressor that his initial foray constituted an unacceptably risky venture – but it did not in the case of Saddam Hussein who badly misjudged the international military resolve in this respect. Failing all else, full military action may thus be required, which brings me to a cautionary point. Activities in the field of humanitarian assistance, such as famine relief and the delivery of medical support have led some commentators to play down the combat function of the armed forces in general and air power in particular. I acknowledge the temptation to do so but to my view we must train to keep air combat capability well honed. The completion of lesser tasks will be comfortably accommodated within this framework.

So what can air power do as a crisis management tool? It can provide tangible evidence of political will, as in the Berlin Airlift of 1948. It can project unconventional military power, as the Israelis did at Entebbe in 1976. It can project conventional military power, as the French did in Chad in 1987 when their air force's intervention quickly defeated Libyan ambitions in the area. It can demonstrate international goodwill, as we and many other nations did in the aftermath of the Ethiopian famine or the Armenian earthquakes. It can deter military adventurism, as the USAF did with its demonstration flights over a potentially rebellious Philippines airfield when Mrs Aquino faced insurrection in 1989. It can carry out limited military operations against distant targets, as the US forces did in Libya in 1986 and it can carry out multi-faceted operations against a major military force, as the coalition did in the Gulf War. In the 1980s alone, the US Air Force conducted contingency air operations in 26 different countries and over the world oceans. It supported humanitarian, disaster relief or rescue operations over 60 times in 49 countries. This list is far from comprehensive and I only include it as evidence that air power can deliver a tailored response to almost any situation.

But of all its potential applications, air power is best known as a means of deterring aggression. Such deterrence can be both implicit and explicit. In the first instance and at the lowest end of the scale, reconnaissance and surveillance aircraft can – in addition to the collection of intelligence – have a salutary deterrent effect on an aggressor. The act of carefully watching – and our present operations over north and south Iraq come to mind – carries the implicit threat to

your opponent that his actions could provoke a response. Moving up the scale of deterrence, a proven ability to exact rapid retribution by launching an attack deep into unfriendly territory represents by any measure a strong and explicit deterrent: the rapid deployment of Harriers to Belize in 1972 and again in 1977 appear to have been a major factor in deterring the threatened Guatemalan invasion of the territory. More recently, the deployment of coalition air power to Saudi Arabia following Iraq's invasion of Kuwait acted as a single deterrent to further Iraqi aggression. Indeed, with all the benefit of hindsight, had it been possible to divine Saddam Hussein's intentions, the rapid deployment of air power into Kuwait before the invasion might well have defused the crisis before it really developed. But here, perhaps, it would be timely to make one short foray into the field of crisis theory.

A military-operational prerequisite for a successful crisis management operation is 'escalation dominance'. It is of crucial importance for the military means to be sufficient to be able to continue operations if the conflict should escalate. Forces must possess, and be seen to possess, the capability to escalate both farther and faster than the opposition.

Escalation dominance does not necessarily mean sending overwhelming force to the conflict area. This could contradict another important principle, namely that of proportionality. Escalation dominance is achieved if the conflicting parties are convinced that any further aggressive behaviour against the deployed force would be pointless. This means that political and military aims must be explained clearly and unambiguously to the conflicting parties and that agreement must be reached on the principle of implementing further military measures at any time if this is necessary to achieve the political objectives.

Escalation dominance can be achieved by the undisturbed build-up of forces in the region, so being in a position to determine the time and place of any military operation. This requires the mounting area to be adequately protected. Moreover, escalation dominance can be achieved only if the national territory and interests are also sufficiently well protected against a countervailing threat.

And, finally, I would suggest to you that if it is not possible to achieve escalation dominance, the crisis management operation is likely to fail and, furthermore, the coalition would be forced to escalate. In contrast, deliberate de-escalation is only possible from a position of superiority.

Let us now return to practicalities. The early air power theorists put in train a long tradition of over-expectation and inflated claims that marked almost every development in air power technology or capacity up to the end of World War II. Then, air power, once perceived by many theorists to represent a military scalpel, was in truth an axe – and a blunt and ruthless one as epitomised by the emergence of the nuclear bomb. That said, we should acknowledge that our Second World War commanders had the foresight to appreciate what air power could achieve for them but what they did not have was the technological capability. But as I said earlier, air power is the product of technology, and most recently, in the Gulf War, various

elements of technology have come together to produce a model for the handling of crisis and war that is at the same time both enormously hopeful and yet potentially dangerous. I was Air Chief Marshal Sir Patrick Hine's Director of Operations throughout the Gulf crisis and perhaps a few minutes of my personal recollections will be helpful in informing your own thinking and discussion.

Saddam Hussein's forces had the benefit of an impressive military infrastructure. Iraq's combat aircraft numbered some 750 and its air defence system fielded almost 17,000 surface-to-air missiles and up to 10,000 anti-aircraft guns. Their modern radar systems were fibre-optically connected to an integrated computer data link system, with command control links located throughout the country. For greater survivability, many primary command control nodes were buried and concrete covered. Nevertheless, within one week of the start of the war, that system had been comprehensively dismantled and defeated; the coalition had gained air superiority. What did this defeat cost the Iraqis? It cost them their air force, which quickly realised that flying against the coalition was suicidal. It chose instead to fly away from it. Some 35 Iraqi aircraft were lost in air-to-air combat, up to 140 fled. It cost their troops supplies and munitions, when depots were destroyed and bridges downed. It cost them their military eyesight, their ability to manoeuvre, their ability to counter-attack and, ultimately, their will to fight. Methods of attack varied from blanket bombing of large troop dispositions to precision assaults on specific buildings. The weapons employed ran the gamut of the airman's inventory from jammers to guns, from cluster bombs to rockets, and from dumb iron bombs to precision-guided munitions. Stripped of its air cover, its surface-to-air defence systems in tatters, the Iraqi army had no chance and, ultimately, no hope. The much-feared mass land battles did not materialise and nor did the casualties.

As the Director of Operations in the Operation Granby Joint Headquarters I was filling a tri-Service appointment and I remain an apostle of 'jointry' because I do not believe that modern warfare, let alone crisis management, lends itself to neat compartmentalisation. There will always be an overarching political framework which we the military have to understand and accept as the framework within which we have to operate. Moreover, I yield to no man in my admiration of the performance of our land and naval forces in the Gulf War. I mention all this to underline my belief that in addressing the employment of air power in the Gulf, the claim that air power won the Gulf War is not important. It is unhelpful to become side-tracked into such an argument, just as it is silly to downplay the key role of air forces in the overall battle. The crucial point is the final matching of the technological claims made for the airborne weapons and their platforms with their actual performance, and the resultant combinations were undeniably effective:

- Where stealth was promised; stealth was achieved.
- Where precision was sought; precision was delivered.

- When claims that armour was now truly vulnerable to air attack were made; tanks burned and APCs exploded.
- When bridges were targeted; bridges fell.

In short, air-delivered power demonstrated that it could fight a war which could lead not only to the collapse of enemy air power but to the destruction and virtual impotence of enemy land and sea power too. Air power came of age. It proved its flexibility. Its unique characteristics of high speed and concentration of force – which make it so effective not only in response but also in pre-emption – were displayed for the world's media to see. Air power provided dynamic attack and mobile defence; it supplied and moved; it sought and found; it diverted; it prevented; and it destroyed. It showed that the efficacy of modern air power derives not so much from what a single platform or system or weapon can do but from the combination of characteristics that produces a great flexibility of options.

I mentioned the potential danger that can arise from misinterpretation of this model. In time of crisis we in the military cannot guarantee certainty – the commodity most sought by politicians as they struggle to rescue an element of choice from the pressure of circumstances. We deal in probabilities and no more so than when planning an air campaign whether it be at the operational or tactical level. The use of precision guided munitions represent to me, as a military technician, economy of effort – very simply put I can achieve a very high probability of destroying a target with a handful of aircraft rather than an air armada. The problem is that I can offer no assurance at all as to where a laser-guided bomb that misses for whatever technical reason, will land. In tight situations, where the political stakes are high and politicians worry about collateral damage, this reality of life is somewhat troublesome and hence the importance of rules of engagement and intelligence gathering. Rules of engagement serve to control the use of force but without restricting the right of self-destruction. Control is the important word because quite clearly a misuse of firepower could either provoke or escalate conflict rather than contain it or calm it down. Moreover, within a coalition, political cohesion could be jeopardised if the rules of engagement of participating nations are not in harmony – but this is not always easy to achieve. If my memory is correct, 12 different sets of national rules of engagement were issued to our forces from the outset to the conclusion of the Gulf crisis.

In operations that may be conducted under restrictive rules of engagement and with neutral movements continuing in or close to the area of operation, it will be increasingly important to maintain accurate and up-to-date recognised air and surface pictures for both the political and the military control of operations.

For land-air operations, the importance of accurate and timely intelligence is possibly even more important, especially at the lower end of the spectrum, when opponents can take advantage of terrain and may merge with the indigenous civilian population.

Traditionally, peacekeeping and counter-insurgency operations have relied on intelligence derived from individuals (HUMINT). While this will certainly remain important, the proliferation of more capable weapons, emphasises the growing importance of effective area surveillance. Airborne tactical recce and interpretation of its imagery has received a tremendous boost in the wake of the Gulf War and subsequent operations as politicians demand a greater certainty of intelligence to inform their decisions.

Turning to the contemporary scene, our air power has been, and is, involved in the management of a whole range of potential or actual crisis situations throughout the world. RAF aircraft have been deployed in a deterrent role in the Falklands since 1982. Our SH continue to operate in support of the security forces in Northern Ireland in the fight against terrorism while others fly in a policing role in Hong Kong. In the Middle East we contribute to two coalition operations which enforce the 'No Fly' Zones over Iraq. In the north, flying from Incirlik in Turkey with tanker support our aircraft operate daily down to the 36th parallel. We have sustained our contribution here for over two years – first with Jaguar and since April this year with Harrier. In the south our Tornados, again with tanker support, monitor the southern 'No Fly' Zone up to the 32nd parallel along, as in the north, with our US and French coalition partners. Last January you may recall that RAF Tornados participated in two successful coalition strikes against Iraqi air defence sites. In the former Republic of Yugoslavia, since July last year RAF Hercules have been flying up to three missions daily into Sarajevo with UN relief support – a demanding and dangerous operation. Since November last year we have been flying an E-3D sentry aircraft out of Aviano in north Italy as part of the NATO AEW force monitoring air activity over the Bosnian 'No Fly' Zone. Since last April we have contributed eight Tornado F3 aircraft with tanker support as a further national contribution of Operation Deny Flight and as recently as July we have sent a squadron of Jaguar fighter bombers to Italy as part of a NATO offensive force poised ready to respond to a request from the UN Secretary General for Air Support. Finally, we provide regular detachments of Nimrod maritime patrol aircraft for Operation *Sharp Guard* which monitors the movement of shipping in the area to enforce sanctions against former Yugoslavia. Some of you may be surprised at the scale of our commitment.

I have tried to be objective in addressing the strengths and limitations of air power in crisis management. But, as divisions, ships and squadrons become fewer and the likelihood of international crisis remains or even grows, it becomes increasingly important that the instrument for dealing with and for managing crisis must be both effective and available. Our future weapons systems will not be any less costly than in the past. At a time when public expenditure, including defence spending, is very much under the spotlight, suffice to say that the relative value for money of aircraft able to deploy and hopefully stabilise a situation in a matter of hours from the time of decision, compares well with alternative capabilities.

While I cannot rule out – at one end of the spectrum at least – that the UK could go it alone for certain crises, a continuation of coalition activity seems far more likely to me. The ability of

air forces to operate together has been very evident in recent years and NATO has been the catalyst in providing remarkable uniformity in operations. English is the language of the air; tactics and concepts of operation have been produced by NATO and, very often, these have been folded into arrangements with nations outside the Alliance. They are tried and tested. Command and control of air forces is well understood and regularly practised. This is not to say that considerable differences in capability do not exist between the various nations, though operational standardisation is, in my experience, rather higher amongst air forces than in the other services.

Other than the United States, the Royal Air Force is unique within NATO in the range of capabilities it can bring to bear throughout the spectrum of crisis. Our transport force and our air-to-air refuelling capability gives us considerable range and carrying power. Our maritime patrol aircraft and our special intelligence gathering capability give us a remarkable range and carrying power. Our maritime patrol aircraft and our special intelligence gathering capability give us a remarkable facility which can be deployed to any part of the world at relatively short notice. Our support helicopters are assisting in crisis management in a variety of places in the world right now, and our offensive air power with its reconnaissance capability provides Saddam Hussein every day with a reminder of its reach.

On the afternoon of 8 August 1990 the Joint Commander for Operation *Granby* received instructions from the Ministry of Defence to prepare for the deployment of a Tornado F3 squadron from Cyprus to Saudi Arabia and a Jaguar squadron from the UK. No plans existed for these deployments so as Director of Operations I had the rare pleasure of addressing an entirely blank piece of paper to sketch out the deployment concept. The formal warning order was issued that evening. By midday on 11 August twelve Tornado F3 were in place at Dhahran, armed and ready to fight. One day later twelve fully combat-ready Jaguar supported by two tanker aircraft were in position in Oman. This was crisis management in action.





2000

# Is there a Role for Air Power in the Post-Cold War World?

This paper was first published in *The RAF Air Power Review* Vol 4 No 3 (Autumn 2001) and is reproduced here in its original form. It was awarded first place in the Gordon Shephard Memorial Prize essay competition for 2001.

By Flight Lieutenant Craig White

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**Biography:** Dr Craig White served in the RAF for 24 years, leaving in April 2022, as a Wing Commander. Dr White served in a variety of roles as a training officer, such as Officer Commanding Force Development Squadron at RAF Lossiemouth, Chief Afghan National Police in HQ Regional Support Command (South), Desk Officer for Personnel branch's junior officers in Manning, and a variety of roles in HQ 22 Group. In his final tour, Dr White was seconded to Loughborough University where he completed a PhD examining the impact of social identity and leadership on resilience within RAF personnel, as part of the Robson Academy of Resilience.

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## Contemporary Introduction 2022

This essay was written as part of my Masters course in International Relations at the University of Birmingham in 2000 - 2001. It is extremely timely that it should be reprinted now with the war in Ukraine ongoing, leading to the bolstering of NATO defences across the eastern most states of the Alliance in response to continued Russian aggression, including the deployment of British forces to the Baltic States. Thus, we could potentially stand at the precipice of a new Cold War between NATO and Russia. Nevertheless, between writing this essay and now, air power has been in much demand, such as in the conflicts in Afghanistan, Iraq, Syria, and Libya, which has emphasised both the key role that air power can play in conflicts, but also some of its limitations as set out in this essay. This essay was written in the months before the 9/11 attacks, including on the World Trade Centre, and the subsequent invasions of Afghanistan and Iraq, which emphasised the role of air power in defeating fielded forces, as well as the challenges in combating insurgencies undertaken by non-state actors. While air power has increased its capability of destroying mobile targets, particularly through the use of RPASs, there are still significant limitations on what it can achieve. In addition, the UK Parliament's decision not to deploy military troops to Syria in 2013, highlights the continued importance of political will to put boots on the ground. Thus, demonstrating the continued importance of air power, which was used to target Daesh in both Syria and Iraq. No doubt, air power will continue to develop its capabilities over the coming decades especially with the F-35 Lightning II being deployed on the new aircraft carriers, and it will retain its prominent role in delivering political will across the globe.

## Introduction

Air power has a significant role to play in the post-Cold War era. Since the end of the Cold War there has been a transformation of the international security environment resulting in an increase in limited-intensity regional conflicts. Furthermore, politicians, increasingly constrained by media-fuelled public opinion, and moral and financial considerations, attempt to demonstrate resolve and commitment to operations while minimising the risk of casualties on either side. The ability of air power to utilise its inherent strengths of height, speed and reach offers politicians a highly visible presence, relative invulnerability, and increased accuracy through the use of Precision Guided Munitions (PGMs). Consequently, air power has played an increasing role in limited-intensity conflicts, culminating in the sole use of air power by the North Atlantic Treaty Organisation (NATO) during Operation *Allied Force*.<sup>1</sup> Nevertheless, the efficacy of air power to undertake strategic bombing within combat operations and Peace Support Operations (PSOs) has been questioned. Analysis of Operations *Desert Storm*<sup>2</sup> and *Allied Force* has shown that while air power is very effective in destroying static targets, it is less destructive against mobile targets. Additionally, while air power has successfully undertaken roles within PSOs, land forces are still required to carry out the full range of tasks in these operations.

Air power is a concept that has historically proven difficult to define. Winston Churchill emphasised this point, arguing that, 'air power is the most difficult of military forces to measure

or even express in precise terms.<sup>3</sup> Consequently, initial attempts to define air power were vague. Marshal of the Royal Air Force Sir John Slessor remarked in the 1950s that 'air power is a compound of Air Forces and all those things on which Air Forces directly or indirectly depend, such as a flourishing aircraft industry and civilian aviation, a good meteorological service, secure fuel supplies and so on'.<sup>4</sup> While the Royal Air Force concept of air power has broadened over time in line with technological developments to include air vehicles from all sectors of the armed forces, including unmanned air vehicles (UAVs) and space-based systems, it has become more focused in terms of peripheral elements. National civilian and commercial resources, for example, are still included, but only those that are used as part of a military operation, whereas the aviation industry has been excluded. Furthermore, the current concept of air power encompasses a wide variety of tasks from high profile combat missions to Combat Support Operations such as Intelligence Surveillance and Reconnaissance (ISR), air transport, search and rescue, and electronic warfare.

*'Air power is the ability to project military force in air or in space by or from a platform or missile operating above the surface of the earth. Air platforms are defined as any aircraft, helicopter or unmanned air vehicle.'*<sup>5</sup>

This broadly acceptable definition will provide the basis for this paper.

The role of air power in the post-Cold War world is determined by its inherent strengths and weaknesses, leading it to make an extremely useful contribution in particular political circumstances. The British air power doctrine manual, *AP 3000*, regards height, speed and reach to be air power's three main strengths.<sup>6</sup> Height confers to air assets not only an enhanced observation and perspective of the battlespace,<sup>7</sup> but also considerable manoeuvrability. Speed allows rapid deployment and also bestows enhanced survivability by reducing exposure to enemy forces. Reach, assisted by air-to-air refuelling, allows force projection to all parts of the earth, unconstrained by topographical obstacles.

From these strengths five characteristics are derived, that enable air power to make a major contribution to modern peace support and combat operations: pace and tempo, flexibility and versatility, penetration, perspective, poise and stand-off and ubiquity of space.<sup>8</sup> Pace and tempo are comprised of three elements: speed of decision, speed of execution, and speed of transition, facilitating the re-deployment of air power at short notice. Flexibility and versatility allow air vehicles to strike various specialist target sets during a single mission. Penetration allows air power to strike targets within the enemy homeland without first defeating its fielded military forces. Perspective is derived from capitalising upon height and reach, permitting a broad view of the battlespace from the air, essential for intelligence gathering. Poise and stand-off allow air vehicles to loiter in close proximity to a potential area of operations, while the ubiquity of space coupled with modern technology enables space-based assets to be pervasive.

AP 3000 also identifies three main limitations of air power: impermanence, limited payload and fragility.<sup>9</sup> Impermanence is derived from the inability of air vehicles to stay airborne indefinitely. The Balkan conflicts of the 1990s highlighted the ability of land forces to hide in woods, civilian buildings and bunkers during air attacks, then re-emerge to continue their operations. Air power is unable to exert continual force upon enemy troops denying them control of their own actions without friendly troops physically to occupy territory. In essence, air power's inability to occupy territory means it cannot control territory permanently. Air vehicles are constrained by the number of weapons stations they possess and by aerodynamic considerations. The effect of this limitation, however, has diminished with the increased accuracy offered by PGMs, as fewer munitions are required. Modern air vehicles are also fragile pieces of equipment that are vulnerable to sophisticated air defence systems, particularly surface-to-air missiles. Nevertheless, the vulnerability of air vehicles can be reduced by utilising speed alongside self-protection devices.

These unique characteristics made it possible for air power to take advantage of the changes in the global political climate, thus assuming a larger role in the post-Cold War world. The end of the Cold War transformed the international security environment with important implications for the possibility and nature of external military involvement. The Cold War provided the stark simplicity of confrontation between the superpowers and their allies. Without the external constraints imposed by their superpower relationships, ethnic disputes previously contained have come to the fore, prompting a marked increase in limited-intensity regional conflicts. High and medium-intensity military interventions by western democracies are often both unnecessary by traditional standards and unpopular. On occasion, however, such intervention may be deemed to be beneficial to national interests; for example, securing cheap Middle Eastern oil supplies was a major motivation for many who participated in the Persian Gulf War.<sup>10</sup> Unless national interests are at stake, however, national governments are unlikely to be deeply committed to military interventions that are usually prompted by either moral outrage or a fear of instability spreading throughout a region. Similarly, media interpretation and influence, together with moral and financial considerations, has reduced the willingness of the electorate to support military intervention. Without a threat to national security or prestige, electorates are perceived to be less happy about servicemen dying – or killing. Public opinion fuelled by media images, for example, not only influenced the decision of President Bush to launch Operation *Restore Hope* in Somalia<sup>11</sup> in 1992, but also forced President Clinton to withdraw all military forces in 1993, after the execution of US servicemen in Mogadishu which caused domestic public outcry. The US is now reluctant to commit ground troops to any military intervention, in an attempt to avoid such a repetition. This unwillingness to commit ground forces was highlighted during the Kosovo conflict in 1999, when President Clinton ruled out utilising ground forces, in order to retain public support for intervention. Additionally, western democracies since the end of the Cold War wish to realise the 'peace dividend'; consequently military spending – either for equipment or for expensive deployments abroad – has fallen further down the list of national priorities.

Should a government wish to contemplate military intervention, it thus has the task of convincing a sceptical electorate, without the aid of Cold War rhetoric for justification. Intervention in the limited-intensity conflicts mentioned above has generally been multinational. Such operations are preferable to unilateral intervention as they offer burden-sharing in terms of finances, equipment, and lives, thus making it easier for politicians to enlist the support of their electorates. Nevertheless, within these operations agreement must be reached between a number of contributors, each of which requires their own domestic support. Organisations such as NATO require operations to be sanctioned by all member states before they can go ahead, forcing a compromise to accommodate those states that are more reticent towards military action. Also, once an intervention is undertaken it is necessary to get results before the coalition crumbles. The need for consensus therefore forces organisations to take fewer risks, and seek to achieve objectives quicker than would be the case if a nation were acting alone. Consequently, military intervention must now be as cheap as possible, and almost completely bloodless, as well as quick and decisive in order to gain results before support wanes.

Within the bounds of such limitations air power is very attractive to politicians, as it offers a highly visible presence, relative invulnerability when compared with ground forces, the ability to escalate and reduce the scale of military action quickly and easily, while indicating commitment to the operation. Moreover, the development of PGMs has resulted in air power offering increased accuracy and 'effects-based' targeting, thereby reducing the number of enemy casualties and the level of destruction required to achieve the campaign objective. Firstly, the rapid arrival of air assets in the area of operations provides a highly visible symbol of presence and resolve to antagonists and onlookers abroad and at home. Within 24 hours of the Iraqi invasion of Kuwait in 1991, Coalition air power was patrolling the Iraqi border with Saudi Arabia, hindering any further southward expansion by Iraq and reassuring neighbouring Arab states. This rapid deployment reported by the media emphasised Coalition commitment to the electorate at home, the Iraqi leadership and Saudi Arabia.

Secondly, air power is less vulnerable to enemy fire when compared with ground forces, and thus is attractive to politicians who wish to keep friendly casualties to a minimum. During situations where there may be a limited political commitment to an operation, aircraft can operate from secure bases beyond the reach of the opponents' military forces. Air power further reduces the number of friendly casualties by reducing the amount of manpower required for military interventions. While Britain offered to commit 54,000 troops to the proposed Kosovo ground force operation,<sup>12</sup> this figure is over ten times the number of British aircrew that participated in Operation *Allied Force*.<sup>13</sup> Additionally, combat aircraft can operate successfully, although with less weapons accuracy, beyond the range of the majority of surface-to-air missile systems and anti-aircraft artillery, reducing their vulnerability even further. During Operation *Allied Force* 10,484 strike missions were flown with the loss of only two aircraft and no lives,<sup>14</sup> an unprecedented achievement from a military standpoint

which meant that it was easier for the governments involved to retain public support for the intervention.

The third attribute that makes air power politically attractive is its ability to utilise PGMs. Since the end of the Cold War, PGMs have become more prominent because of the increased accuracy they offer. PGMs confer to air power the ability to identify and destroy very small targets with only a small risk of catastrophic deviance from the designated point of impact:

*'In 1945, 3,024 aircraft with an average delivery error of 3,300 feet were required to hit a 60 x 100 feet target; by the Vietnam War the number had reduced to 44 aircraft, and by the Gulf War only eight aircraft were required.'*<sup>15</sup>

The Gulf War prompted claims that PGMs provided air power with a 'surgical strike' capability with only one bomb needed to destroy a target. Although this claim proved ultimately to be false, by the end of Operation *Deliberate Force*,<sup>16</sup> less than two PGMs were required to destroy each designated point of impact.<sup>17</sup> This improved accuracy decreases the chances of PGMs hitting the wrong target and causing collateral damage.<sup>18</sup> As Western democracies are highly sensitive to media images of collateral damage, these images have the potential to weaken electorate support for an operation, even to the point of causing its premature cessation. Additionally, an opponent will undoubtedly highlight instances of collateral damage, in an attempt to discredit the interventionist's operations with observers and other coalition members. During the Gulf War, for example, Iraqi leader Saddam Hussein permitted the world's media unrestricted access only to bomb sites involving collateral damage. By decreasing collateral damage, PGMs assist in maintaining public support for an operation, without which national governments would find it extremely difficult to sustain such actions.

Moreover, the unprecedented accuracy that these weapons offer enables air vehicles to carry out 'effects-based' targeting, through which it is possible to pre-determine the level of destruction that is caused. Politicians thus seek to deny the enemy use of their facilities without having to destroy them completely. The ability to engage in 'effects-based' targeting, therefore, is an important attribute in view of the cost of rebuilding a nation's infrastructure and facilities after the end of a conflict. It is possible, for example, to disable a power station by destroying only its water pumping station, an effective but inexpensive procedure in terms of risk to aircrew and post-conflict reparation.

The last major advantage that PGMs confer to air vehicles, is the ability to attack several targets concurrently, something not possible with 'dumb' bombs.<sup>19</sup> Thus, it has been argued that PGMs enable air power to concentrate force at many desired points simultaneously,<sup>20</sup> allowing more targets to be destroyed in a shorter period of time than was previously possible. During the first night of Operation *Allied Force*, 44 key targets were destroyed within Belgrade, a level of destruction that could not have been achieved without the use of PGMs.<sup>21</sup> Consequently, PGMs allow operations to be completed relatively quickly, with the length of conflicts now calculated

in days rather than months and years. The future development of PGMs will lead to air power playing an increased role within limited-intensity conflicts. Relatively inexpensive guidance systems will confer a day and night, all weather precision capability to a large amount of 'dumb bombs', thereby enhancing the capabilities of current weapons in a cost-effective manner.<sup>22</sup> Also, the procurement of long-range air launched cruise missiles, such as Stormshadow, will decrease aircraft and crew vulnerability further by increasing the stand-off potential of air power.

Finally, air power is inherently flexible, allowing action to be suspended and activated, and also escalated and decreased in accordance with the diplomatic process. During Operation *Deliberate Force*, NATO bombing of the Bosnian Serbs was paused to allow them to remove their heavy weaponry from the Sarajevo demilitarised zone. After the Bosnian Serbs failed to comply with NATO instructions bombing was reconvened. Moreover, air assets can be extracted from their foreign operating bases without the problems associated with extracting surface forces. All of the above attributes increasingly make air power the instrument of choice for politicians as it best fits the political requirements for military intervention.

While air power has played an increasing role in the post-Cold War world, there are a number of limitations that need to be considered: the accuracy of PGMs is dependent upon good intelligence, air power has difficulty targeting non-state actors, and it encounters significant difficulties when employed against strategic targets that are not static. Despite the highly accurate bombing demonstrated by PGMs, the world media remembers the bombs that go astray. The destruction of the Al Firdos command bunker in the Gulf War that resulted in the death of 314 sheltering civilian Iraqis,<sup>23</sup> illustrated PGMs' dependence upon good intelligence. Similarly, it can be argued that the way in which the accuracy of these weapons is presented leads to false expectations. The Circular Error Probability (CEP) of PGMs is generally quoted in tens of feet, however, CEP only shows where the nearest 50 per cent of the weapons will fall. PGMs perform poorly when their guidance systems fail, a problem which can result in the weapon missing the target by miles. In 1998, a US Tomahawk cruise missile went so far astray as to land in Pakistan instead of Afghanistan. While PGMs have undoubtedly improved the capability of air power within military operations, there remain serious limitations that must be taken into account,<sup>24</sup> and it would be unwise to exaggerate capabilities.

Increasingly, limited intensity combat operations are directed against non-state actors, such as communal militias, violent political movements, and other organised political actors that are not nation states. Recent examples include Somalia in 1992 and 1993, Bosnia in 1995, and the destruction of targets connected to Osama bin Laden's terrorist organisation in 1998. It is clear that there are inherent difficulties in using air power against non-state actors: such adversaries may lack identifiable and targetable assets, inaccurate intelligence estimates are common and non-state adversaries may lack control over constituent elements.<sup>25</sup> The US missile attacks against Osama bin Laden were ineffectual as he lacked assets that were vulnerable to military force. Further, inaccurate intelligence led to US Cruise missiles



destroying what was believed to be a chemical warfare production facility in the Sudan, linked to bin Laden. The facility was in fact a pharmaceutical factory, a mistake that caused severe embarrassment to the US. Although air power has succeeded in some instances, it needs to overcome the problems of a lack of targets and dislocated authority which provide circumstances in which air power struggles to be effective. It is not clear, however, that these difficulties could be better overcome by the use of an alternative military method, such as ground forces.

Air power has been utilised for strategic effect with varying degrees of success in the post-Cold War era. Strategic bombing is directed towards the opponent's centres of gravity, such as infrastructure, key production facilities and fielded military forces, where 'the effect sought by air power could be destructive, non-destructive or a combination of both, against target sets which undermine the opponent's ability, will and means to continue his aggression'.<sup>26</sup> Analysis of two case studies, Operation *Desert Storm* and Operation *Allied Force*, highlights the effectiveness of air power in destroying static strategic targets.

During Operation *Desert Storm* air power was successful in destroying many strategic target sets including command and control organs, power generation facilities, refined lubricant production plants, transportation infrastructure and dug-in troops. The Baghdad electrical power grid was disabled after aircraft destroyed 27 generation plants and transmission facilities throughout the country.<sup>27</sup> Similarly, 28 Iraqi oil facilities were devastated, effectively shutting down refined petroleum production, and after ten days of attacks Iraqi refined oil production was also shut down,<sup>28</sup> while the destruction of 44 command and control facilities left the Iraqi leadership separated from their forces and unable to communicate effectively.<sup>29</sup> The vast Iraqi force assembled in Kuwait, numbering 500,000, depended upon constant supplies of food, water, fuel and ammunition from Iraq. Coalition aircraft destroyed 44 key rail and road bridges in Iraq,<sup>30</sup> effectively halting resupply, while the troops themselves, their equipment and supply dumps in Kuwait, were continually targeted. Supply levels were cut by 90 per cent, and 48 per cent of tanks, 30 per cent of armoured troop carriers, and 60 per cent of artillery<sup>31</sup> were destroyed, seriously degrading Iraq's ability to fight Coalition ground forces. Consequently, it has been argued that strategic air power was the decisive factor in the Coalition's victory in the Gulf War:

*'Gulf Lesson One is the value of air power.'*<sup>32</sup>

It can be argued, however, that the Gulf War was ideally suited to air attack, and surrounded by unique conditions. The Iraqi army fought a conventional war, utilising large formations that were immobile, dug in, and occupying sparsely populated desert terrain far away from civilians. These conditions meant that the Iraqi forces were easier to target and air vehicles could use large amounts of unguided munitions without fear of causing collateral damage. Coalition air power was thus able to inflict an unprecedented level of destruction on fixed targets and Iraqi fielded forces in a relatively short space of time.

Air power was less successful during Operation *Desert Storm* in combating mobile targets, especially Scud missile launchers. Iraqi Scud missiles posed a considerable threat to Coalition cohesion during the Gulf War by threatening to provoke Israel's entry into the conflict. The destruction of Scud missile launchers was therefore a top priority for campaign planners. Nevertheless, despite 2,493 sorties dedicated to the 'Scud hunt', the Iraqi launchers were never fully suppressed – 88 were fired against Israel, Saudi Arabia and Bahrain.<sup>33</sup> While aircraft managed to destroy most of the fixed Scud launch sites,<sup>34</sup> the majority of the mobile launchers that Coalition aircrews believed that they had destroyed were later found to be decoys.<sup>35</sup>

Although directed against very different enemy forces, NATO air power was as effective against static targets during Operation *Allied Force* as in the Gulf, attacking 440 static targets, with over 75 per cent suffering moderate to severe damage.<sup>36</sup> Moreover, NATO destroyed or significantly damaged a wide array of targets including: 14 command posts, 34 road bridges, 11 railway bridges, 29 per cent of all Serbian ammunition storage capacity, 57 per cent of petroleum reserve capacity and all Serbian controlled oil refineries.<sup>37</sup> Consequently, Operation *Allied Force* served to reinforce the efficacy of air power against fixed targets.

Kosovo did, however, provide NATO air power with a more challenging scenario in which to demonstrate its effectiveness against ground forces. NATO dedicated over 30 per cent of its sorties to the destruction of Serb forces, which was regarded as NATO's 'No 1 priority'.<sup>38</sup> Yet, these forces proved to be very adept at 'going to ground', and concealing their heavy equipment in woods and urban areas, thereby posing a high risk of collateral damage for NATO. Decoys were also used extensively throughout Kosovo, while Serbian troop formations were small in number, widely dispersed and constantly on the move. Consequently, NATO aircrews were hampered by insufficient intelligence regarding the location of Serb forces, which was necessary for the effective use of PGMs. Moreover, Serb forces were not heavily dependent on re-supply from their homeland as food and water could be obtained locally, and they had their own ammunition stores within Kosovo. Overall, therefore, NATO aircraft encountered great difficulty in destroying Serbian fielded forces.

In the aftermath of the conflict NATO claimed to have destroyed 93 tanks, 153 armoured personnel carriers, 339 military vehicles and 389 mortars and artillery pieces.<sup>39</sup> The British Ministry of Defence claimed that NATO air power effectively reduced the Serb's capacity to carry out ethnic cleansing by forcing their heavy equipment into hiding. Sir John Goulden remarked that 'the bottom line is that we bottled up the equipment that was in Kosovo'.<sup>40</sup> It can be argued, however, that Serb forces only required heavy equipment in order to fight a NATO ground force, as lightly armed Serb infantry were more than a match for Kosovo Liberation Army troops lacking training and combat experience. Furthermore, air power was unable to stop Serb troops and militia burning the homes of Kosovar Albanians and forcing 850,000 of them to flee abroad.<sup>41</sup> Judah has argued that the efficacy of air power against tanks and artillery is academic when, 'the most potent weapon in ethnic cleansing is the cigarette-lighter needed to set houses on fire'.<sup>42</sup> Equally seriously, NATO aircraft were

constrained by topography that provided the enemy with the ability to conceal their troops, and by adverse weather – both optical and laser guided PGMs were unable to track targets obscured by large amounts of cloud. The House of Commons Select Committee on Defence's report stated that: '[NATO air power] did not stop Serbian forces from forcing civilians from their homes and manipulating the refugee flow'.<sup>43</sup> Consequently, air power can be seen as ineffective against widely dispersed small groups of lightly armed troops that are concealed by wooded areas and mountains, or intermingled with civilians. Thus, the evidence of air power in Kosovo confirms the picture presented by the Gulf War – that air power is highly effective against static strategic targets, but is far less impressive when faced with mobile targets such as Scud missile launchers or light infantry.

Perhaps the most striking feature of the post-Cold War security environment, however, is not the more conventional conflict scenarios discussed above, but the Peace Support Operations (PSOs), defined as, 'multi-functional operations involving military forces and diplomatic and humanitarian agencies ... that ... are designed to achieve humanitarian goals or long term political settlement'.<sup>44</sup> This concept of operations includes peacekeeping, peace enforcement, conflict prevention, peace making, peace building and humanitarian missions. While the UN initiated just 13 PSOs between 1948 and 1988, during the last decade this has risen significantly, with the UN activating 36 such operations, including those undertaken in Somalia, Haiti and Bosnia.<sup>45</sup>

Air power also has a role to play within PSOs. Utilising its strengths air power has the ability to carry out certain tasks more effectively than land and naval power within these types of operation, such as ISR, the rapid transportation of men and supplies, and enforcing no fly zones. Nevertheless, this does not mean that air power is able to carry out PSOs in isolation, as ground personnel are required for many roles, such as providing human intelligence (HUMINT) and building interpersonal relationships with the host nation.

Colonel Owen of the United States Air Force has proposed four tactical roles within PSOs that air power assets are able to undertake: observation, interposition, patrolling, and civic actions.<sup>46</sup> In the first area, observation, air power offers significant capabilities, including the ability to cover a wide area continually, provide a high standard of definition on specific targets, and a day and night all-weather capability. Air vehicles can be used to observe the implementation or violation of a truce process, including cease fires, border violations and the positioning of troops, as well as the location and size of threats to the Peace Support force. Air power, through the use of ISR assets such as the U2/TR1A high altitude manned reconnaissance aircraft, the Phoenix UAV, and Helios satellite constellation, is able to cover a wide area, with a good view from a variety of altitudes. ISR assets provide not only a high standard of definition coupled with a day and night capability, but also radar equipped platforms such as the E-8 Joint Surveillance and Target Attack Radar System which are largely unaffected by the weather. Finally, modern UAVs allow specific targets or areas of territory to be observed for long periods of time. Long endurance UAVs, such as the United States'

Predator platform, which was successfully deployed over Bosnia, combine a range of 500-700 kilometres with an endurance time of 48 hours.<sup>47</sup> ISR assets have been used to good effect, exposing the existence of mass graves in Bosnia and highlighting the movement of large numbers of refugees towards the Macedonian border in Kosovo.

While air power undoubtedly increases the ISR capability of a military force, there remain limitations to what it is capable of observing. It cannot reveal the content of buildings or vehicles, detect small arms from a distance, or discriminate between military and civilian trucks in a convoy. In Kosovo, NATO mistook a refugee convoy for military vehicles and killed fifty civilians.<sup>48</sup> Ground troops are required to search buildings and vehicles and provide detailed local HUMINT, enhanced by familiarity and experience with the local environment. In contrast with air assets, troops are able to promote good relations with the local population, thereby helping to deter violations of peace agreements. Further, high technology ISR assets are extremely expensive, especially as a multiplicity of sensors are required to provide total coverage and clarity, and are therefore not available to all armed forces.

The second role that air power undertakes within PSOs is interposition, where military forces are used to create and maintain buffer zones between belligerents, and to prevent border violations and military confrontation. Air assets possess the ability to move troops and equipment rapidly over large distances, unconstrained by the barriers of physical topography, such as mountains and lakes. In contrast land forces have great difficulty transporting troops and equipment quickly to isolated locations without good quality roads. Further, the speed and reach of aircraft means that they can respond quickly to sudden changes in the situation on the ground, facilitating the rapid interposition of forces to complete the tasks highlighted above.

Thirdly, air vehicles can be used to patrol the area of operations to increase the visibility, credibility and effectiveness of the Peace Support force. Patrolling aircraft provide a means by which the Peace Support force can establish control over the belligerents through the enforcement of no-fly zones and air embargoes. Moreover, the speed and responsiveness of air vehicles means that they can provide valuable support and protection to land based patrols dispersed over a wide area. Such air patrols are relatively invulnerable, while land patrols are vulnerable to attack by snipers and superior force levels.

Fourthly, air power is capable of carrying out civic actions that can promote stability and confidence between the Peace Support force and the host nation. Civic actions can include a multitude of tasks such as providing assistance to law enforcement agencies, protecting economic assets, the provision of specialist advice, the distribution of food and medicine, and the evacuation of people from disaster areas. For example, British helicopters and transport aircraft were used both to rescue civilians from floods in Mozambique, and to deliver vital supplies to Sarajevo during the Bosnian conflict. Air assets possess the ability to reach isolated areas quickly, particularly important in siege or disaster relief operations. In comparison with surface transportation, however, aircraft payloads are usually smaller. Moreover, ground

forces are able to develop important interpersonal relationships, building trust with the local population and leaders through face-to-face contact.

Air power is a vital component of most PSOs, providing a highly visible presence through patrols or the transportation of troops, equipment and supplies in a short period of time. Once a government decides to initiate a PSO it is important that action is taken quickly in order to demonstrate commitment and resolve to the electorate, coalition partners and those parties that the politicians are attempting to support or to deter. If troops and supplies are needed urgently, then air vehicles are the only means of achieving this aim. The utility of air power has been demonstrated by their use in every major PSO since the end of the Cold War, including Bosnia, Kosovo, Somalia and Sierra Leone.

Since the end of the Cold War the international security environment has changed considerably as a result of the decline in east-west antagonism. Without ideological rhetoric, politicians have found it increasingly difficult to justify military operations abroad. Governments have found themselves constrained by the reluctance of the electorate to support action unless national interests are at stake, and have therefore emphasised the humanitarian nature of operations in order to gain public approval. Additionally, media images play an important role in retaining public support throughout a military operation. Images such as the public execution of US troops in Somalia or the bombing of a civilian convoy in Kosovo can lead to public disapproval and the ending of military action. Politicians, therefore, when confronted by low-intensity regional conflicts are required to deliver short but decisive operations that are ideally bloodless for both sides.

Within this political environment the positive attributes of air power have led to it becoming the military instrument of choice for politicians. Air power offers fewer friendly and enemy casualties, as well as less collateral damage than ground operations. The increased accuracy offered by PGMs has led to the development of 'effects-based' targeting, improving the efficacy of air power in combat operations. The utilisation of air power can, therefore, lead to fewer images of death and destruction in the media, and thereby help to engender continued public support for military operations. Furthermore, PGMs offer the ability to destroy a large number of targets simultaneously, resulting in shorter operations. In short, without the use of air power politicians would have been more reluctant to embark on limited-intensity military operations. Moreover, as future development further enhances accuracy and range for PGMs, the role of air power within military operations will continue to increase. Operations *Desert Storm* and *Allied Force* highlighted the efficacy of air power against all types of static targets. It is the only type of military force that is capable of penetrating deep into the enemy homeland without first defeating their fielded forces, and it has been and will continue to be successful in combating fielded forces that are reliant on heavy equipment or on extensive re-supply.

Air power is, however, limited in some important respects; for example, the accuracy of PGMs is reliant upon good intelligence and the performance of sophisticated guidance

systems. Furthermore, non-state actors that lack identifiable targets have demonstrated a degree of immunity to air attack, and the efficacy of air power against mobile targets is uncertain, especially when the enemy is adept at utilising topography and local communities to conceal forces and equipment. Importantly, the ability to deny the enemy the use of his heavy equipment is academic in situations where only light infantry is required to achieve the objective. Despite these limitations, however, as long as the international security environment is characterised by regional conflict, low-intensity fighting or humanitarian crises, air power will be central to any military option available to political leaders.

## Notes

<sup>1</sup> *Allied Force* was the NATO designate for the air campaign conducted during the Kosovo conflict in 1999.

<sup>2</sup> Operation *Desert Storm* was the US designate for the military operations carried out by Coalition forces during the 1991 Persian Gulf War.

<sup>3</sup> Richard Hallion, *Storm Over Iraq: Air power and the Gulf War*, Smithsonian, 1991, p. 2.

<sup>4</sup> *AP 3000 British Air Power Doctrine*, HMSO, 1999, p. 1.2.1.

<sup>5</sup> *AP 3000 British Air Power Doctrine*, p. 1.2.1.

<sup>6</sup> *AP 3000 British Air Power Doctrine*, pp. 1.2.3-1.2.8.

<sup>7</sup> *AP 3000 British Air Power Doctrine*, p. 1.2.3.

<sup>8</sup> *AP 3000 British Air Power Doctrine*, pp. 1.2.4-1.2.5.

<sup>9</sup> *AP 3000 British Air Power Doctrine*, pp. 1.2.4-1.2.5.

<sup>10</sup> Lawrence Freedman and Efraim Karsh, *The Gulf Conflict*, Faber and Faber, 1994, pp. xlv-xlv.

<sup>11</sup> Operation *Restore Hope* took place from December 1992 – May 1993, and was aimed at securing the safe delivery and distribution of humanitarian aid within Somalia.

<sup>12</sup> House of Commons Select Committee on Defence, 'Fourteenth Report: The Kosovo Campaign', 23 November, 2000.

<sup>13</sup> House of Commons Select Committee on Defence, 'Fourteenth Report'.

<sup>14</sup> House of Commons Select Committee on Defence, 'Fourteenth Report'.

<sup>15</sup> Group Captain Andrew Lambert, *The Psychology of Air Power*, RUSI Whitehall Paper Series, 1994, p. 4.

<sup>16</sup> *Deliberate Force* was the NATO designate for the air campaign in the Balkans, beginning in 1995.

<sup>17</sup> John Tirpak, 'Deliberate Force', *Air Force Magazine*, October, 1997, p. 39.

<sup>18</sup> Collateral damage is defined as damage to property or personnel adjacent to, but not constituting part of, an authorised target.

<sup>19</sup> The United States Air Force B-2 Spirit bomber is capable of carrying 16 Joint Direct Attack Munitions (JDAM), enabling a single aircraft to initiate a parallel attack against 16 separate targets.

<sup>20</sup> Merrill McPeak, 'Precision Strike: The Impact on the Battle Space', *Military Technology* (May 1999), pp. 20-24.

<sup>21</sup> House of Commons Select Committee on Defence, 'Fourteenth Report'.

<sup>22</sup> It costs approximately \$14,000 to transform a 'dumb bomb' into a global positioning system

guided munition, using a JDAM tail kit. Source: Wing Commander Ken Smith, Air Warfare Centre, RAF Cranwell.

<sup>23</sup> Lawrence Freedman and Efraim Karsh, *The Gulf Conflict*, Faber and Faber, 1993, pp. 326-327.

<sup>24</sup> Wing Commander Greg Bagwell, 'Precision Weapons: Considerations for their employment', *Air Power Review*, Vol. 2, No. 1 (Spring 1999), pp. 1-14.

<sup>25</sup> Daniel Byman, *et al.*, *Air Power As a Coercive Instrument*, RAND, 1999, pp. 107-26.

<sup>26</sup> *AP 3000 British Air Power Doctrine*, p. 2.6.1.

<sup>27</sup> Hallion, *Storm Over Iraq*, p. 191.

<sup>28</sup> Hallion, *Storm Over Iraq*, pp. 192-193.

<sup>29</sup> Hallion, *Storm Over Iraq*, p. 190.

<sup>30</sup> Hallion, *Storm Over Iraq*, p. 190.

<sup>31</sup> Stephen Biddle, 'Victory Misunderstood: What the Gulf War Tells Us about the Future of Conflict', *International Security*, Vol. 21, No. 2 (Fall 1996), pp. 139-79.

<sup>32</sup> George Bush, in Grant Hammond, 'Myths of the Gulf War: Some Lessons Not to Learn', *Air Power Review*, Vol. 3, No. 2 (Summer 2000), p. 68.

<sup>33</sup> Hallion, *Storm Over Iraq*, p. 181.

<sup>34</sup> Hallion, *Storm Over Iraq*, p. 179.

<sup>35</sup> Mason, *Air Power*, p. 160.

<sup>36</sup> House of Commons Select Committee on Defence, 'Fourteenth Report'.

<sup>37</sup> House of Commons Select Committee on Defence, 'Fourteenth Report'.

<sup>38</sup> General Michael Short, in Daniel Byman and Matthew Waxman, 'Kosovo and the Great Air Power Debate', *International Security*, Vol. 24, No. 4 (Spring 2000), pp. 22-23.

<sup>39</sup> General Wesley Clark and Brigadier General John Corley, 'Press Conference on the Kosovo Strike Assessment', 16 September, 1999.

<sup>40</sup> House of Commons Select Committee on Defence, 'Fourteenth Report'.

<sup>41</sup> Tim Judah, *Kosovo: War and Revenge*, Yale University Press, 2000, p. 241.

<sup>42</sup> Judah, *Kosovo*, p. 309.

<sup>43</sup> House of Commons Select Committee on Defence, 'Fourteenth Report'.

<sup>44</sup> *AP 3000 British Air Power Doctrine*, p. 3.13.8.

<sup>45</sup> Colonel Robert Owen, 'Aerospace and Land Power in Peace Operations: toward a new basis for synergy', *Air Power Review*, Vol. 2, No. 4 (Winter 1999), p. 27.

<sup>46</sup> Owen, 'Aerospace and Land Power in Peace Operations', pp. 26-47.

<sup>47</sup> Peter van Blyenburgh, 'UAVs: Where Do We Stand?', *Military Technology*, March 1999, p. 30.

<sup>48</sup> Judah, *Kosovo*, p. 260.

2000/2010

# The Royal Air Force and UK Air Power over Iraq and Kosovo, 1997-2000: A Comparative Perspective

By Dr Sebastian Ritchie

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**Biography:** Sebastian Ritchie is an official historian at the Air Historical Branch (RAF) of the Ministry of Defence. He obtained his PhD from King's College, London, in 1994 and lectured at the University of Manchester before joining the Air Historical Branch. He is the author of multiple classified official histories covering RAF operations in Iraq, the former Yugoslavia, Libya and Afghanistan, and has also lectured and published widely on aspects of air power and air operations, as well as airborne operations, in the Second World War and post-war periods. His published books include *Industry and Air Power* (1997), *Arnhem: Myth and Reality* (2011), and *The RAF, Small Wars and Insurgencies* (two volumes, 2011).

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**Abstract:** This paper considers the role of the Royal Air Force and the application of air power in Operation *Bolton* (Iraq, 1997-2000) and during the NATO operation *Allied Force* (Kosovo 1998-1999). Typically, historians have addressed *Bolton* and *Allied Force* independently, yet their similarities suggest there is a strong case for considering them in parallel. Both were independent air operations, both were initiated by the first Blair government, both were fought alongside alliance partners, and both were subject to the command and control of the newly created Permanent Joint Headquarters. Both involved the use of identical offensive capabilities by the RAF. Most of all, both witnessed efforts to combine diplomacy and air power and illustrate the scope and limitations of this approach to crisis management.

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## Introduction

This paper considers the role of the Royal Air Force and the broader application of air power in Operation *Bolton* (Iraq, 1997-2000) and during the NATO operation *Allied Force* – the Kosovo crisis of 1998-1999.<sup>1</sup> Operation *Bolton*, initiated in response to the so-called UNSCOM crisis, witnessed continuous efforts by the United States and the UK to use the threat of aerial bombardment to coerce Saddam Hussein's regime in Iraq into co-operation with the United Nations Special Commission (UNSCOM), which had been established after the Gulf War in 1991 to supervise the elimination of Iraqi weapons of mass destruction (WMD). Overt hostilities ultimately erupted in December 1998, when the coalition mounted a brief campaign of air strikes under the operation name *Desert Fox*, and then continued at a lower level of intensity over southern Iraq.

Operation *Allied Force* began on 24 March 1999 but was preceded by many months of diplomatic activity. It was mounted against the Federal Republic of Yugoslavia (FRY – which then comprised Serbia and Montenegro) in response to the actions of the FRY security forces in the southern Serbian province of Kosovo. Two and a half months later, on 10 June the campaign was suspended after the FRY's president, Slobodan Milosevic, agreed to withdraw his troops from Kosovo and satisfy a range of other requirements laid down by the international community for ending the conflict. By that time, many Kosovo Albanians had been subjected to appalling human rights violations in a process resembling the ethnic cleansing previously witnessed in Bosnia, and hundreds of thousands had fled to refugee camps in Albania and Macedonia to escape the Yugoslav army, military police and paramilitaries.

In the same period, NATO bombing inflicted extensive damage on the FRY's military and economic infrastructure. NATO aircraft flew some 38,004 sorties, of which 10,484 were offensive sorties. The UK contributed 1,618 sorties to NATO's total, 1,008 of which were offensive sorties – flown by Harrier GR7s based at Gioia del Colle in Italy and Tornado GR1s based at RAF Bruggen in Germany. Between 24 March and 10 June, NATO aircraft released 23,614 munitions against FRY targets. During the operation, the number of committed NATO aircraft almost doubled. The offensive sortie rate increased from between 50 and 100 per day in the first week of the campaign to an average of more than 280 per day in the week preceding the start of peace negotiations.

Typically, historians have addressed these two operations independently. Yet, from the RAF's perspective, the important similarities and continuities that extend across *Bolton* and *Allied Force* suggest that there is a strong case for considering them in parallel. Both were independent air operations, conducted without any accompanying intervention on the ground; both were initiated by Tony Blair's first Labour government and coincided with Labour's Strategic Defence Review (SDR). Theoretically, at least, we might expect operational activity to reflect the assumptions of SDR and of RAF doctrine, which was revived under the auspices of the Director of Defence Studies (RAF) and the Air Warfare Centre (AWC) in the 1990s. Both operations were fought alongside coalition partners or formal allies, and both were

also subject to the command and control of the newly created Permanent Joint Headquarters (PJHQ). Both also involved the employment of identical offensive capabilities by the RAF. Most of all, however, *Bolton* and *Allied Force* witnessed efforts to combine diplomacy and air power and serve to illustrate the scope and limitations of this approach to crisis management.

## Strategic Background

Operation *Bolton* and Operation *Allied Force* occurred during Tony Blair's first Labour administration, which came to power in May 1997 after almost two decades of Conservative rule. International relations had seen several years of upheaval since the end of the Cold War. Despite confident expectations of a substantial peace dividend, conflict became more familiar – not less. The first Gulf War (the UK Operation *Granby*) erupted in 1990 and No-Fly Zones (NFZs) were subsequently established over northern and southern Iraq. Yugoslavia descended into a bloody civil war, leading to the creation of another NFZ over Bosnia and peacekeeping measures on the ground under combined UN and NATO leadership. Hostilities eventually broke out in August 1995, when Operation *Deliberate Force* was launched against the Bosnian Serbs. The question in 1997 was whether this trend would continue under a Labour government. In the event, if anything, it intensified.

## Defence Policy

The Blair government had an election manifesto pledge to initiate SDR on coming to power. Launched in May 1997 and published in July 1998, SDR made several assumptions concerning the nature of future UK military commitments. Of note, it envisaged that 'most future operations will be conducted by joint forces composed of fighting units from individual services'.<sup>2</sup> In other words, they would involve the combined action of two or more Armed Services.

SDR sought to prepare the Armed Services to mount a single full-scale operation such as Operation *Granby*, or two smaller operations that would not both involve warfighting and would not be maintained simultaneously for longer than six months.<sup>3</sup> This latter scenario might have meant, for example, a warfighting operation of no more than six months' duration being sustained alongside a longer (or 'enduring') non-warfighting operation. The two operations considered here provided the first opportunities to compare the theory of SDR with the reality of the Blair government's foreign and defence policy.

## Doctrinal Renaissance

While RAF perspectives had been incorporated into NATO doctrine in the 1970s and 1980s, the publication of AP 3000, *Royal Air Force Air Power Doctrine*, in 1990, represented the Service's first independent excursion into the doctrinal field for more than two decades. However, in considering the employment of combat air power, AP 3000 used a terminology substantially drawn from Cold War NATO publications that was not easily applicable to air operations in the post-Cold War era. Perhaps the most relevant statement appeared under the Strategic Air Offensive heading and concerned what was described as 'political signalling'.

The threat, or the use of, conventional strategic air offensive action provides governments with a flexible and responsive instrument of crisis management. It can be used, as a means of signalling political intentions, either independently or in conjunction with other force elements ... It could also be used to deter impending aggression, signal resolve, threaten escalation, demonstrate friendly capabilities or eliminate specific enemy capabilities.<sup>4</sup>

The AP also suggested that strategic air power could be employed in so-called 'punishment operations', for example, as a response to state-sponsored support for terrorism.

Beyond this, the NFZ concept was entirely absent from the AP, and anti-surface force operations were deemed to be part of a 'truly joint campaign' in which 'the different force elements operate together synergistically, offering each other mutual support to achieve objectives'.<sup>5</sup> It also stated that 'anti-surface force action works best when used in direct cooperation with friendly surface operations, where the enemy is forced to expose and attempt to manoeuvre his forces while under fire'.<sup>6</sup> RAF operational doctrine did not anticipate the possibility of an independent air operation against surface forces.

By the time the AWC published a doctrinal manual in 1996 entitled *Royal Air Force Air Operations*, the three NFZs had been maintained for several years. Nevertheless, although the manual discussed peace support operations at some length, its consideration of NFZs extended to just a single line on 'airspace control' measures that might include air exclusion zones, air policing and combat air patrols.<sup>7</sup> Anti-surface force operations were again expected to be joint. The manual declared that 'Air interdiction must be conducted in concert with the land force battle for optimum synergy'. Other concepts such as Battlefield Air Interdiction and Close Air Support were defined by 'the proximity of targets to friendly forces and the control arrangements which are therefore required'.<sup>8</sup> Like AP 3000, *Royal Air Force Air Operations* did not envisage a situation in which land forces were entirely absent.

## **Coalition, Alliance and National C2**

The extremely close bond between the RAF and the United States Air Force (USAF), which dates back to the Second World War, was rejuvenated during the conflicts of the 1990s. While the first Gulf War provided the RAF with live operational experience of modern USAF doctrine and operating procedures, defined especially by such Command and Control (C2) provisions as the Combined Air Operations Centre (CAOC) and the Air Tasking Order (ATO), and the processes used to generate it, the RAF gained further experience of USAF C2 as the decade wore on. A direct result was the creation of the UK Air Operations Centre in the later 1990s, which led in turn to the establishment of the Joint Forces Air Component Headquarters (JFACHQ) in 1999.<sup>9</sup> By that time, no other American ally was so familiar with the USAF way of warfare.

Predictably, the UK exercised a more prominent role in the narrowly based Gulf coalition than in the NATO alliance, which, in 1999, numbered 19 member states. Equally, as the

main coalition contributor, the USAF exercised a considerable degree of independence and ran operations over Iraq along lines substantially determined by the Combined Forces Air Component Commander (CFACC), which were fully supported by the RAF. By contrast, over the former Yugoslav territories, campaign management was rendered infinitely more complicated by the scale of the NATO alliance, US security concerns, closer political supervision (linked to more prominent media reporting) and the air component's subordination to higher NATO command echelons. Against this background, the RAF had to contend with less visibility of (and influence within) planning processes than it was accustomed to in the Gulf.<sup>10</sup>

In the UK, joint command and control provisions were overhauled in the 1990s. At the beginning of the decade, UK C2 procedures for out-of-area operations were founded on principles that were both national and joint, with command in theatre assigned to a Joint Force Commander operating from a deployed headquarters. At home, the Chiefs of Staff would delegate command to a Joint Headquarters (JHQ) located either at Headquarters Strike Command (HQ STC – now Air Command) or CINCFLEET Headquarters, Northwood.<sup>11</sup>

The JHQ system was not immediately reviewed after Operation *Granby*. Nevertheless, a procedure that involved the periodic establishment of a Joint Headquarters to provide national C2 during a single major crisis was obviously unsuited to a situation characterised by multiple, simultaneous or enduring operations. For this reason, the MOD ultimately decided to establish the PJHQ at Northwood. At the same time, the Defence Crisis Management Organisation (DCMO) was formed in the MOD, and a number of responsibilities were transferred from the department to the new headquarters. In future, the MOD would concentrate on policy formulation and the provision of strategic guidance.<sup>12</sup> PJHQ was inaugurated in April 1996 and thus inherited the two Iraqi NFZ missions and the peace implementation task in Bosnia. However, the first two warfighting operations mounted under PJHQ command were *Bolton* and the UK contribution to *Allied Force*.

## Capability

During the 1990s, UK defence spending was slashed from 3.9 per cent of GDP to 2.6 per cent. For the RAF, this was an era of base closures, squadron disbandment and redundancies. At the beginning of the decade, the RAF's trained strength exceeded 83,000 personnel; by 1997 this figure had been reduced to 54,000, and it fell to 51,000 during the *Bolton* and *Allied Force* period. The RAF had 28 fast jet squadrons in 1990 divided between the strike/attack, offensive support, air defence and reconnaissance roles. By 1997 there were 22. The offensive air element fell from 16 in 1990 to 11 in 1997.<sup>13</sup>

The rush to cut defence spending is understandable given the apparent disappearance of a strategic threat to Western Europe. Yet the reductions were implemented by politicians, officials and military chiefs who inevitably struggled to understand a global security environment in which there was no longer any challenge from the Warsaw Pact and the extent to which it would generate an increased operational demand for air power.

The tendency was to underestimate the resources that would be needed to confront emerging threats. Hence, the apparent contradiction between the continuous front-line reductions and the fact that the RAF was committed to operations throughout this period. It is a paradox that explains why the defence climate of the 1990s was one of stringency and why there was far less scope than might be imagined for using cuts in front-line strength to fund capability improvements and realise the 'smaller but better' aspirations expressed by defence ministers.<sup>14</sup>

The consequences become clear if we consider the lessons identified by the RAF from the first Gulf War and the extent to which they were exploited: funding cuts clearly reduced the scope to action key recommendations. Some lessons were not implemented before they were relearnt over Iraq and Kosovo at the end of the decade, some elicited only a slow or partial response, and others failed to secure the necessary funding or prioritisation. Post-*Granby* recommendations for improving the UK's capacity to provide logistical support for extended or concurrent overseas commitments had not been fully implemented by the time SDR was undertaken. Some aircraft enhancements introduced during *Granby* were made permanent in the mid-1990s, but capability initiatives concerning, for example, anti-armour munitions, electronic warfare equipment and secure communications had yet to deliver at the end of the decade. An identified dependence on the United States for the suppression of enemy air defences (SEAD) had not been addressed, nor had a range of interoperability issues that implied long-term capability investment to allow the RAF to continue fighting alongside the USAF.<sup>15</sup>

Most noteworthy of all, the 1990s transformation of offensive air tactics – the shift from lower to medium altitude flying and laser-guided bombing – had to be accomplished within rigid financial limits, with adverse consequences at squadron level. The RAF became entirely dependent on a single type of laser designator known as the Thermal Imaging Airborne Laser Designator (TIALD), and TIALD pods originally intended for the Tornado GR1 alone were then divided between the GR1, Harrier and Jaguar fleets as it became necessary to share the burden of operational deployments in the Gulf and the former Yugoslavia across all three forces. The supply of TIALD pods became a serious 'pinch-point' in the later years of the decade and the key factor (although not the only factor) impeding the development of precision bombing in the RAF.<sup>16</sup>

### **Diplomacy and Air Power (1): Operation Bolton**

The UNSCOM crisis, which dates from the later months of 1997, originated in UN efforts after the first Gulf War to deny WMD to Saddam Hussein's regime in Iraq. After the war, UNSCOM and the International Atomic Energy Agency (IAEA) presided over the destruction of large quantities of weapons and their supporting industrial infrastructure. However, it was an uphill struggle, and verification often posed insuperable problems. In time, UNSCOM came to suspect that the Iraqis were operating an elaborate concealment system designed to hide documents, computer records and possibly WMD or related equipment; in 1995 this was confirmed by Saddam Hussein's son-in-law, Hussein Kamel, following his defection to Israel.<sup>17</sup>

Thereafter, UNSCOM had little option but to target the concealment mechanism, but this change of direction provoked strong Iraqi opposition. Moreover, as it threatened to extend the weapons inspection process into the indefinite future, it incurred the displeasure of countries like Russia and China, which were hoping to profit from the removal of economic sanctions against Iraq. Such international consensus as had formerly existed on Iraqi disarmament began to break down. These developments assumed crisis proportions in October 1997 when UNSCOM issued a hard-hitting report describing how their activities were being hampered by non-co-operation and concealment by the Iraqi authorities.

Deliberations within the coalition of countries maintaining the northern and southern Iraqi NFZs soon revealed a strong consensus in favour of using air power rather than ground forces in any prospective military operation against Iraq. For this there were three reasons. First, air power could be deployed quickly: a substantial coalition force was already present in the Gulf to sustain the NFZs and could be enlarged rapidly. By contrast, the deployment of a sufficiently capable ground force would have taken months and could only have been achieved at considerable expense. Second, a ground operation was likely to involve far heavier casualties. Third, there was a genuine belief that air power could be employed coercively to produce a quick, clean, resolution to the crisis. This outlook was based on perceptions of what air power had achieved earlier in the decade, partly in the Gulf but especially in Bosnia. In 1995, an independent air operation – *Deliberate Force* – had apparently brought the Bosnian Serbs to the negotiating table after only two weeks without western casualties or collateral damage.

Initially, PJHQ did not conclude that there was a clear requirement for more combat aircraft in theatre. Sufficient assets were already based there in support of the NFZs at Incirlik, Turkey (Operation *Northern Watch*) and Prince Sultan Air Base (PSAB), Al Kharj, Saudi Arabia (Operation *Southern Watch*). The view that reinforcements were needed reflected the government's position that Iraq was unlikely to succumb to diplomatic pressure unless it was backed by force. The visible deployment of additional air-to-ground firepower seemed the best way to emphasise this threat.

Equally, if offensive aircraft were to be dispatched, PJHQ's preferred option was that they should be land-based Tornado GR1s. However, this pre-supposed the availability of a base from which offensive missions could be mounted, and it seemed doubtful that the Saudi government would allow them to be flown from their soil. It was in this context that PJHQ suggested deploying an aircraft carrier with a mixed force of RAF Harrier GR7s and Royal Navy FA2s. Although the precision bombing capabilities of these aircraft were more limited (the GR7s were being fitted for laser self-designation but the FA2s had no self-designating capability), the presence of GR7s in the Gulf would at least present a credible threat to Iraq. Early in November, HMS *Invincible* was diverted to the Mediterranean and 1(F) Squadron was placed on reduced notice to move.

In the meantime, relations with Iraq continued to deteriorate, and UNSCOM ultimately withdrew their inspectors in mid-November. The UK formally initiated Operation *Bolton* on 14 November with the following objectives:

Political objectives: resume effective UNSCOM operations, ensure the safety of remaining UNSCOM personnel, and keep unanimity within the UNSC and the Arab world sympathetic towards UN aims.

Military objectives: support the political objectives by deploying and sustaining sufficient military forces, in concert with the US and other potential coalition partners, to coerce Iraq into compliance, or to respond with military action in the event of Iraqi attacks upon Coalition forces.

Strategic End State: restore the authority of the UN in Iraq with the resumption of UN weapons inspections with no preconditions.

An approach was now made to the Kuwaitis to establish whether they could provide a base from which UK aircraft could fly offensive missions against Iraq. They were found to be very enthusiastic, but concessions from the Iraqis then defused the crisis, and the GR1 deployment was placed on hold. Nevertheless, the government decided that *Invincible* should set sail with the GR7s on board, both for training purposes and to keep UK options open if the UN weapons inspectors ran into further problems. By the start of December, UNSCOM was indeed reporting renewed difficulties.

Meanwhile, the RAF completed a base reconnaissance of Kuwait and firmly established that a GR1 detachment could deploy to Ali Al Salem. This now became the MOD's preferred option, and the Secretary of State for Defence therefore recommended that *Invincible* should return to the UK. Yet this proposal was not supported by the Foreign Office, where it was felt that the withdrawal of the carrier might suggest a lack of UK resolve to adversaries and allies alike. The deployment of land-based aircraft to an airfield so close to the Iraqi border might also be unduly escalatory. Initially, then, *Invincible* remained in the Mediterranean. This course of action also created scope to 'turn the coercive screw' subsequently – increasing pressure incrementally by sending *Invincible* to the Gulf first and the GR1s later.

In January 1998, with the UNSCOM crisis deepening again, the government shifted its stance and decided to adopt a harder line. The MOD therefore recommended moving *Invincible* through the Suez Canal and deploying the GR1s to Ali Al Salem. *Invincible*'s transit was finally sanctioned on the 15th, she entered the canal on the 18th and reached the Straits of Hormuz on the 24th. A few days later, the GR7s mounted their first training sorties, and their initial Southern Watch missions were executed on the 29th.

On 6 February, the GR1 deployment to Ali Al Salem was approved, heralding an all-out expeditionary effort into what was, at that time, a very austere base environment. An operational capability was established there in less than a week. PJHQ then reviewed UK postures and recommended that the carrier-borne GR7s be withdrawn and that the Ali Al Salem GR1 detachment be increased to 12 aircraft.

Despite the build-up of forces in theatre, the aim was still to support the diplomatic process, but the possibility of live hostilities was inherent in this approach, and it appeared unlikely that, if Iraq were bombed, UNSCOM would afterwards be readmitted. The government therefore agreed that if armed force were used and Saddam Hussein still did not allow UNSCOM inspections, he would be held at risk of further military action if he attempted to recreate his WMD capability again. The Americans must have had to address the same issue at this time, but their position was somewhat different. There was in fact a growing frustration in Washington over the extent to which policy was being dictated by the cycle of confrontations between the weapons inspectors and the Iraqi authorities, and the Clinton administration was evidently less daunted than the British government by the prospect of developing a strategy in which Iraqi disarmament was important but no longer central.

Faced with the enlarged US and UK military presence and under intense diplomatic pressure, Iraq appeared to capitulate. On 23 February, the UN Secretary General and the Iraqi Foreign minister, Tariq Aziz, signed a memorandum of understanding that paved the way for the renewal of UNSCOM and IAEA activities. It therefore seemed that the strategy of diplomacy backed by the threat of force had been successful.

In May, the Americans began drawing down their forces in the Gulf, offering the UK scope to withdraw at least some of the GR1s. There were now 24 of these aircraft in Kuwait, Saudi Arabia and Turkey (for the northern NFZ), and the RAF were becoming concerned about the sustainability of this commitment on the eve of the GR1-GR4 upgrade. But while there was an operational requirement to maintain a GR1 detachment at Ali Al Salem, there remained a strategic need to keep at least some combat aircraft at PSAB. So, acting on advice from the RAF and PJHQ, the Ministry of Defence proposed that a consolidated force of six GR1s should operate from Ali Al Salem, while Tornado F3 fighters took over the PSAB commitment. This recommendation was first tabled in mid-June 1998, yet the F3s did not deploy to PSAB until February 1999 and the GR1 force at Ali Al Salem was not reduced until January 2000, and then to eight rather than six aircraft.

How can this be explained? Initially, the MOD's preferred course of action did not secure unanimous government support. There was concern about the fact that the reductions would take place in the second half of July, for the head of UNSCOM was due to visit Iraq early in August and a further dispute appeared likely. In the event, there was another confrontation even before the visit, therefore the GR1s remained in situ. So began the sequence of events that led inexorably to Operation *Desert Fox* in December. After an extended period of



argument, both within the UN and between the UN and Iraq, the Iraqis finally suspended all co-operation with the weapons inspectors on 31 October. However, well before that, the movement of American forces out of theatre had been halted. As the US build-up resumed, the UK deployed more RAF personnel to Ali Al Salem and moved reconnaissance operations there from PSAB.

Once again, the Anglo-US concept was diplomacy backed by the threat of force, but it now seemed more probable that hostilities would break out. Therefore, both governments examined the potential consequences of war more closely, including the likelihood that Iraq would not readmit UNSCOM. With this in mind, they agreed that air strikes should target Saddam Hussein's WMD capability and weaken his regime politically and militarily. Then, even if UNSCOM were not immediately reinstated, the position would be preferable to one in which Saddam was allowed progressively to curtail the Special Commission's activities. At the same time, the British government recognised that the US had a wider objective of maintaining credibility. The threat of force would lose much of its value as a diplomatic tool unless the Americans demonstrated that they were prepared to use it.

On 14 November, coalition forces were on the very point of commencing operations (under the name *Desert Viper*) when the Iraqis announced yet again that they would co-operate with UNSCOM. Once more, military action was placed on hold while further deliberations took place in the UN. UNSCOM returned to Iraq on the 18th, but the crisis was renewed almost immediately, and it is clear that the Americans concluded at this stage that military action was inevitable. The US government also believed strongly that air operations against Iraq should be concluded by the start of Ramadan on 20 December. A further series of intrusive UNSCOM inspections, which ran into forthright Iraqi opposition, ultimately allowed this timetable to be realised.

On 15 December, UNSCOM reported to the UN that Iraq had not provided full co-operation and had in fact imposed new restrictions on the weapons inspectors. The inspectors were withdrawn on the 16th, and Operation *Desert Fox* began that evening. In part, the operation targeted industrial sites linked to WMD or prohibited missiles, but stockpiles, suspected stockpiles, or dual-capability sites were not attacked. The other main targets were the security forces involved in regime security and the concealment mechanism, higher command and control, the Republican Guard, economic targets related to illegal oil exports, and Iraqi air defences. Over four days, approximately 300 combat and support aircraft flew more than 600 sorties; 90 air-launched cruise missiles and 600 other air-released munitions were employed along with 325 TLMs. RAF GR1s flew 28 attack sorties during the operation, releasing 52 bombs. Two Bahrain-based VC10 tankers were also involved, along with a Nimrod R1, which operated out of Kuwait International Airport.

At first, it was difficult to assess the operation's achievements in relation to its objectives. Most selected targets were hit, and the campaign destroyed many of the industrial plants required

for Iraq's missile programme, as well as a variety of other locations associated with prohibited weapons production or concealment. However, it was only some years later, after Saddam Hussein's overthrow, that the Iraq Survey Group established that *Desert Fox* had effectively finished off what remained of his WMD programmes.<sup>18</sup>

At the same time, the targeting of the Iraqi regime, the military high command, and the security forces on which they relied reflects the fact that *Desert Fox* had as much to do with sending political signals as with degrading WMD-related facilities. Essentially, it issued a blunt warning to Iraq (and other pariah states) by demonstrating that a US-led coalition had the capacity to strike all the key pillars of the regime if it continued to pose a direct and tangible threat. On the 19th, President Clinton declared that UNSCOM would no longer be the focus of American policy towards Iraq; instead, the US and her allies would pursue a strategy of containment via the NFZs and other means.

In the immediate aftermath of *Desert Fox*, there was a sharp upsurge in Iraqi activity in the NFZs, including new SAM deployments, SAM launches and violations by Iraqi aircraft. London and Washington responded with a *démarche* threatening Iraq with a military response, and a so-called 'tit-for-tat' cycle began. By August 1999, there had been 200 violations of the NFZs since *Desert Fox*, along with 300 SAM launches; Iraqi AAA had also become very active and there had been numerous SAM radar illuminations. The coalition had responded on 92 days, attacking 300 targets with 1,070 bombs; RAF Tornados had hit 23 targets (with multiple aiming points) expending 85 bombs. In the UK the MOD was unhappy with this situation. Much of the initiative appeared to rest with Saddam Hussein, and it seemed probable that an aircraft would be lost sooner or later, or else that there would be a major collateral damage incident. Yet there was no obvious solution beyond seeking to maintain operations that were effective, but low in intensity and media profile.

There was at least now scope to replace the PSAB GR1s with F3s, and the swap finally took place in February 1999. Scaling down the GR1 detachment at Ali Al Salem proved to be harder. With the GR1-GR4 upgrade in progress, it was becoming increasingly difficult to maintain overseas commitments and meet aircrew training requirements in the UK. The Air Staff argued that too many aircraft were deployed and that too few were available at home; operational standards seemed certain to suffer as a result.

A proposal to draw down the detachment to eight aircraft was tabled in September but again fell afoul of political and diplomatic developments. By this time, negotiations were under way in the UN to create a new weapons inspection organisation to replace UNSCOM and produce an SCR linking weapons inspections to the termination of sanctions against Iraq. Once more, it was argued that the premature withdrawal of aircraft might suggest a lack of UK resolve to nations such as Russia and China, who were arguing for an unconditional end to sanctions. The draw-down proposal was resubmitted in November following the appointment of a new Secretary of State for Defence, but another month went by before the UN passed Resolution

1284, which created UNMOVIC, and only then was ministerial authorisation to withdraw four GR1s from Ali Al Salem finally granted. The scene was now set for the final three years of the RAF's contribution to operations over the southern NFZ.

## Diplomacy and Air Power (2): Kosovo

While the international community was struggling to restore UNSCOM weapons inspections in Iraq in 1998, a second major crisis was unfolding in Kosovo. Its origins may be identified in many centuries of Balkan history and lie beyond the scope of this paper. The key development was Yugoslavia's progressive disintegration in the early 1990s, beginning with the cessation of Slovenia and Croatia and then descending into civil war in Bosnia. Kosovo was the next in line, and the potential for conflict there was recognised by the international community early in the decade. Previously an autonomous province of Serbia, Kosovo had been subject to sustained efforts from Belgrade to reassert direct Serbian government since the accession to power of Slobodan Milosevic in 1989.<sup>19</sup>

Belgrade's policies were deeply resented by the majority Albanian population. In the aftermath of the Bosnian war, the later 1990s witnessed a marked polarisation between the Albanian and Serb communities in Kosovo. This was characterised by the emergence of the Kosovo Liberation Army and its violent campaign against the FRY security forces, and by the employment of increasingly indiscriminate and disproportionate reprisals by FRY army and police units against the Kosovo Albanian population as a whole. By 1998, western governments believed that they were confronted by a second Bosnia and were deeply concerned over the potential for civil war in Kosovo to destabilise other Balkan countries. There was no support for Kosovo's independence, but stability in the province appeared unlikely without constitutional reforms offering a significant degree of devolution. The so-called Contact Group of nations (France, Germany, Italy, Russia, the UK and the US) therefore embarked on a diplomatic drive to resolve the crisis, and sponsored two UNSCRs, 1160 and 1199, calling for an end to violence and repression in Kosovo and the beginning of meaningful dialogue between the FRY and the Kosovo Albanians.

However, as in Iraq, and based on past experience in Yugoslavia, it seemed that diplomacy would be ineffective unless the threat of force lay behind it. And, just as the coalition had opted to employ air power in response to the UNSCOM crisis in Iraq, so too did NATO almost immediately opt for an air-based response to the deteriorating situation in Kosovo. Again, air could be deployed relatively cheaply and easily; forces were already in theatre supporting peace enforcement operations over Bosnia; air operations appeared to be all but 'casualty-free' and again, the lesson of Operation *Deliberate Force* was apparently that air power could achieve NATO's objectives independently and within limited timescales.

In the summer of 1998, Serb forces launched a series of ground offensives in Kosovo that resulted in civilian casualties and were accompanied by looting and the destruction of property, livestock and crops. Entire villages were left in ruins. In rapidly growing numbers,

the Kosovo Albanians fled their homes. In September, the UN reported more than 200,000 refugees in the province and warned of an impending humanitarian catastrophe. In October, while diplomatic efforts continued, the North Atlantic Council approved OPLAN 10601 – the phased air operation that became Operation *Allied Force*.

The prospect of outright hostilities over Kosovo diminished somewhat in the later months of 1998 after the US Special Envoy to the FRY, Richard Holbrooke, brokered an agreement with Milosovic under which an unarmed verification mission entered the province to monitor compliance with UNSCRs. To an extent, therefore, events mirrored the coalition's experience in the Gulf the previous February, when the combination of diplomacy backed by the threat of air strikes on Iraq had apparently been successful.

However, the situation deteriorated again in January 1999, and when 45 Kosovo Albanians were killed by FRY security forces at Racak there was general agreement within the Contact Group that a stronger line was essential. In so-called 'proximity talks' at Rambouillet, France, in February, the rival protagonists were issued with a series of demands, which were backed by the threat of force in the event of non-compliance. The Rambouillet Accords called for an immediate ceasefire, the withdrawal of nearly all Yugoslav security forces from Kosovo, the demilitarisation of the KLA, the insertion of a NATO-led peace-implementation force, KFOR, into the province, and effective autonomy for Kosovo within the FRY. The Kosovo Albanians eventually signed the Accords, but the FRY delegation refused even to discuss the deployment of an international peacekeeping force and rejected several other terms on the grounds that they violated the FRY's sovereignty and territorial integrity. The air campaign began on 24 March after the failure of last-ditch attempts to persuade Milosevic to reconsider his position.

The British documents suggest a certain lack of clarity at the top level of government over air strategy for Kosovo. There was general agreement on the desirability of a coercive air campaign if diplomacy failed but no precise understanding of what this might involve. The NATO force assembled for the task did not boast a very large offensive element, and its target list was confined to the FRY air defence system and military infrastructure targets in southern Serbia and Kosovo. Its capacity to coerce the FRY's political leadership in Belgrade was questionable.

Nevertheless, expectations of the campaign were very optimistic: it was apparently believed that Milosevic would capitulate after a few days of bombing, and no alternative or contingency strategy was ready for implementation if Operation *Allied Force* failed to accomplish this ambitious goal. Nor had much thought been given to the possibility that the FRY would respond to air strikes by launching an all-out assault into the disputed province. By mid-March 1999, a considerable volume of information had reached NATO suggesting that this was precisely how Milosevic would react. The British government did not entirely ignore this possibility but merely concluded that air power might, in such circumstances, be employed to reduce the FRY's capacity to repress the Kosovo Albanians. The practical implications of such a strategy were not considered in detail.

The initial *Allied Force* air strikes were heavily disrupted by poor weather, and NATO was immediately confronted by a full-scale Serbian offensive into Kosovo. Under strong political pressure to protect the Kosovo Albanians, the alliance therefore switched a substantial proportion of its limited combat air strength to operations against fielded FRY forces in the Kosovo Engagement Zone (KEZ). The campaign's orientation towards KEZ targets was then encouraged by three factors. First, the process for clearing other types of target proved long and convoluted because it involved at least formal consultation with the entire NATO alliance; second, KEZ operations were favoured by political leaders because they were thought to involve less risk of collateral damage than attacks against other target sets; third, SACEUR, General Wesley Clark, involved himself directly in the targeting process and insisted on attaching an overriding priority to KEZ strikes.

Unfortunately, KEZ operations proved very uneconomic. Operation *Allied Force* was largely conducted at medium altitude (at least 15,000 feet) to reduce the vulnerability of participating aircraft to Serbian ground-based air defences. However, it was often extremely difficult to locate small and mobile tactical targets from this height, and many of the participating aircraft were not optimised for strikes on tactical target arrays. Consistently poor weather complicated the task further and caused many missions to be cancelled or aborted in the air. FRY forces proved adept in the art of passive air defence, employed decoys and camouflage to good effect, and made maximum use of the protection afforded by the weather. In the absence of a threat from NATO on the ground, they dispersed and concealed both troops and equipment. Finally, they managed to secure ample intelligence on the timing and orientation of NATO attacks (including early warning from radars in Montenegro, which the coalition was reluctant to strike), and were able to tailor their dispersal and movement plans accordingly.

The air campaign's orientation towards KEZ operations unquestionably reduced its effectiveness during the first month of hostilities, but there were other problems too. At first, the committed NATO air forces were not large enough to mount sustained operations on a scale likely to coerce the FRY. Clearance for targets located outside the KEZ remained slow and was persistently hampered by the collateral damage concerns of alliance members. Equally, the campaign suffered under SACEUR's direction from a lack of strategic focus, random target selection and a failure to identify the FRY's centres of gravity. It also took time to expand command and control provisions, notably the Strategy and Guidance, Apportionment and Targeting (Strat/GAT) functions of the CFACC's headquarters and Combined Air Operations Centre (CAOC) at Vicenza, Italy.

Against this background, British strategists soon began to doubt the capacity of air power to achieve NATO's objectives independently. Fearful of the consequences for the alliance if the operation failed, they increasingly argued from a joint perspective that a ground intervention was essential and that the correct use of air power should be to prepare the battlespace for this ground campaign. Clear timelines were needed to govern the development of NATO strategy, from the existing air campaign to battlefield preparation, and to the insertion of a

ground force. These arguments found some sympathy within NATO's high command, but political leaders from other alliance nations proved far more cautious. They would only agree to the establishment of the peacekeeping force, KFOR.

On the other hand, London's view that NATO could not be seen to fail was more widely accepted by alliance partners, and this helped to remove some of the political barriers that had at first constrained the air campaign. Subsequently, a range of initiatives sought to increase the effectiveness of Operation *Allied Force*. The air component, which numbered fewer than 500 aircraft in March, was enlarged to reach 900 in May, and the proportion of ground-attack aircraft increased markedly within this total. In late April, the CFACC produced a Strategy and Mission Statement, which envisaged increasing the bombing effort against military infrastructure and strategic targets in Serbia, while continuing with KEZ attacks. Leading members of the alliance sought to accelerate the target clearance process and persuade SACEUR of the need to plan more methodically, and C2 improved under a fully functional CAOC.

The results were mixed. The CAOC continued to complain about SACEUR's frequent interventions, and General Clark went on micro-managing the air campaign but without a clear strategy, his focus remaining firmly on the KEZ. Equally, while the CFACC's Strategy and Mission Statement was implemented in theory, there was hardly any reduction in the campaign's emphasis on KEZ operations in the first half of the month. Poor weather also continued to restrict the sortie rate and hamper target identification, and, despite some streamlining in target clearance procedures, particular alliance members still blocked key targeting proposals.

Nevertheless, there were also some grounds for cautious optimism. The first clear indication that the air campaign was causing serious alarm at the highest governmental and military levels in the FRY was detected at the beginning of May, when there was a sudden and marked increase in ground-based air defence activity. Milosevic subsequently began offering limited concessions, such as a partial troop withdrawal, if NATO would halt the bombing. Anti-war and anti-conscription demonstrations in southern Serbia were soon followed by overt criticisms of the war from certain provincial and civic leaders.

Then, as the weather cleared during the final week of May, NATO was at last able to unleash all the offensive forces at its disposal. The result was an increase in the attack sortie rate of over 90 per cent compared with the average rate recorded in the preceding three weeks, and most of these sorties located and bombed FRY targets. By the end of May, intelligence was emerging to suggest the presence of a 'peace party' in Belgrade, although the 'war party' was thought to be stronger. Assessments of the air campaign's physical impact also became noticeably more upbeat, presenting evidence of widespread damage to the FRY's economic and military base, its communications network and its IADS. The picture was only less optimistic where KEZ targets were concerned.

In the last week of May, General Clark finally agreed to a major reorientation towards strategic bombing. Subsequently, with strong support from Washington, he approached the leading European powers but found them reluctant to accept his proposals. This was partly because they wished to confirm the legality of some of the targets independently, and partly because they feared that the proposed strikes would cause collateral damage and civilian casualties. Fortunately, as the threat of deadlock loomed, diplomatic efforts to resolve the crisis achieved a vital breakthrough.

After NATO launched *Allied Force* in March 1999, the scope for further diplomatic initiatives at first seemed extremely limited, but action to achieve a negotiated resolution to the crisis soon came to focus on Russia, the FRY's only major diplomatic ally. Calculating that Milosevic's regime would be impossibly isolated without Russian support, western diplomats sought to align Moscow more closely with their stance on Kosovo. Critically dependent on western financial aid in the later 1990s, the Yeltsin government proved susceptible to these overtures. Early in May, Russia accepted a G8 statement of principles for ending the Kosovo conflict, which was also broadly acceptable to NATO, and the Russian envoy to the FRY, Viktor Chernomyrdin, was subsequently instrumental in turning this statement into a draft peace settlement. Yet it was only possible to bridge the gulf between Russia and NATO by couching this document in somewhat vague terms – a lack of clarity that may have encouraged Milosevic to hope for concessions during detailed peace negotiations.

It is popularly supposed that the peace terms finally accepted by Milosevic resulted from a joint diplomatic initiative undertaken by the EU envoy, Maarti Ahtisaari, and Chernomyrdin, at the beginning of June. However, the documents show that Ahtisaari only decided to visit Belgrade *after* Milosevic signified his willingness to accept the G8's principles on 28 May. In fact, the FRY leader was looking for a way out. When Ahtisaari presented him with the draft peace document, Milosevic sought a range of concessions, which were refused, but his military representatives afterwards tried to insist on a halt to NATO bombing before they withdrew their forces from Kosovo; they also sought an extension of the timetable for implementing the agreement.

Negotiations eventually broke down, but many NATO members meanwhile requested the immediate suspension of *Allied Force*. Had the air campaign been stopped, there would have been far less pressure on Milosevic to accept an agreement, and it might subsequently have been very difficult to persuade all alliance members that offensive operations should be resumed. The Deputy SACEUR, General Rupert Smith, captured the very essence of NATO's dilemma at this time:

The problem lies, from a military point of view, in arriving at the delivery of the agreement while maintaining pressure. If we don't keep pressure on the Serbs, we fear that we may arrive at a position where we cannot deliver the agreement ... We need to maintain the pressure of bombing ... until we have an agreement that can be delivered.

The air campaign was moderated for a few days while negotiations were in progress, but its intensity increased again when the FRY rejected the agreement.

Milosevic then signified his willingness to accept the peace terms on offer if they were supported by a UNSCR. The SCR had to accommodate Russian and FRY political sensitivities by papering over certain remaining areas of dispute regarding FRY sovereignty and territorial integrity and NATO's role in the peacekeeping force. Nevertheless, in practical terms, it created scope for revising Kosovo's constitutional status, relative to the remainder of the FRY, and for deploying a NATO-led peacekeeping force in the province. The SCR's passage was swiftly followed by the signature of a Military Technical Agreement between the FRY and the Commander of KFOR, and by the suspension of Operation *Allied Force*.

### **SDR Assumptions**

The role of air power in Operation *Bolton* and Operation *Allied Force* raised important questions regarding two fundamental SDR assumptions. The first was that future operations would probably be joint. The essence of jointery is the deployment of the correct force mix – the combination of air, land and maritime forces most likely to deliver the operational objective quickly and effectively. The underlying principle is that joint effects are greater than the sum of the effects that can be brought to bear by each individual component.

Where national operations are concerned, this may not pose much difficulty. In coalition warfare it can prove significantly harder for the simple reason that key allies are almost certain to have different perspectives and priorities. In the case of Iraq, the UK and the US were agreed during the *Bolton* period that their objectives could be delivered by air power (including maritime air power) and diplomacy, without the deployment of ground forces, and this judgement on Iraqi operations was only changed by the events of 11 September 2001.

However, during *Allied Force*, UK arguments favouring a joint air and ground operation, which were backed by most senior Army and RAF officers, received no support from Washington or other alliance capitals, and this effectively dictated that the campaign against the FRY was fought in a single dimension.<sup>20</sup> The case for mounting or threatening a ground operation might have been a strong one, but it was not sufficiently persuasive to overcome the basic objections that confronted British statesmen in 1999: ground operations take longer to mount, are very expensive and may well involve heavy casualties. Again, this calculation was only changed by the emergence of strategic threats to the US and other western nations after the turn of the century.

Thus, for the UK, Operation *Bolton* only ranked as 'joint' for the brief period when the carrier-borne Harrier force was positioned in the Gulf, but the Harriers were never employed operationally against Iraq. Similarly, while carrier-borne FA2s were committed to the Kosovo conflict, they merely flew uneventful combat air patrols and did not make a significant contribution to the air campaign. It is likely that both deployments were partly promoted to



underline the case for SDR's key procurement recommendation – acquisition of the Queen Elizabeth class carriers. Otherwise, *Bolton* and Kosovo were assigned entirely to the RAF. They were not joint operations and they provided little or no opportunity for the Armed Services to develop joint operational doctrine or capabilities.

Secondly, the launch of Operation *Bolton* and Operation *Allied Force* in rapid succession challenged SDR's concurrency expectations. While *Allied Force* conformed to the concept of a medium-scale warfighting operation of less than six months' duration, *Bolton* had by 1999 developed into an enduring warfighting operation and was being maintained alongside the RAF's contribution to policing the northern Iraq NFZ. During the period when these three operations were being conducted simultaneously, and in the following years, when further operations were mounted in Sierra Leone (2000) and Afghanistan (2001), the strategic assumptions that underpinned SDR were clearly exceeded. This was fully acknowledged by the Defence White Paper published in 2003, although the subsequent expansion of commitments in Iraq (Operation *Telic*, from 2003) and Afghanistan (Operation *Herrick*, from 2004) meant that it would prove no easier to align strategic assumptions and defence activity thereafter.<sup>21</sup>

That the predictions proved less than accurate is not so much a criticism of SDR as an acknowledgement that the frequency, nature and duration of post-Cold War conflicts was extremely difficult to predict. The assumptions laid down in SDR were not set in stone, and many other considerations influenced British strategy in the period covered in this paper. Yet it is important to acknowledge that the assumptions were continuously exceeded and that, of the three Armed Services, only the RAF contributed to all the operations listed here and was subject throughout to the resource pressures and multiple risks involved.

### Doctrinal Implications

If neither *Bolton* nor *Allied Force* supported SDR's assumptions of jointery, the tendency to employ the RAF independently of the other Armed Services in both operations also challenged key tenets of UK air power doctrine. This divergence between operational doctrine and practice could be viewed positively. In a sense, by moving into doctrinally uncharted territory, air power was demonstrating its inherent flexibility. Yet, as doctrine is founded on experience and accumulated wisdom, it should not be ignored. Moreover, if doctrine and practice are not broadly aligned, military practitioners may find themselves poorly prepared for the missions they are required to execute.

In the earlier era of RAF doctrinal activity, extending from the inter-war years to the 1960s, operational experience was often rapidly translated into doctrine. By contrast, the authors of more recent publications have struggled to keep pace with constantly changing military developments. Perhaps, then, it is not surprising that the doctrinal impact of *Bolton* and *Allied Force* was limited. Although the RAF produced an extensive lessons study of air operations over Kosovo, no equivalent air lessons report was ever prepared on *Bolton* or the broader

subject of the UK contribution to *Southern Watch* (or the other NFZs). In the third edition of AP 3000, which appeared in 1999, the experience of Operation *Bolton* undoubtedly influenced coverage of such topics as preventative diplomacy, peace enforcement and coercion.<sup>22</sup> AWC operations doctrine likewise continued to acknowledge the utility of air power as an instrument of crisis management.<sup>23</sup> Coverage of particular air roles such as surveillance and reconnaissance was also directly applicable to the *Bolton* task. Yet, although they accounted for so much of the RAF's operational activity in the 1990s, NFZ operations and associated subjects such as air policing and containment received hardly any attention.

In the sphere of jointery, it could be argued that there was more alignment. UK air doctrine did not change significantly after Kosovo, continuing to view anti-surface force operations in the context of joint campaigns executed in support of conventional western ground forces, but this position gained support from *Allied Force* in one important sense: a ground threat to Serbian security forces in Kosovo would have benefited the air campaign over the KEZ; in the absence of a NATO ground offensive, the Serbs could deploy in ways that reduced their vulnerability to air power.

The case for jointery would subsequently be reinforced by the greater emphasis on air-land integration that characterised the era of Operation *Telic* and Operation *Herrick*. However, it was not so easily applicable to Operation *Ellamy* (Libya, 2011) and Operation *Shader* (Iraq and Syria from 2014). The last 11 years have witnessed a renewed preference for air-based intervention without a significant western ground presence, which suggests that both *Bolton* and *Allied Force* may have had a longer-term significance that merited more detailed consideration in a doctrinal context. There is perhaps a need to improve the integration of doctrine with recent and longer-term historical experience.

## Air C2

While RAF officers were evidently more comfortable with C2 arrangements in the Gulf during Operation *Bolton* than with the NATO command structures employed in *Allied Force*, they adapted quickly. In due course, it transpired that there was still scope to exert considerable influence by securing key positions in the CAOC or through informal engagement at higher command levels. Nevertheless, the experience might perhaps have served as a reminder – if not a warning – of the need for the RAF to maintain its investment in NATO C2.

As for the new UK C2 provisions, they apparently functioned well. The RAF's *Allied Force* lessons study praised the 'uncomplicated' national C2 structure extending from PJHQ to Commander British Forces Italy (Air) (CBFI(A)) to unit level, describing it as 'simple and effective'. A lack of interference from other headquarters was also noted. The only reservation expressed in the report was that, on occasion, more direct links between the CBFI(A) and HQ STC might have been beneficial – particularly where the delivery of air capability was concerned. It was suggested that PJHQ might 'consider how best to interface the NCC with the Supporting Command, without prejudice to the C2 chain'.<sup>24</sup>

The two operations nevertheless raised questions about how the RAF contributes to the application of UK air power that remain under discussion to this day. Prior to the restructuring of the MOD in the early 1980s, it was still possible for the Chief of the Air Staff to exercise a considerable influence on the employment of air power during operations. Subsequently, although the authority of the individual Chiefs of Staff waned, HQ STC's role as a joint operational headquarters preserved the RAF's influence when British forces were committed to the Gulf in 1990 at a time when CDS was himself an RAF officer.

The establishment of PJHQ in 1996 altered this situation decisively, dictating that operational C2 from CDS downwards would function on joint lines. Ironically, the RAF's role in the exercise of operational air C2 diminished considerably at a time when independent air operations were being conducted in the Gulf and over the former Yugoslavia. From then on, the likely effect of employing air power (or threatening to employ it) would be calculated by senior officers from all three services and by ministers and officials from more than one department of state. The flaws inherent in such a system are obvious. If air is to play a central role in military operations, as it did in *Bolton* and *Allied Force*, its employment should be guided by professional air expertise. The post-Kosovo RAF lessons report referred specifically to this issue when it stated that the C2 chain from theatre to PJHQ had worked well 'because ACOS J3 [the Head of Operations at PJHQ] was an airman and understood the inherent [air] problems'. The same degree of understanding appeared unlikely if the post was occupied by an officer from one of the other Armed Services.<sup>25</sup>

### **TIALD and Paveway**

The RAF combat aircraft committed to *Bolton* and *Allied Force* were initially tasked to strike targets using laser guided Paveway II and III bombs designated by the TIALD pod. These were the only bombs released during *Bolton* but, as *Allied Force* developed, the GR7s were also authorised to release unguided weapons. This was partly because they included cluster munitions deemed suitable for tactical targets in Kosovo and partly because dense cloud cover often prevented the use of LGBs. The RAF had no alternative means of precision guidance at that time.

During the build-up to both operations, a lack of LGB training capacity emerged as a significant issue. In October 1998, the Tornado GR1s of 14 Squadron deployed on *Bolton* had their first opportunity to designate and deliver Paveway II bombs since 1995, using the Udairi range in Kuwait. As a direct result, they unearthed a serious pulse coding defect with the TIALD-Paveway combination that would have been spotted long before if there had been more training opportunities for front-line squadrons and closer scrutiny of the results. It was easily rectified, but if incorrect codes had been used two months later, in *Desert Fox* (or in the previous February, when hostilities were only narrowly averted), all the Paveway IIs dropped would have missed their targets.<sup>26</sup>

Another perspective on this problem is provided by a statement of the RAF's TIALD pod inventory dated 26 February 1999, less than a month before the *Allied Force* commitment

was substantially assigned to the Harrier GR7s. On that date, the RAF possessed 34 pods, 13 of which had been returned to industry for upgrade or development work and 6 of which were unserviceable. Front-line detachments committed to the Gulf or the former Yugoslavia accounted for 11 more, leaving just 4 for training, of which 2 could only be used by the Jaguar force. The remaining 2 were allocated to the Tornado GR1 squadrons at RAF Lossiemouth, leaving the Harrier force with no training pods at all.<sup>27</sup>

RAF investigations after *Bolton* and *Allied Force* revealed a hit rate with LGBs that matched but did not better the rate achieved in the first Gulf War (the first time the RAF employed LGBs and airborne designation operationally). This suggested an urgent need for improved training regimes, with more frequent opportunities for aircrew to practise with TIALD and Paveway and better recording and analysis of the results. In *Allied Force*, the prevailing shortage of TIALD pods and TIALD-qualified crews tied the committed Tornado GR1s to their home base at RAF Bruggen, in North-West Germany, even though ramp space was available far closer to the FRY. The extra distance increased their vulnerability to weather-related problems and other operational constraints that caused numerous missions to be cancelled or aborted in the air.<sup>28</sup>

Fortunately, both operations provided the RAF with an opportunity to learn from experience. Although the availability of TIALD pods and TIALD-capable aircraft remained a problem for at least one detachment in Operation *Telic* in 2003, by that time the standard of laser-guided bombing in the RAF had improved, and the squadrons were also equipped with Enhanced Paveway bombs that could be guided by GPS if poor weather prevented the use of laser designation.<sup>29</sup>

## **Diplomacy and Air Power: Scope and Limitations**

Operation *Bolton* was originally mounted with the aim of coercing the Iraqi government into renewed cooperation with UNSCOM, the longer-term goal being verified Iraqi disarmament. The combination of diplomatic pressure and military threat was apparently successful in February 1998, when the Iraqis agreed to the resumption of UNSCOM activities but was subsequently abandoned by the US. *Desert Fox* sought to deny the Iraqis what remained of their WMD capability and punish Saddam Hussein's regime for persistently obstructing UNSCOM. It also heralded a strategic reorientation towards containment, which endured until the fall of Saddam's regime in 2003.

A diplomatic solution to the crisis proved impossible because there was not enough international backing for UNSCOM. The lack of a broad international consensus in support of Iraqi disarmament by the late 1990s emboldened Saddam Hussein and helps to explain his willingness to confront the weapons inspectors and the coalition. By the summer of 1998, the realities of this situation were clear to Washington, and the Clinton administration concluded that an UNSCOM-based strategy was no longer tenable. As there was equally no support in the US administration for military action against Iraq on a scale equivalent to the Gulf War, a strategy of containment based chiefly on the NFZs was the only realistic alternative.

Although *Desert Fox* had many critics and containment was often said to have failed, Iraq's residual WMD programmes withered and died after December 1998, and no weapons remained by the time coalition forces invaded just over four years later.

Operation *Allied Force* was launched to achieve the withdrawal of FRY security forces from Kosovo and the insertion of a NATO-led peace-keeping force into the province. Again, events at first suggested a possible resolution to the crisis via the threat – but not the use – of force and, even after the first air strikes in March 1999, the leading alliance governments confidently expected a rapid capitulation from Milosevic.

Once the realities of the Kosovo conflict had become clear, diplomatic efforts resumed alongside the air campaign. The critical difference between *Allied Force* and *Bolton* lay in the FRY's vulnerability to total diplomatic isolation. This was ultimately achieved via the exploitation of non-NATO international organisations such as the G8 and the EU. With the G8 principles for resolving the crisis agreed by Russia and NATO, and under intensifying pressure from *Allied Force*, Milosevic found himself in an impossible position by the end of May 1999. Nevertheless, the interaction between diplomacy and air power continued throughout the negotiations in early June, as the FRY repeatedly sought concessions that might have made NATO's objectives more difficult to realise. Ultimately, while the UNSCR that effectively ended the conflict was couched in face-saving terms that provided Milosevic with a degree of political protection, it delivered absolute victory to NATO.

It would be problematic to suggest hard and fast lessons about the relationship between air power and diplomacy on the evidence of just two operations spanning a brief period. History rarely repeats itself, and a multiplicity of variables may affect its course. Context is all-important and encompasses many different factors, including (but not limited to) the domestic and international political situation, basing and access, and geography. With such reservations in mind, there are perhaps just three very generalised points to consider by way of conclusion. First, the threat of force in support of diplomacy implies the use of force when all other options have been exhausted; a failure to take military action can only reduce the plausibility and effectiveness of the threat in future and may also create difficulties in the sphere of alliance cohesion and solidarity. Second, whether threatened or applied, air power cannot transform unrealistic diplomatic objectives into realisable goals, but its application may provide an alternative means of achieving broadly those same objectives. Third, air power can support realistic diplomatic activity through the actual or threatened use of force, but the desired outcomes may not be achieved without protracted and concerted diplomatic efforts and extended high-intensity operations.

## Notes

<sup>1</sup> The operation name *Allied Force* is employed throughout as it will be most familiar to the reader. The overarching UK operation name was *Kingower*, while UK air operations over Kosovo were mounted under the name *Engadine*.

- <sup>2</sup> Strategic Defence Review (July 1998), Chapter 5, para 79.
- <sup>3</sup> Strategic Defence Review (July 1998), Chapter 5, para 89.
- <sup>4</sup> Air Publication (AP) 3000, *Royal Air Force Air Power Doctrine* (MOD, 1990), p. 90.
- <sup>5</sup> AP 3000, p. 73.
- <sup>6</sup> AP 3000, p. 71.
- <sup>7</sup> Air Warfare Centre, *Air Operations* (RAF, 1996), p. 6.V.5.
- <sup>8</sup> Air Warfare Centre, *Air Operations*, p. 4.II.2.
- <sup>9</sup> CAS 91/1 Pt A, Future Command and Control of Air Power – Final Report of the ACAS and ACDS OR (Air) Working Group, 6 October 1994; Wing Commander Redvers TN Thompson, 'Post-Cold War Development of United Kingdom Joint Air Command and Control Capability', *Royal Air Force Air Power Review*, Vol 7, No 4, Winter 2004, pp. 76-78.
- <sup>10</sup> Air Historical Branch, *The Royal Air Force and UK Air Power over Iraq and Kosovo, 1997-2000*, pp. 121-122, 126-128, <https://www.raf.mod.uk/our-organisation/units/air-historical-branch/post-coldwar-studies/raf-over-iraq-and-kosovo-1997-2000/> (accessed 15 March 2022).
- <sup>11</sup> Air Historical Branch, *The Royal Air Force in Operation Granby, The First Gulf War, 1990-1991: Command and Control*, p. 8, <https://www.raf.mod.uk/our-organisation/units/air-historical-branch/post-coldwar-studies/command-and-control/> (accessed 15 March 2022).
- <sup>12</sup> Air Historical Branch, *Royal Air Force Command and Control, 1982-2014* (official RAF narrative), p. 69.
- <sup>13</sup> Air Historical Branch, *The Royal Air Force and UK Air Power over Iraq and Kosovo, 1997-2000*, pp. 7-8.
- <sup>14</sup> CM 1981, *Statement on the Defence Estimates, 1992* (HMSO, London, 1992), p. 32.
- <sup>15</sup> Sebastian Ritchie, 'The Royal Air Force and the First Gulf War, 1990-91: A Case Study in the Identification and Implementation of Air Power Lessons', *Royal Air Force Air Power Review*, Vol 17, No. 1, Spring 2014, pp. 36-52.
- <sup>16</sup> Air Historical Branch, *The Royal Air Force and UK Air Power over Iraq and Kosovo, 1997-2000*, Annex I.
- <sup>17</sup> This section is based on the account of Operation *Bolton* contained in Air Historical Branch, *The Royal Air Force and UK Air Power over Iraq and Kosovo, 1997-2000*.
- <sup>18</sup> Air Force Historical Research Agency, *Airmen at War*, Perry D. Jamieson, 'Southern Iraq', pp. 8-9, [https://www.afhra.af.mil/Portals/16/documents/Airmen-at-War/Jamieson\\_SouthernIraq30Sep15.pdf?ver=2016-08-22-131406-023](https://www.afhra.af.mil/Portals/16/documents/Airmen-at-War/Jamieson_SouthernIraq30Sep15.pdf?ver=2016-08-22-131406-023) (accessed 17 March 2022).
- <sup>19</sup> This section is based on the account of Operation *Allied Force* contained in Air Historical Branch, *The Royal Air Force and UK Air Power over Iraq and Kosovo, 1997-2000*.
- <sup>20</sup> Air Historical Branch, *The Royal Air Force and UK Air Power over Iraq and Kosovo, 1997-2000*, p. 194.
- <sup>21</sup> CM 6041-I, *Delivering Security in a Changing World* (Defence White Paper, December 2003), p. 7, paras 3.2-3.3.
- <sup>22</sup> AP 3000, *British Air Power Doctrine* (Directorate of Air Staff, MOD, 1999), pp. 1.1.7-1.1.11.
- <sup>23</sup> Air Warfare Centre, *Air Operations* (RAF, 2000), p. 5.IV.3.
- <sup>24</sup> Air Historical Branch, *The Royal Air Force and UK Air Power over Iraq and Kosovo, 1997-2000*, pp. 228-229; NCC – National Contingent Commander, in this case the CBF(A).

<sup>25</sup> Air Historical Branch, *Royal Air Force Command and Control, 1982-2014*, p. 90; see also Colin S Gray, *Airpower for Strategic Effect* (Air University Press, Alabama, 2012), p. 272.

<sup>26</sup> Air Historical Branch, *The Royal Air Force and UK Air Power over Iraq and Kosovo, 1997-2000*, p. 60; see also Annex I.

<sup>27</sup> Air Historical Branch, *The Royal Air Force and Air-to-Ground Combat, 1990-2014* (official RAF narrative), p. 48.

<sup>28</sup> Air Historical Branch, *The Royal Air Force and UK Air Power over Iraq and Kosovo, 1997-2000*, p. 141.

<sup>29</sup> Air Historical Branch, *The Royal Air Force and Air-to-Ground Combat, 1990-2014*, p. 143.

2010

# Lethal Autonomous Weapons Systems – Warfare’s Best Humanitarian Hope?

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By Wing Commander James Beldon

The author’s rank is reflected at the time of the original article’s publication, which has been reproduced in its entirety. The Contemporary Introduction has been written as an update for the 2022 *ASPR* Platinum Jubilee Edition.

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## Contemporary Introduction 2022

On dusting off the 2016 edition of *Air Power Review* (as it was then titled) in which my article on Lethal Autonomous Weapons Systems (LAWS) first appeared, my first question was 'What has changed?' First and foremost, at this time of writing (April 2022), it is difficult to arrive at a conclusion other than that the age of wishful thinking lies dead in the shattered concrete, mud and blood of Ukraine. The bringing to account of those responsible for the hideous war crimes committed overwhelmingly by the Russian Federation's military forces, in contravention of the principles of *jus ad bellum* and *jus in bello* will occur in the future: but it is an incontrovertible truth that Russia's egregious breaches of international humanitarian law in Ukraine were commissioned, committed and largely denied by men (and possibly women) throughout the Russian military and political command structure. In other words, the war crimes we have witnessed in Ukraine, which have been on a scale not seen in Europe since the end of the Second World War, have been committed by human beings. In reviewing my 2016 article, I still consider that autonomous systems that remove the awfulness inherent in human nature should be pursued holds just as true today as it did then.

One thing that hasn't changed as quickly as I thought it might do is the development of Artificial Intelligence (especially advances towards the solution of General Artificial Intelligence, which itself tends towards real consciousness) that would make the necessary leap towards endowing machines with a form of contextualisation and self-learning that could reach – and possibly exceed – a human's ability to apply force in a way compatible with the highest humanitarian principles. That is not to say that this aim is not being vigorously pursued around the world, although I very much doubt that in the quarters of our potential enemies it is being done with those humanitarian principles in mind. We must not cede the advantage to those who may wish to do us harm; we would never envisage doing so in other spheres of military technology.

One glimmer of hope emerging from the horror of Ukraine is that world opinion (that is to say, the 'Free World's' opinion) is firmly behind the Ukrainian cause, and resolutely against the horrors being inflicted against civilians. There is also general agreement that Ukraine's use of highly automated systems (such as the 'Switchblade' loitering munition) have been a good thing. The 'Anti-Drone' lobby is conspicuously silent on the issue. I have little reason to doubt, given the gravity of the situation, that resistance would be anything other than 'muted' should genuinely 'autonomous' weapons be available for employment by Ukraine now, and therefore play an important role in defeating Russia and stopping its killing of civilians.

Through Ukraine's use of light, highly automated and highly effective weapons, we might be witnessing the greatest evolution in warfare since the 1991 Gulf War. Whether in a year's time, five years or two decades, the march towards ever greater autonomy in weapons is inevitable, in my view. Even the UK's policy position, which in 2016 stated that the UK 'does not possess fully autonomous weapon systems and has no intention of developing them' is beginning to shift a little. In a House of Lords debate on 1 November 2021, the UK Defence Minister Baroness

Goldie, stated that the UK 'does not use systems that employ lethal force without context-appropriate human involvement'. The definition of what constitutes 'context-appropriate human involvement' is open to conjecture, but Baroness Goldie *was* quite clear that any system would need to comply with established International Humanitarian Law. This seems, to this observer at least, to imply that the UK is at last recognising that autonomy must be considered as part of this country's military capabilities in the future; not to do so would, in my view, invite military and, quite conceivably, existential disaster. It remains my view, therefore, that just as I concluded in 2016, it remains desirable, necessary and warfare's best humanitarian hope, to develop autonomous weapons endowed with the unerring ability to apply IHL consistently, and certainly better than human combatants can. If any further proof was needed to demonstrate how woeful humans' own compliance with IHL has been and continues to be, Putin and the Russian Armed Forces have proved it in 2022.

## Introduction

**T**he past decade has witnessed a revolution in the use of remotely operated systems by the UK's Armed Forces. Nowhere has this been more evident – or controversial – than in the air domain. Debate over the nomenclature of such systems – known variously as 'Unmanned Air Vehicles (UAVs)', 'Uninhabited Air Systems (UASs)', 'Remotely Piloted Air Systems (RPAS)' and the plethora of hybrids that these and other terms have spawned – reflects the ideological battle that continues to rage over the nature of such systems and the extent to which meaningful human control prevails over them. The term 'drone' has become the popular, yet currently misleading, term for such systems, which has been exploited by opponents to propagate the false notion that the RAF (through its use of the armed MQ-9 Reaper RPAS) is engaged in unethical and inhumane killing by autonomous machines beyond human control. In this characterization, the anti-drone lobby has been wholly wrong, as the Minister for the Armed Forces, Penny Mordaunt MP, recently addressed during a House of Commons adjournment debate on 'Drones in Conflict':

I will briefly provide a bit of clarity and on the record bust some of the myths that surround the term "drone", which conjures up images of machines free from human oversight and able to operate with complete autonomy. That is the stuff of science fiction movies, not the reality. Although drones do not operate with an individual in the cockpit, the fact is that a trained professional human being is in control of the system at all times. The difference is that they operate remotely from the vehicle. The term "drone" also overlooks the fact that the aircraft itself is part of a much larger system composed of other vital components such as the ground stations, networks and, most importantly, the personnel....The Government have no intention of developing systems that operate without this all-important human hand in the weapon command and control chain.<sup>1</sup>

But, as this paper explores, there is reason to question whether the UK's position on Lethal Autonomous Weapons Systems (LAWS) – which applies across all environments – is ultimately

sustainable or even desirable, should such systems become viable.<sup>2</sup> The notion that a human should always be the ultimate decision maker in the delivery of lethal force is certainly correct now, but it is debatable whether this can or should remain so in the future.

At the MOD's first RPAS-focused media event held at RAF Waddington in December 2013, the then Defence Secretary, Philip Hammond MP, observed that 'Much of the criticism of unmanned aerial systems is based on misunderstanding. This event provides a great opportunity to better inform people about these life-saving assets and their variety of purposes.'<sup>3</sup> In that aim, the event was successful, and so, albeit to a limited degree, has been the MOD's subsequent communications effort in countering the 'Killer Drones' narrative concerning the use of Reaper, a cause somewhat hindered by the system's unedifying name – an issue which the Prime Minister recently sought to address by giving the RAF's next generation of armed RPAS the name 'Protector'.<sup>4</sup> Encouragingly, the idea of remotely piloted drones as 'life savers' or 'protectors' has gained some traction in academic circles, with Dr David Whetham of King's College London<sup>5</sup> and Professor Caroline Kennedy of the University of Hull<sup>6</sup> arguing in favour of their use in UN Peacekeeping and Enforcement operations. In addressing the bad press surrounding drones (largely as a result of US 'targeted killings'), Professor Kennedy argues that:

Drones, even armed drones, can be used in a virtuous manner to protect civilians in line with a UN mandate, just as they can be used in a manner which is perceived as immoral or unethical. ...armed drones are not innately evil or immoral weapons and if used in a manner which deters and prevents acts of genocide and human rights violations then they would likely be welcomed by a public under siege and in need of protection.<sup>7</sup>

The 'virtuous' life-saving drone, in the sense intended by Professor Kennedy, is one that is under permanent human control, reliant on the virtues of its human controllers. But is it conceivable that drones could themselves exhibit sufficient humanitarian virtue to make life taking decisions without explicit human involvement? So far, in promoting its case that the rules<sup>8</sup> governing the employment of lethal force by RPAS are identical to those involving traditional aircraft, the MOD has ruled out developing autonomous weapons systems, stating that only expert military personnel make decisions involving the employment of lethal force and that it is neither possible nor desirable for such decisions ever to be delegated to non-human entities. However, the technology enabling ever higher degrees of automation is evolving rapidly, and so are the arguments. Edges are blurring between machine-made and man-made decisions. Accordingly, although the progression towards autonomy in weapons systems presents some useful opportunities, the legal, ethical and presentational challenges that accompany such advances are already causing the UK's and other states' policymakers headaches, not least because of public unease over the use of 'drones'.

Perhaps unsurprisingly, owing to antipathy towards drone strikes, vastly more has been written arguing against their use and the development of autonomous weapons systems than

has been written in favour.<sup>9</sup> A notable exception is the US computer science and roboticist, Professor Ronald C. Arkin, whose research in the field of autonomy in military systems has added an important perspective to the potential military and ethical benefits that may result from the development of appropriately intelligent LAWS. His 2010 paper on 'Ethical Autonomy in Unmanned Systems'<sup>10</sup> drew together research from a wide variety of sources and over many decades to demonstrate the failure of fighting men and women to behave ethically in war; indeed, nearly two-thirds of his paper was devoted to ethical, moral and psychological human failings in combat – a disquieting yet revealing insight for the military professional. To a large extent, therefore, Arkin's argument in favour of the development of ethical LAWS relies principally on the demonstrated incapability of humans to perform ethically in war rather than on the as yet unproven virtues of ethically endowed machines. In the intervening five years since Arkin's paper was first published, the ethical and legal arguments over LAWS have gained momentum, courting the attention of some eminent figures, such as Professor Stephen Hawking, and Noam Chomsky, who have called for a pre-emptive ban on LAWS.<sup>11</sup> Whilst this author disagrees with the position taken by Hawking et al, their intervention nonetheless highlights that not only has debate on LAWS gained momentum since Arkin's 2010 paper, but so has the technology.

Although a precise timetable cannot yet be given, there is reason to consider that evolution – or perhaps revolution – in the artificial intelligence and robotics fields will ultimately fulfil the dream (or nightmare) of drones endowed with the ability to form reasoned judgements and then decide and act on them without human input.<sup>12</sup> When technology spawns such capabilities, the only remaining impediments to their weaponisation would be international law and decision makers' ethics. Whilst no state (or any other body) has declared outright that a non-human entity could (or should) be empowered to decide on the employment of lethal force, it would be naïve to think that research and development is not already underway in certain states, including the USA, and that such technology is truthfully and universally considered to be undesirable. Furthermore, from a practical perspective, it is likely to become increasingly difficult to determine how the boundary between meaningful human control and machine autonomy can be universally defined and agreed, when the ideal would be to achieve a perfect unity between human and machine.

Already, designers of military and commercial equipment of all sorts seek to lever the mutual advantages of human and machine to achieve optimum synergy for the overall system. As machines become ever more intelligent and capable, it is likely that some functions currently performed best by humans will ultimately be better performed by machines, thereby releasing humans to exploit their consequently freed capacity to perform extant or new functions for which their aptitude remains supreme. Indeed, there is fundamentally nothing new in this context: for example, aircraft autopilot systems perform certain functions better than their human counterparts, and history shows us that the exploitation of human and machine synergy has been in constant evolution since Palaeolithic man first hewed a cobble into a hand-axe. So far, it is arguable that this evolution has been constrained to the physical

rather than conceptual domain, but is it really inconceivable that artificial intelligence should not supersede human decision making, including those decisions involving lethality, if the relevant technology proves itself to be more competent than human beings in making such decisions? Those, like Sharkey, who oppose the development of LAWS, argue that machines lack the sophisticated intelligence and psychology to understand higher intent or interpret human actions, intentions and emotions in the way that humans do.<sup>13</sup> But such a standpoint reflects technology as it is now, not as it might be in the future. Furthermore, such a viewpoint fails to acknowledge that all humans are different and are liable to reach different conclusions when faced with identical inputs based on a whole range of subjective factors (including fear, selfishness, fatigue and ideology) – which Arkin explored extensively in his 2010 paper.<sup>14</sup> It is simply misleading, as Sharkey implies, to assume that all humans are of equal virtue, intelligence and character, or that none is susceptible to the debilitating effect on ethical conduct that exposure to combat can promote. 'Designing out' the frailties that lead human combatants to act unethically and illegally should be a primary aim in the development of LAWS, with a commensurate uplift in the ethical conduct of warfare.

The UK Government argues that we might be a very long way off from witnessing the requisite advance in artificial intelligence that could enable such a possibility, but we cannot be sure. It must therefore be questioned whether the UK's policy on the use of remotely operated military systems, at the heart of which has been enshrined the primacy of human decision making, is sustainable indefinitely, or whether, in fact, the development and employment of genuinely autonomous weapons systems are inevitable and, perhaps, even ethically desirable.

Although there is no internationally agreed definition of what constitutes a 'LAWS',<sup>15</sup> it may be understood that in order to be described as truly or fully 'autonomous', rather than simply 'automated', a system must be capable of independently 'interpreting higher level intent'<sup>16</sup> and direction',<sup>17</sup> analysing its physical and operational context in order to make decisions and act independently from further human influence; in the case of fully autonomous weapons systems, these include decisions to employ lethal force. The UK remains sceptical of the feasibility of such systems and categorically states that it 'does not possess fully autonomous weapon systems and currently has no intention of developing them. Such systems are not yet in existence and are not likely to be for many years, if at all.'<sup>18</sup> Indeed, despite the very wide spectrum of opinions on the legalities and ethics of LAWS, there is a general consensus that none are in existence yet. According to Human Rights Watch (HRW), a member of the Campaign to Stop Killer Robots (CSKR), a 'civil society' organisation comprising a number of NGOs,<sup>19</sup> 'Fully autonomous weapons... do not yet exist'.<sup>20</sup> Furthermore, it is generally accepted that in-service weapon systems exhibiting a high degree of automation, such as loitering munitions, the Phalanx close-in anti-shipping-missile system and Israel's 'Iron Dome' anti-rocket surface-to-air missile system, fail to meet the definition of 'full autonomy', because humans programme them to respond within precisely defined parameters to pre-defined conditions. In Phalanx's case, when commanded to automatic mode, it automatically detects and engages sea-skimming supersonic anti-shipping missiles

(which humans lack the necessary response time to counter adequately) according to very tightly controlled parameters. Because systems like Phalanx behave in accordance with the explicit programming instructions of humans in reaction to precisely pre-defined circumstances, they are usually defined as 'automated' rather than 'autonomous', although some refer to them as 'partially autonomous'. Noel Sharkey has described the reasoning process of such systems as ultimately rooted in the simple computer programming language of 'the humble IF/THEN statement'.<sup>21</sup> Whilst Sharkey would argue that such systems are to be considered as 'autonomous', they do not fulfil the requirements set out above of being able to interpret higher level intent and analyse their context beyond the narrow scope of an 'IF/THEN' decision process. They are not endowed with the requisite initiative to respond to factors that lie outside those defined in their programmes. In sum, with apologies to Descartes, such systems do not 'think', therefore they are not [autonomous].



Automated, not autonomous: Phalanx Close-in Weapon System  
(Credit: U.S. Navy)

So much for the current state of play. The future viability of LAWS is where opinion begins to diverge comprehensively. Contrary to the UK's position that autonomous weapons systems are 'not likely to be [in existence] for many years, if at all',<sup>22</sup> HRW argues that 'weapons technology is moving rapidly toward greater autonomy' paving the way for weapons with the 'power to determine when to take human life'.<sup>23</sup> Despite the wide spectrum of views on the subject, notably the contested term 'greater autonomy', the international community is addressing the legal issues concerning LAWS through the auspices of the UN Office in Geneva's Convention on Certain Conventional Weapons (CCW) annual 'Meeting of Experts on Lethal Autonomous Weapons Systems', the most recent event having taken place between 13 and 17 April 2015. Because it is a diplomatic forum, the UK's lead department for LAWS is the Foreign and Commonwealth Office (FCO), supported by the MOD. In addition to state and UN representation, other participants in the forum include the Campaign to Stop Killer Robots and the International Committee for Robot Arms Control (ICRAC). So far there has been little tangible progress towards achieving international agreement on LAWS, even over the definition of the term. All parties agree, however, that contemporary technology is incapable of producing systems with the required artificial intelligence to meet the broadly agreed understanding of what a truly autonomous system is, i.e. although a degree of autonomy can be achieved through the automation of certain functions of a weapons system, they are as yet incapable of exercising reasoning and judgement to the same sophisticated level as a human being. In these regards, humans continue to outperform machines and, in the view of the ICRC,

a supersession by machines is 'unlikely to be possible in the foreseeable future.'<sup>24</sup> Consequently, although highly automated systems have been demonstrated to perform well in highly predictable circumstances, so far not even the most complex 'autonomous' system has yet exhibited the power of judgement necessary to adapt satisfactorily to complex, dynamic and unexpected circumstances; moreover, as a consequence, when faced with the unpredictable, state-of-the-art 'autonomous' machines can behave unpredictably.

For those who fear imminent World domination by Terminator-esque killer robots, it should be reassuring to learn quite how relatively under-developed even the most advanced 'partially autonomous' systems are at present. Sharkey argues, with some justification, that 'The autonomous robots being discussed for military applications are closer in operation to your washing machine than to a science fiction Terminator.'<sup>25</sup> It is notable, for example, that one of the most significant milestones so far reached autonomously by an unmanned system was the recent achievement by the US Navy's X-47B Unmanned Combat Air System Demonstrator (UCAS-D) of in-flight refuelling. Important though this milestone undoubtedly was in terms of extending the range and endurance of unmanned systems and in demonstrating the high technical merit of the machine in performing the delicate manoeuvres inherent in in-flight refuelling, it hardly marked a decisive breakthrough in the race to achieve machine supremacy over human judgement. Indeed, this success served as much to highlight the limits of artificial intelligence as it pointed to its potential.



The US Navy's X-47B UCAS-D achieved autonomous in-flight refuelling on 22 April 2015 – a milestone for aviation, but no indicator that machines are capable of out-reasoning humans. (Credit: U.S. Navy)

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Hence, in light of the pronounced limitations of current autonomous technology, the debate over LAWS has principally circulated around the issue of whether to introduce a pre-emptive ban on such systems, with groups such as ICRAC claiming that 'The delegation of violence to a machine – whether lethal or less lethal – is a violation of human dignity.'<sup>26</sup> The UK rejects the premise of this argument, stating that it would never delegate the decision to employ lethal force to a machine and that IHL already prohibits their development. As the FCO has stated, 'Whilst technological advances will likely increase the level of automation in some systems, just as in non-military equipment, the MOD has no intention to develop systems that operate without human intervention in the weapon command and control chain.'<sup>27</sup> The UK considers that its stance accords precisely with extant International Humanitarian Law (IHL), which it believes already effectively bans all states from introducing fully autonomous systems.



Specifically, Article 36 of Additional Protocol 1 to the 1949 Geneva Conventions obliges states 'to determine whether [a weapon's] employment would, in some or all circumstances, be prohibited by this Protocol or by any other rule of international law applicable to the High Contracting Party.'<sup>28</sup> In its interpretation of Article 36, the UK contends that a fully autonomous system would never be capable of meeting the principles of humanity, proportionality and distinction in the targeting process and, therefore, IHL signatory states are compelled to limit weapons systems to those which operate under 'meaningful human control'. Article 1 of the UN's Universal Declaration of Human Rights states that 'All human beings are born free and equal in dignity and rights. They are endowed with reason and conscience and should act towards one another in a spirit of brotherhood.'<sup>29</sup> Consequently, under the current provisions of IHL, it can be argued that the principle of humanity is inseparable from the human species; ipso facto, no other living or artificial creation has the right to judge matters involving humanity. But in arguing that humans alone have the right to make decisions that have humanitarian implications, there is an inherent presupposition that either humans are (and always will) remain inherently superior to artificial creations in making judgements based on humanitarian principles, or that human mistakes or misdeeds will remain more admissible than machines' potential inerrancy. The first presupposition is open to conjecture, but in this author's opinion is unlikely to withstand the test of time; the second, ironically, seems almost certainly inconsistent with humanitarian objectives. So far in history, humans have failed consistently to live up to humanity's loftier ideals. Indeed, as Arkin argued in his 2010 paper, '... it seems unrealistic to expect normal human beings by their very nature to adhere to the Laws of Warfare when confronted with the horror of the battlefield, even when trained.'<sup>30</sup>

To err is, indeed, human, as humanity's sad history of war and its associated crimes have lamentably demonstrated. But to forgive mankind en masse for its propensity for making bad decisions would be an error in itself if artificial intelligence is developed that is better equipped than humans to make better humanitarian decisions. To argue that decisions to employ lethal force should always be made by humans is to argue that ISIL's murderous reign of terror is more acceptable than, in another context, the sparing of a non-combatant by a machine whose 'mind' is unfettered by fatigue, fear, hatred or perverted ideology.

The UK's position is that it cannot envisage a point at which machines will be capable of exercising the principle of humanity enshrined in the Laws of Armed Conflict. Even defence companies exploring the potential of autonomy seem at pains to highlight the involvement of human decision making. BAe Systems, whose Taranis project seeks to employ facets of autonomous behaviour, is scrupulously coherent with this principle, emblazoning its Taranis web page with the emboldened statement 'CONTROLLED BY A HUMAN OPERATOR.'<sup>31</sup> But proponents of a pre-emptive specific ban on LAWS contend that high levels of automation and autonomy materially influence human operators' decisions in any case: in effect, they argue, the information presented by the system railroads the operator into taking a particular course of action. Furthermore, proponents of a bespoke ban argue that, without one, there is a danger of a new arms race, lowering the threshold on the use of force and



the dilution of discrimination in its application. There are, of course, many shades of opinion on the subject, but none is as well-defined as the UK's policy. The USA, which is the only state other than the UK to have publicly announced its policy on autonomous and semi-autonomous weapons, has provided some detail on its approach to LAWS, but it is ultimately more ambivalent than the UK regarding its interpretation of weapons: 'Autonomous and semi-autonomous weapon systems shall be designed to allow commanders and operators to exercise appropriate levels of human judgment over the use of force.'<sup>32</sup> Quite what is meant by the intention to 'allow appropriate levels of human judgment' remains unclear, but senior US officials seem much more at ease with the concept that fully autonomous weapons systems will supersede some manned and remotely operated systems. US Secretary of the Navy Ray Mabus recently declared, 'I'm for a full-up penetrating strike fighter. ....[UCLASS]<sup>33</sup> ought to be the bridge to a full-up strike fighter – an autonomous strike fighter – that [operates] in contested environments.'<sup>34</sup> By 'contested environment', it is reasonable to assume that Secretary Mabus means one in which not only can the opposition be expected to employ kinetic measures to defeat friendly systems, but one that is contested in electromagnetic terms too, i.e. an environment in which the ability to control a system via satellite link (or any other reliant on the electromagnetic spectrum) is disrupted. It might further be inferred, therefore, that human operator intervention would be severely limited, if not negated entirely, under such operational conditions. Hence, autonomy – i.e. self-reliance and the ability to think – would be vital facets of such a system. US Admiral Darrah went further in a recent interview:

"What we're doing today is deterministic autonomy...it's not autonomous" because boundaries and parameters are pre-set for the aircraft, he said. The admiral said the navy would continue using deterministic autonomy until artificial intelligence is capable of operating within the same rule set as humans... The navy is also studying autonomy as it relates to the system's weapons, the admiral said, including the extent to which a weapon could someday make a targeting determination downrange.<sup>35</sup>

Admiral Darrah's statement indicates that the US is not only contemplating, but planning for, the use of LAWS, despite their apparent incompatibility with International Humanitarian Law – at least as the UK interprets it. According to Sharkey, 'decision making robots... have appeared in all of the US military's roadmaps since 2004.'<sup>36</sup> At least the US is relatively candid about its approach to such systems – other states (including China, Russia and France) are substantially more guarded on their own definitions of LAWS and their interpretations of International Humanitarian Law as applied to automatic and autonomous weapons systems.

From this temporal vantage point, it is uncertain if or when fully autonomous weapons systems will become viable. But let us, for a moment, at least assume that they will become feasible at some future point, either through evolution or revolution in the artificial intelligence and robotics domains. Technical viability will ultimately challenge legality.

Any international accord that either confirms that IHL already effectively bans LAWS or introduces a bespoke pre-emptive ban on such systems may deter or delay the development of such systems, but it is unlikely that legislation could be anything more than a speed bump on the road to some form of military employment. Already, it is unclear how most states interpret IHL with respect to LAWS, and it is probable that some would actively pursue such systems as soon as technology facilitates them – the USA seems already to be marching down this path.

Weapons innovation nearly always usurps extant legislation – how, for example, could nuclear weapons ever meet the conditions of proportionality and humanity that IHL enshrines, yet despite this contradiction they continue to form a vital component of several states' military inventories? Moreover, paradoxically perhaps, nuclear weapons are generally (though not universally) considered to have exerted a positive effect on the relative peacefulness of the post-Second World War era. So, despite their seeming incompatibility with IHL, it may be considered that nuclear weapons have (so far, at least) made a positive contribution to peace and, therefore, have reduced the scale of human suffering through war. Consequently, for many states, despite their potentially apocalyptic consequences, nuclear weapons are considered to be peace-positive. Should technology permit, those states that judge LAWS to offer military advantage are likely to argue that such systems are more capable than humans in exercising the lofty principles of human reasoning and judgement than humans themselves because they would not be susceptible to the deleterious effects of anger, fatigue, fear, greed, hatred and pain to which humans are subject. Should LAWS develop to a point where they are capable of practising the highest levels of judgement and reason, unfettered by human frailties, it might reasonably be argued that they would be better equipped than humans to decide on matters concerning the use of lethal force – and to do so consistently. It should need no reminder that each and every crime against humanity has been committed by a human. Is it not humanity's humanitarian responsibility to make LAWS that are more virtuous than humans themselves?

Given the current limitations of artificial intelligence, humans remain best equipped to decide when to employ lethal force. But we already exist in a hybrid world where humans and machines co-exist, exploiting the synergy between the calculative accuracy of machines with human flexibility to deal with multifarious and unpredictable planning conundrums. High automation and partial autonomy have a place in our lives and professions now – the RAF Voyager incident of 2014 served to highlight the life-saving benefits of high automation in aircraft safety systems when humans get it wrong. But neither technology nor humanity are yet at a point where life-taking decisions can be delegated to machines. Nevertheless, whatever the status of IHL, it will take just a few LAWS genies to be released from their technological, legal and ethical lanterns to revolutionise warfare. Although commendable, the UK's present position on LAWS looks vulnerable to an unpredictable and innovative future. Whether through technological evolution or revolution, it would be unwise to conclude that international law in any form will ultimately prevent the creation of systems displaying a degree of autonomy that

draws into significant question the viability and appropriateness of 'meaningful human involvement' in decisions involving the employment of lethal force. Paradoxically, the machines may ultimately be more humane than humans; given humanity's track record, this does not appear to be an impossible or, indeed, undesirable aspiration. Hence, if or when technology matures to the point where machines can be endowed with the ideals of human virtue and the intelligence to interpret their context and higher intent accurately, it is surely advantageous, from both the perspectives of military advantage and ethics, to allow such machines to make lethal decisions. Therefore, rather than seeking to ban such technology or unilaterally withdraw from the development of such systems, it would be better for states to agree to a humanitarian code to which LAWS should adhere – IHL, which humans have proven lamentably incapable of observing, already provides a suitable framework.

## Notes

<sup>1</sup> House of Commons Daily Hansard, "Drones in Conflict," [www.parliament.uk](http://www.parliament.uk), October 13, 2015: Columns 292-293, <http://www.publications.parliament.uk/pa/cm201516/cmhansrd/cm151013/debtext/151013-0004.htm#15101371000002>.

<sup>2</sup> This article considers the use of LAWS within the framework of combat and the Laws of Armed Conflict. It does not address the separate, but often conflated, debate surrounding the use of drones in targeted killings in states which are neither at war with the prosecuting state nor have given permission for such strikes to take place on their sovereign territory. For further insight into this issue, the author recommends reading: Noel Sharkey, "Saying 'No!' to Lethal Autonomous Targeting," *Journal of Military Ethics* 9:4 (2010): 370-383.

<sup>3</sup> UK Ministry of Defence, "Unmanned aerial systems on show," *UK Ministry of Defence*, last modified December 18, 2013, <https://www.gov.uk/government/news/unmanned-aerial-systems-on-show--7>.

<sup>4</sup> BBC News, "UK drone fleet to double in fight against IS, says PM," BBC, last modified October 4, 2015, <http://www.bbc.co.uk/news/uk-politics-34436917>.

<sup>5</sup> David Whetham, "Drones to protect," "Virtuous drones?," *The International Journal of Human Rights*, 19:2 (2015): 199-210.

<sup>6</sup> Caroline Kennedy and James I. Rogers, "Virtuous drones?," *The International Journal of Human Rights*, 19:2 (2015): 211-227.

<sup>7</sup> *ibid.*, 222.

<sup>8</sup> International Humanitarian Law (or the Laws of Armed Conflict) and Rules of Engagement.

<sup>9</sup> British attitudes towards drones are complex and dependent upon the context in which they are used. Opinion polling has shown support of up to 75% for drone strikes that would kill a known terrorist if no innocent civilians killed at the same time. See: YouGov, "British Attitudes Towards Drones," YouGov, last modified April 3, 2013, <https://yougov.co.uk/news/2013/04/03/british-attitudes-drones-and-targeted-killing/>.

<sup>10</sup> Ronald C. Arkin, "The Case for Ethical Autonomy in Unmanned Systems," *Journal of Military Ethics* 9 (4) (2010): 332-341.

<sup>11</sup> Doug Bolton, "Stephen Hawking, Noam Chomsky and thousands of others sign open letter calling for a ban on 'killer robots,'" *The Independent*, last modified July 27, 2015,

<http://www.independent.co.uk/life-style-7-4/stephen-hawking-noam-chomsky-and-thousands-of-others-sign-open-letter-calling-for-a-ban-on-killer-10420169.html>.

<sup>12</sup> Ben Goertzel, "Human-level artificial general intelligence and the possibility of a technological singularity. A reaction to Ray Kurzweil's *The Singularity Is Near*, and McDermott's critique of Kurzweil," *Artificial Intelligence* 171 (2007): 1161–1173.

<sup>13</sup> Sharkey, "Saying 'No!' to Lethal Autonomous Targeting," *Journal of Military Ethics* 9:4 (2010): 370.

<sup>14</sup> Arkin, "The Case for Ethical Autonomy in Unmanned Systems."

<sup>15</sup> For Conference purposes, the UN and International Committee of the Red Cross used the following working definition of Autonomous Weapons System: 'Weapons that can independently select and attack targets, i.e. with autonomy in the 'critical functions' of acquiring, tracking, selecting and attacking targets'. (International Committee of the Red Cross, "Report of the ICRC Expert Meeting on 'Autonomous weapon systems,'" May 9, 2014, <https://www.icrc.org/eng/assets/files/2014/expert-meeting-autonomous-weapons-icrc-report-2014-05-09.pdf>).

<sup>16</sup> Correct interpretation of 'higher level intent' relies on that intent being clearly and unambiguously expressed. The perils of poorly expressed commander's intent were, for example, infamously illustrated at the Battle of Balaclava when Lords Lucan and Cardigan misinterpreted their Commander Lord Raglan's ambiguous intent, and led the Light Brigade to disaster. Even if LAWS are developed that can match humans' ability to interpret commanders' intent, that interpretation will, to a very large degree, remain reliant on the unambiguous articulation of that intent.

<sup>17</sup> UK MOD Development, Concepts and Doctrine Centre, *JDN 2/11 The UK Approach to Unmanned Aircraft Systems* (UK: MOD, 30 March 2011), 2-3. [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/33711/20110505JDN\\_211\\_UAS\\_v2U.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/33711/20110505JDN_211_UAS_v2U.pdf) (accessed 2 June 2015). The JDN 2/11 definition of an autonomous system is: 'An autonomous system is capable of understanding higher level intent and direction. From this understanding and its perception of its environment, such a system is able to take appropriate action to bring about a desired state. It is capable of deciding a course of action, from a number of alternatives, without depending on human oversight and control, although these may still be present. Although the overall activity of an autonomous unmanned aircraft will be predictable, individual actions may not be.'

<sup>18</sup> Alistair Burt (UK Under Secretary of State for Foreign Affairs), Letter to Kate Allen, Executive Director, Amnesty International UK (June 27, 2013), <http://www.una.org.uk/sites/default/files/Killer%20robots%20-%20reply%20from%20FCO%20-%2027%20June%202013.pdf>.

<sup>19</sup> Human Rights Watch, "Shaking the Foundations – The Human Rights Implications of Killer Robots," Human Rights Watch (2014), [http://www.hrw.org/sites/default/files/reports/arms0514\\_ForUpload\\_0.pdf](http://www.hrw.org/sites/default/files/reports/arms0514_ForUpload_0.pdf).

<sup>20</sup> The Campaign to Stop Killer Robots comprises: Human Rights Watch; Article 36; Association for Aid and Relief Japan; International Committee for Robot Arms Control; Mines Action Canada; Nobel Women's Initiative; PAX (formerly known as IKV Pax Christi); Pugwash Conferences on Science & World Affairs; and the Women's International League for Peace

and Freedom.

<sup>21</sup> Noel Sharkey, "Saying 'No!' to Lethal Autonomous Targeting," *Journal of Military Ethics* 9:4 (2010): 377.

<sup>22</sup> Alistair Burt, Letter to Kate Allen.

<sup>23</sup> Human Rights Watch, "Shaking the Foundations."

<sup>24</sup> International Committee of the Red Cross, "Report of the ICRC Expert Meeting on 'Autonomous weapon systems.'"

<sup>25</sup> Sharkey, "Saying 'No!' to Lethal Autonomous Targeting," 379-80.

<sup>26</sup> ICRC, "ICRC closing statement to the 2015 UN CCW Expert Meeting," ICRC, 17 Apr 15, <http://icrac.net/2015/04/icrac-closing-statement-to-the-2015-un-ccw-expert-meeting/>.

<sup>27</sup> Alistair Burt, Letter to Kate Allen.

<sup>28</sup> United Nations, *Protocol additional to the Geneva Conventions of 12 August 1949, and relating to the protection of victims of international armed conflicts (Protocol 1)* (New York: United Nations, June 8, 1977), 21. <https://treaties.un.org/doc/Publication/UNTS/Volume%201125/volume-1125-I-17512-English.pdf>.

<sup>29</sup> United Nations, "The Universal Declaration of Human Rights," United Nations, December 1948, <http://www.un.org/en/documents/udhr/index.shtml#a1>.

<sup>30</sup> Arkin, "The Case for Ethical Autonomy in Unmanned Systems."

<sup>31</sup> BAE Systems, "TARANIS," BAE Systems, <http://www.baesystems.com/en/product/taranis> (accessed October 2, 2015).

<sup>32</sup> US Department of Defence, *Department of Defense Directive: Autonomy in Weapon Systems* (Washington DC: Department of Defense, November 21, 2012), 2. <http://www.dtic.mil/whs/directives/corres/pdf/300009p.pdf>.

<sup>33</sup> Unmanned Carrier-Launched Airborne Surveillance and Strike.

<sup>34</sup> Marina Malenic, "Surveillance or Strike?," *IHS Jane's Defence Weekly* (June 3, 2015): 31.

<sup>35</sup> *ibid.*

<sup>36</sup> Noel Sharkey, "Saying 'No!' to Lethal Autonomous Targeting," *Journal of Military Ethics* 9:4 (2010): 370.

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# What does Protect and Defend mean for a UK National Approach to Space?

By Group Captain Rayna Owens

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**Biography:** Group Captain Rayna Owens is in her twelfth year in space-related positions across the Defence Space Enterprise, including as Station Commander at RAF Fylingdales, Space Policy and Strategy within the Air Staff, and helping establish the capability elements of UK Space Command. She has worked extensively across defence, government and with international and industry partners supporting the development of collaborative initiatives and activities such as the Combined Space Operations Initiative, and leading UK participation in US space wargames. She has developed a particular interest in New Space, space future development, space domain awareness and counterspace and has been studying these topics over the last few months mentored by King's College London.

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## Abstract

The space domain is regarded by many as a global common and often described as the ultimate high ground; however it lacks concepts of sovereignty, national borders or an agreed set of norms of behaviour. The domain has undergone significant evolution within the last seven years, through increasing nations' involvement, and the development and testing of counterspace capabilities, coupled with an exponential proliferation of commercial activities. In parallel, many nations have grasped the nature of their reliance on the space domain for defence, security, and Critical National Infrastructure (CNI), as well as for everyday life. Increasingly collaborative initiatives between nations have helped to build a common understanding of developing threats, operational practices and the necessity to collaborate, as well as refining respective national perspectives.

The UK has been pursuing a unique joint civil-military approach towards development of Space Domain Awareness (SDA) and has been enhancing its UK Space Operations Centre (SpOC) since 2016. Such activity has informed the National and Defence Space Strategy direction to develop a UK National Space Operations Centre (NSpOC). This collaborative way ahead will add a different complexion to UK space developments than if activities were developed separately.

Protection and Defence of UK interests is a phrase that flows from the Integrated Review (IR) and its associated Command Paper, through the National and Defence Space Strategies, to the UK Space Command Mission. The phrase is also reflected in a range of strategies, policies and missions for new space organisations in allied nations. Ensuring the Protection and Defence of UK interests requires the development of a collaborative approach, including working across Defence, Government and internationally with key allies and industry partners. This article examines the major factors which should be considered when developing such an approach, based on the new strategic framing, a Governmental ambition for capability by 2030,<sup>1</sup> civil-military work to develop a NSpOC and to fit with the three elements of national interest outlined in the IR: sovereignty, security and prosperity.

## Context

The space domain and its related activities have been characterised by significant change over recent years. Since 2016, an increasing number of nations have realised the strategic benefits to be gained from space, and this has led to the formation of 11 new Space Agencies<sup>2</sup> and space programmes, with many existing space nations increasing their activities. Understanding the prominence of space as part of nations' CNI has also increased as technological use has developed significantly. In the UK this was brought into focus when the Blackett Report: *Satellite-derived Time and Position: A Study of Critical Dependencies* was published in January 2018. This Report stated that the economic impact to the UK of a loss of Global Navigation Space System (GNSS)<sup>3</sup> was estimated at £5.2bn over a five-day period.<sup>4</sup> Similarly, in 2018, the US believed that 14 of 16 CNI sectors were reliant on the Global Positioning System (GPS).<sup>5</sup>

The development of collaborative military initiatives amongst allied nations includes the 2014 Combined Space Operations (CSpO) Initiative, which comprises seven nations.<sup>6</sup> This has enabled regular dialogue between nations' military, operational, capability and policy staffs which has helped seed understanding across governments of the importance of space and its developing threats and hazards. The CSpO nations have developed strong relationships and a level of shared understanding and this activity has deepened collaboration and led to some nations' participation in the US-led space coalition under Operation *Olympic Defender*.<sup>7</sup> There have also been increasingly complimentary public statements from CSpO nations on key activity such as the Russian ASAT test in November 2021, due to shared understanding and interpretation of good and bad behaviour. The CSpO Vision for 2031 was released by participating nations in February 2022 and outlines shared views on the importance of space, guiding principles, objectives, and lines of effort currently in progress.<sup>8</sup> This is further evidence of deepening understanding and increasingly collaborative activities between key space nations.

The domain has also been subject to significant commercial proliferation in the last five years which has seen commerce move into an increasing range of space mission areas. This is likely due to a range of factors, including the increasing options for and reduction in cost of access to space from existing commercial launch providers<sup>9</sup> and the proliferation of new providers, with 15 new launch vehicles due to debut in 2022.<sup>10</sup> The rise of the mega-constellation has brought mass production to satellite manufacturing, where previously each unit would likely have been a bespoke build. Space X (Starlink constellation),<sup>11</sup> Airbus (OneWeb constellation)<sup>12</sup> and Thales (new Telesat constellation)<sup>13</sup> are all quoting impressive build rates which will inevitably drive down unit costs. The so-called 'space billionaires', including Elon Musk, Jeff Bezos and Sir Richard Branson, fuel their space developments with bold strategic vision<sup>14</sup> and this, coupled to an accessible social-media-friendly approach has engendered a level of public interest in space, which has arguably not been seen since the Apollo era. Space is seen as a fascinating and lucrative area to work and invest in, and there has been a surge of interest from Silicon Valley and a significant increase in venture capital investments due in part to Space X and other commercial successes.<sup>15</sup> Estimates value the global space industry at US\$350 billion, with an increase to more than US\$1 trillion predicted by 2040<sup>16</sup> and the Space Tech 2021 Report states that there are around 10,000 private sector companies and 5,000 leading investors in space technology.<sup>17</sup>

## UK Space Developments

UK space developments have increased at pace, with significant Government analysis of the key issues, and the creation of a set of coherent cross-government structures including formation of a National Space Council<sup>18</sup> as a sub-committee of the National Security Council. Space Directorates have also been created within the Ministry of Defence and the Department of Business Energy, Innovation and Skills. Such analysis has resulted in a comprehensive set of evidence as part of the IR, enabling significant additional funding for the Defence Space Programme over the next ten years.<sup>19</sup> Both National and Defence Space Strategies have



subsequently been published, including a coherent approach to delivering three identified strategic themes and a costed plan for the extra funding required for their delivery.

The UK Space Sector continues to be buoyant with the population of space organisations in the UK growing on average nearly 21% per annum since 2012, with 1,293 organisations recorded in the latest version of the UK Space Agency Size and Health of the Space Sector Report. The Report indicated that every region in the UK hosted space organisations, with the South and East and Greater London having the largest concentration. Employment in the sector has enjoyed considerable growth of 6.7% from 2018/19 to 2019/20 with employment tripling since 2000/2001 and an annual growth rate of 6%.<sup>20</sup>

The FCDO work in the UN on Reducing Space Threats through Norms, Rules and Principles of Responsible Behaviours is progressing. The proposed resolution has been adopted and an Open-Ended Working Group (OEWG) has formed, with the first meeting taking place in Vienna in May 2022. This process is likely to take time, as the second OEWG is not scheduled to take place until 2023. However, this is a significant step forward in international space collaboration and is a demonstration of the stated intent for UK continued global leadership on norm-setting.<sup>21</sup>

## **Protect and Defend**

The requirement to protect and defend UK interests is reflected consistently across the IR and within both Space Strategies. The IR articulated the 'Government's 2030 ambition for the UK to have the ability to monitor, protect and defend our interests in and through space, using a mixture of sovereign capabilities and burden-sharing partnerships with our allies.'<sup>22</sup> The National Space Strategy includes Protect and Defend as one of five goals, whilst the Defence Space Strategy includes it as one of three Strategic Themes. Both strategies also reflect direction for work between civil and military elements on the formation of a NSpOC. This level of collaboration between civilian and military elements of government is unique and provides significant opportunity for future development. A single NSpOC covering all UK interests will have a broader mission set than other military SpOCs and will require the development of different relationships and approaches. Collaborative work has been underway since 2016, with the UK Space Agency (UKSA) and the RAF working together on SpOC enhancement. A Commercial Integration Cell<sup>23 24</sup> was also formed within the SpOC which is enabling the development of relationships and the passage of information with relevant industry partners.

The Defence Space Strategy sets out a three-pronged approach to delivery of the Protect and Defend Theme: 'development of capabilities to deliver effective operational outcomes; identification and attribution of threats to space systems; and responses to hostile activities in a proportionate and coordinated manner'.<sup>25</sup> It identifies key elements as credible deterrence and response options, an intelligence-focused strategy, domain awareness, effective Space Control Capability and resilient on-orbit and terrestrial and cyber infrastructure as well as international

collaboration and commercial partnerships. Plans seek to continue development of existing Space Domain Awareness capabilities, as well as new national additions, and identifies the requirement for collaboration with allies and commercial partners. The requirements to detect, track, characterise and attribute objects in space and build agility into space command and control mechanisms and decision making are identified, as is the requirement to work in partnership with the UKSA, to help establish a NSpOC that will be fully integrated with allies and partners, as well as across Government.

## **National Interest**

While National Interest is a key tenet of international relations, there is no single agreed definition of the term as it is seen as context dependent. However, the IR outlines 'three fundamental national interests; sovereignty, security, and prosperity, alongside shared values fundamental to national identity, democracy, and way of life. These values include a commitment to universal human rights, the rule of law, free speech and fairness and equality'.<sup>26</sup>

## **Towards a Protect and Defend Approach**

Given the establishment of a NSpOC and its associated span of National Interest, the UK approach to Protect and Defend will be broader than military capabilities and support to military operations. Therefore, Protect and Defend is better considered as an approach which will likely include a number of factors including: understanding reliance; building resilience; developing domain awareness; understanding the span of required missions; and the need to develop a comprehensive and joined up approach to assessing and dealing with threats and hazards.

## **Understanding Reliance**

Understanding reliance on space is key to being able to Protect and Defend interests, however given the pervasiveness of space services, developing such knowledge is problematic. The Blackett Report reflects this challenge, stating that 'GNSS is so prevalent today that it has contributed to a system-of-systems issue, such that even the most vigilant operators of infrastructure and other applications may not be completely aware of the magnitude of their reliance'.<sup>27</sup> While GNSS and the timing and location services that these systems provide are of vital importance, they are not the only important areas: missile warning, satellite communications, and a range of earth observation functions are also key to many aspects of defence and security. As the approach to Protect and Defend develops there will likely be a requirement to study vulnerability.

## **Building Resilience**

Given the critical importance of services from space to CNI, Defence and many other aspects of modern life, the hostile physical environment and the increasingly congested and contested domain, there is a requirement to ensure resilience of space systems or key services. The US highlighted a framework for considering mission assurance through resilience in 2011<sup>28</sup> which

considers disaggregation, protection, distribution, proliferation, diversification, and deception as resilience approaches. The level of resilience should be considered at the start of the design process for future space systems or architectures. In 2017 the Aerospace Corporation,<sup>29</sup> laid out a Resilience Taxonomy to consider the trades that could be made to meet mission requirements against a range of factors. This, or a similar type of approach, may be helpful as Space Command matures.<sup>30</sup> Resilience can also be built by considering the development of alternate capabilities that do not rely on space where this is possible. Alternatives also include reversionary modes of accessing information which would normally be delivered by space services, physical or cyber protection measures, space system design, operational usage and procedures, volume of satellites, collaboration and interoperability across systems or nations.

### **Building Sufficient SDA capabilities**

Understanding activity within the domain is fundamental, including what is normal and what is not. This approach is common to the other operational domains, however there are inherent challenges in achieving this within space.

Global space surveillance capabilities, have not matched pace with the growth of satellite numbers, and this situation is compounded by the lack of an agreed lexicon to describe domain surveillance,<sup>31</sup> agreed data standards, formats, interfaces, and modelling tools. Government and national space surveillance systems generally use orbital prediction, updated by sensor tasking, rather than comprehensive continuous surveillance of all orbital regimes. This approach is due, in part, to the vast areas which require surveillance, the legacy of predictable satellite behaviour and sensor and system technology. There is no international mechanism for sharing satellite movements in the way that 'flight plans' denote aircraft movements and there are no internationally agreed norms of behaviour. This means that surveillance, tracking, oversight and understanding of 'normal behaviour' on orbit is not as well developed as in other domains. Therefore, identification of unusual, dangerous, or even nefarious activity is not easy, whilst protocols to discuss activity of concern are not formalised and determination of intent is difficult.

The UK is part of the US Space Surveillance Network, contributing data from RAF Fylingdales, and is in discussion with the US about hosting a US Deep Space Radar.<sup>32</sup> The current UK BMD radar programme could potentially provide additional space surveillance capabilities.<sup>33</sup> Developing discussions as part of CSpO could also foster collaborative approaches between nations on additional space surveillance capabilities. It is anticipated that the own, collaborate, access approach will be fundamental for future capability developments on SDA and in relation to the NSpOC.

### **Understanding the Span of Mission Sets**

The Defence Space Strategy identifies the requirement to detect, track, characterise and attribute objects in space and build agility into space command and control mechanisms

and decision making.<sup>34</sup> However, work to develop the NSpOC is also likely to consider expansion of missions to include exchanging information with relevant industry partners, and oversight of licencing and launch operations. The UK Space Agency is currently running a pilot service, providing Space Surveillance and Tracking information to UK-licensed satellite operators.<sup>35</sup>

## Threats and Hazards

The space domain is subject to a range of threats and hazards which for the purposes of this paper are deemed intentionally nefarious activities to impact on or interfere with a satellite or space system; and environmental factors and unintended impacts such as space weather, debris, incompetent operation, or unintentional interference respectively. When considering threats to space capability, all three elements of a space system should be considered, including the ground segment, and the spectrum links used to control a satellite and transfer data or services, in addition to the satellite itself. While consideration of hazards is focused on the space segment, this does not mean that the ground segment will not be subject to hazards.

### Threats

Counterspace capabilities can provide kinetic physical, non-kinetic physical, cyber, or electromagnetic effects against space systems which can be temporary or permanent in nature.<sup>36</sup> Year-on-year increases in the number of nations developing counter space capabilities and the increase in pace of the capability developments in some nations, including Russia and China, is causing increasing concern. Regular open-source reporting has developed to cover this area, with the Centre for Strategic and International Studies (CSIS) 'Space Threat Assessment'<sup>37</sup> and the Secure World Foundation 'Global Counterspace Capabilities'<sup>38</sup> reports in their fifth year, while the Defense Intelligence Agency (DIA) 'Challenges to Security in Space' Report is in its fourth year.<sup>39</sup> These documents cover types of counterspace capabilities, track national developments and highlight specific national behaviour.

This year's CSIS Report highlights four key events from 2021: the July 2021 Chinese hypersonic glide vehicle test; the launch and behaviour of a new Chinese geo stationary orbit (GEO) satellite, SJ-21; the November 2021 Russian direct-ascent ASAT test in Low Earth Orbit (LEO); and Russia's GPS jamming in Ukraine.<sup>40</sup> The DIA Report covers the expansion of Chinese and Russian space and counterspace weapons development, combined with the general rise of other foreign space capabilities. These factors are driving many nations to formalize their space policies, to better position themselves to secure the space domain and facilitate their own space services.

Appropriate and proportionate responses to threats to space systems can be delivered from any of the operational domains or may be provided as a multi-national response as such threats are likely to affect more than one nation. Policy considerations are likely to inform any development of space control capabilities.

## **Hazards**

### **Space Weather**

Space weather is the term used to describe a range of phenomena originating from the Sun, including magnetic fields, radiation, particles, and matter, that can impact on the technology used on Earth and on satellites in orbit. Space weather occurs continuously, much like terrestrial weather, and generally has no tangible disruptive effects. However, in its more severe form, space weather can cause significant disruption to GNSS and radio communications, as well as satellites, and the result of this disruption could impact CNI. As a result, space weather has been included in the National Risk Register since 2011 with the Department for Business Energy and Industrial Strategy being the Lead Government Department for managing this risk. The Met Office Space Weather Operations Centre is one of a small number of global forecasting centres who produce space weather services. There is already a linkage to the UK SpOC which generates military space weather predictions. A UK Severe Space Weather Preparedness Strategy was published last year.<sup>41</sup> As the NSpOC matures, the relationship between the Operations Centres and the forecasting and warning activity may well change.

### **Space Debris**

The increasing numbers of satellites being launched is particularly significant. In 2021, it was 1,702, more than the total number of operational satellites in orbit just six years before. Over the intervening period the increase has been significant, including a 20% rise from 2016-2019, and a 30% rise from 2020-2021. Potential future numbers are staggering, with current plans lodged with the Federal Communications Commission (FCC), the body responsible for licencing spectrum in the US, for more than 94,000 satellites on orbit.<sup>42</sup> The debris population has been growing as a result of launches since Sputnik in 1957, as each launch adds to the debris with upper stages, rocket bodies and other items remaining on orbit in addition to the satellite. Added to this there are a number of large legacy rocket bodies from earlier launches which cause specific concerns. Today, nearly half of all catalogued debris are fragments from three major events: China's ASAT test in 2007, an accidental collision between a US communications satellite and a defunct Russian satellite in 2009, and the Russian ASAT test in 2021.<sup>43</sup>

There is no agreed model for calculating the size of the debris problem, however the problem is enormous and growing. One reliable source indicates that as of January 2022, more than 25,000 objects of at least ten centimeters in size were tracked and catalogued in Earth's orbit including active satellites.<sup>44</sup> <sup>45</sup> In addition to this there is a significant amount of currently non-trackable debris, which are objects less than ten centimeters in size. Estimates on this population size range from 600,000 to 900,000 pieces in Low Earth Orbit (LEO).<sup>46</sup> The average impact speed of orbital debris with another space object will be approximately six miles per second (10 km/s)<sup>47</sup> which creates significant potential energy when collisions occur. There are concerns that the increasing debris population could cause a scenario called the Kessler syndrome or Kessler effect, named after the NASA scientist who first proposed the concept in 1978. This is a situation where the density of objects in the LEO grows to an extent that collisions between two objects could cause a cascading effect, generating more space debris,

which, in turn, increases the likelihood of further collisions.<sup>48</sup> Space is not universally and uniformly congested, therefore the collision risk is also non-uniform, with the most significant debris populations in LEO.

### **Liability and Licencing Responsibility**

Liability for space activities is complicated and is covered by two of the 'five United Nations treaties on outer space'<sup>49</sup> which form the bedrock of current space law. The Outer Space Treaty (OST) sets the framework for liability and provides that 'States are responsible for authorising and supervising private activities and bear international liability for any damage or loss arising from them'.<sup>50</sup> The Liability Convention places liability for harm on Earth caused by an object in space or formerly in space, on the launching state.<sup>51</sup> This convention has yet to be fully tested in a court of law as the only invocation of the treaty led to an out-of-court settlement.<sup>52</sup> The UK is a signatory to four of the treaties: the OST, Rescue Agreement, Liability and Registration Conventions, National responsibility is instantiated in UK law through the 1986 Outer Space Act (OSA) and the 2018 Space Industry Act (SIA). The Civil Aviation Authority (CAA) took on the Space Regulator role last year from the UKSA.<sup>53</sup> The UK has developed a progressive and forward leaning regulatory regime, through legislation and associated instruments, to encourage the growth of commercial space activities. Current UK licencing under the OSA or SIA requires applicants to hold insurance for their activities, and indemnify Government, however all operator licences contain a limit of operator liability.<sup>54</sup> As a signatory to the Registration Convention the UK maintains a list of Space Objects.<sup>55</sup>

The number of UK Objects has been increasing year-on-year with a significant increase since February 2019 when OneWeb launched its first satellites, and with 413 satellites on orbit OneWeb now owns represents 83% of UK Objects. Understanding space domain activity and the potential link to UK liability could become important elements of UK interest as UK Objects and debris populations increase and UK launch operations start later this year.

### **Incompetence**

The significant legacy costs associated with satellite build and launch meant that the number of satellite operators was low, and they were highly skilled. However, as the costs of satellite manufacture and launch reduce, the number of launch operators and licencing nations increase, the potential for 'flag of convenience'<sup>56</sup> or jurisdiction shopping for licencing is also likely to increase. This could lead to poor assessment of mission risk and unskilled satellite operations, which could lead to safety issues and even collisions.

### **Developing a Coherent Approach to Assessing Threats and Hazards**

A collision in space, whether caused by nefarious or dangerous activity or by resident debris will likely have significant and enduring impacts which are felt more broadly than by those involved in the incident. Similarly, impact on satellite systems from space weather or liability from UK object activity could all impact on UK interests, UK CNI and other aspects of our defence and security.

Current UK threat assessment processes are well understood and mature. However, the range of threats and hazards in the space domain and the spectrum of interested parties across Government will likely drive discussion about a coherent approach to assessing risks and plans for the NSpOC. Given the broad ranging impacts of an incident in space or involving a UK Object, and close linkages to our CNI, dialogue with the National Security Secretariat focusses upon linkages to Central Government arrangements for crisis response.<sup>57</sup>

### Summary

UK Space developments have led, over recent years, to a developing cross-Government structure, additional funding for the Defence Space Programme through the IR and publication of National and Defence Space Strategies which identify activity to meet the National space ambition. The ability to Protect and Defend UK interests is key to delivery of this ambition and central to the UK Space Command Mission. A comprehensive SDA capability is critical to enabling this, as it will enable understanding of the pattern of life within the Space Domain. A Protect and Defend approach has been outlined within the Defence Space Strategy and the Civil and Military approach to developing a NSpOC will be key in bringing all these aspects together. A number of factors will need to be considered as part of this activity, including: understanding reliance, building resilience, developing domain awareness, understanding the span of required missions and the need to develop a comprehensive and joined up approach to assessing and dealing with threats and hazards. This civil-military approach is unique and while there will be challenges to developing a coherent approach across stakeholders, the likely outcomes are expected to deliver significant benefits to the UK.

### Notes

<sup>1</sup> By 2030, the Government's ambition is for the UK to have the ability to monitor, protect and defend our interests in and through space, using a mixture of sovereign capabilities and burden-sharing partnerships with our allies.

The Integrated Review 2021 - GOV.UK ([www.gov.uk](http://www.gov.uk)).

<sup>2</sup> Since 2016 11 new space agencies have formed in the following countries: Australia, Costa Rica, El Salvador, Azerbaijan, Greece, Luxemburg, New Zealand, Uzbekistan, Portugal and Turkey

<sup>3</sup> Global Navigation Satellite System.

<sup>4</sup> The economic impact on the UK of a disruption to GNSS: full report - The British Library ([bl.uk](http://bl.uk)) accessed 2 Feb 22.

<sup>5</sup> The New Satellite Arms Race Threatening to Explode in Space | **WIRED** accessed 17 Feb 22.

<sup>6</sup> Australia, Canada, UK, and US, New Zealand, France and Germany.

<sup>7</sup> Building the New Space Coalition - **Air Force Magazine**.

<sup>8</sup> Combined Space Operations Vision 2031 - GOV.UK ([www.gov.uk](http://www.gov.uk)).

<sup>9</sup> SpaceX has helped to reduce the cost of launch from well over \$100 million per rocket to around \$47 million through the development of reusable rocket stages. Costs to satellite operators are now as low as \$1,400 per kg, having fallen from more than \$10,000 per kg before 2000 – Ofcom Space strategy.

<sup>10</sup> Space Foundation Releases The Space Report 2022 Q1 with New Findings on U.S. Workforce,

Insurance Costs and Launch Vehicle Debuts - Space Foundation.

<sup>11</sup> <https://www.cnbc.com/2020/08/10/spacex-starlink-satellite-production-now-120-per-month.html>.

<sup>12</sup> Revolutionising satellite production for a more connected human race | Airbus.

<sup>13</sup> <https://spacenews.com/thales-alenia-selected-to-build-telesats-broadband-constellation/>.

<sup>14</sup> Rocket men: why tech's biggest billionaires want their place in space | Space | The Guardian.

<sup>15</sup> How is venture capital affecting the space sector? ([filling-space.com](https://filling-space.com)).

<sup>16</sup> Investing in Space Exploration | Morgan Stanley.

<sup>17</sup> <https://analytics.dkv.global/spacetech/SpaceTech-Industry-2021-Report.pdf>.

<sup>18</sup> Leading the new space age: government backs ambitious plans for the UK in space - GOV.UK ([www.gov.uk](https://www.gov.uk)) accessed 18 May 22.

<sup>19</sup> Additional £1.4Bn/10 years.

<sup>20</sup> Size and Health of the UK Space Industry 2021 - GOV.UK ([www.gov.uk](https://www.gov.uk)).

<sup>21</sup> The Integrated Review 2021 - GOV.UK ([www.gov.uk](https://www.gov.uk)).

<sup>22</sup> *ibid*.

<sup>23</sup> UK space and RAF to establish Commercial Integration Cell for greater military and commercial space collaboration.

<sup>24</sup> The Chief of the Air Staff's speech at the Global Air Chiefs' Conference 2021 - GOV.UK ([www.gov.uk](https://www.gov.uk)) accessed 18 May 22.

<sup>25</sup> UK Defence Space Strategy 2022.

<sup>26</sup> The Integrated Review 2021 - GOV.UK ([www.gov.uk](https://www.gov.uk)).

<sup>27</sup> [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/676675/satellite-derived-time-and-position-blackett-review.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/676675/satellite-derived-time-and-position-blackett-review.pdf).

<sup>28</sup> Microsoft Word - TAB B - Resilience Taxonomy White Paper v9.5 (16 Sep 2015) - DASD edits - No Title Page.docx ([fas.org](https://fas.org)) accessed Feb 22.

<sup>29</sup> US Federally Funded Research and Development Centre which supports the DoD, IC and NASA on space.

<sup>30</sup> Microsoft Word - Resilience\_WhitePaper\_v12.docx ([aerospace.org](https://aerospace.org)) accessed 15 May 22.

<sup>31</sup> There is a lack of universally agreed definitions however common terms include: Space Surveillance and Tracking (SST), typically a civil term, Space Situational Awareness (SSA) typically a military term and more recently Space Domain Awareness (SDA), first used in US military circles and now more broadly by CSpO nations. The latter term aiming to capture the broader set of circumstances relating to intent of actions.

<sup>32</sup> US wants giant radar in UK to track space objects - BBC News.

<sup>33</sup> BMD radars will normally have latest SDA capability due to similarity of target.

Update: UK approved to buy ballistic missile defence radar ([janes.com](https://janes.com)) accessed 15 May 22.

<sup>34</sup> Defence Space Strategy: Operationalising the Space Domain - GOV.UK ([www.gov.uk](https://www.gov.uk)).

<sup>35</sup> Monitor Your Satellites - Case study - GOV.UK ([www.gov.uk](https://www.gov.uk)) accessed 15 May 22.

<sup>36</sup> 220404\_Harrison\_SpaceThreatAssessment2022.pdf ([csis-website-prod.s3.amazonaws.com](https://csis-website-prod.s3.amazonaws.com)).

<sup>37</sup> *ibid*.

<sup>38</sup> Global Counterspace Capabilities Report | Secure World ([swfound.org](https://swfound.org)).



<sup>39</sup>Challenges\_Security\_Space\_2022.pdf (dia.mil).

<sup>40</sup>220404\_Harrison\_SpaceThreatAssessment2022.pdf (csis-website-prod.s3.amazonaws.com).

<sup>41</sup>UK Severe Space Weather Preparedness Strategy (publishing.service.gov.uk).

<sup>42</sup>The Meteoric Rise in Satellite Numbers - Union of Concerned Scientists (allthingsnuclear.org).

<sup>43</sup>McKnight, D., Matney, M., Walbert, K., Behrend, S. Casey, P., and Speaks, S.; 25 September 2017; 'Preliminary Analysis of Two Years of the Massive Collision Monitoring Activity'; *International Astronautical Congress*.

<sup>44</sup>Union of Concerned Scientists (UCS); 1 January 2022; 'Satellite Database'; <https://www.ucsusa.org/nuclear-weapons/space-weapons/satellite-database>. Accessed 19 March 2022.

<sup>45</sup>McKnight, D., Macdonald, J., Arora, R., Pelton, J., Jenniges, J., and Martinez, P.; S2468-8967(20)30006-9; May 2019; 'The Global Risk Continuum (GRC)'; *The Journal of Space Safety Engineering, JSSE 104*, International Association for the Advancement of Space Safety (IAASS) Space Safety Conference, Los Angeles, CA, May 2019.

<sup>46</sup><https://www.ucsusa.org/nuclear-weapons/space-weapons/satellite-database>.

<sup>47</sup>NASA - Frequently Asked Questions: Orbital Debris accessed 15 May 22.

<sup>48</sup>Kessler, Donald J.; Cour-Palais, Burton G. (1978). 'Collision Frequency of Artificial Satellites: The Creation of a Debris Belt' pdf. *Journal of Geophysical Research*. 83 (A6): 2637–2646.

<sup>49</sup>The 'Outer Space Treaty' Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, and the 'Liability Convention' Convention on International Liability for Damage Caused by Space Objects accessed 6 Apr 22.

<sup>50</sup>Licensing private outer space activities | Globe Law and Business specialises in producing practical, topical titles for international legal and business professionals.

<sup>51</sup>Kehrer, Trevor (2019) 'Closing the Liability Loophole: The Liability Convention and the Future of Conflict in Space,' *Chicago Journal of International Law*: Vol. 20: No. 1, Article 5. Available at: <https://chicagounbound.uchicago.edu/cjil/vol20/iss1/5> accessed 19 Mar 22.

<sup>52</sup>The incident in 1978 when Cosmos 954, a Soviet satellite, inadvertently fell to Earth in uninhabited Canadian territory.

<sup>53</sup>CAA takes on space regulator role (electronicsweekly.com) accessed 1 May 22.

<sup>54</sup>Spaceflight legislation and guidance - GOV.UK (www.gov.uk) accessed 1 May 22.

<sup>55</sup>UK registers of space objects | Civil Aviation Authority (caa.co.uk) accessed 1 May 22.

<sup>56</sup>**Flag of Convenience (FOC)** is a business practice whereby a ship's owners register a merchant ship in a ship register of a country other than that of the ship's owners, and the ship flies the civil ensign of that country, called the flag state.<sup>[2]</sup> The term is often used pejoratively, and although common, the practice is sometimes regarded as contentious. Each merchant ship is required by international law to be registered in a registry created by a country,<sup>[3]</sup> and a ship is subject to the laws of that country, which are used also if the ship is involved in a case under admiralty law. A ship's owners may elect to register a ship in a foreign country which enables it to avoid the regulations of the owners' country which may, for example, have stricter safety standards. They may also select a jurisdiction to reduce operating costs, avoiding

higher taxes in the owners' country and bypassing laws that protect the wages and working conditions of mariners.<sup>[4]</sup> The term 'flag of convenience' has been used since the 1950s.

<sup>57</sup> The Central Government's concept of operations - GOV.UK ([www.gov.uk](http://www.gov.uk)) accessed 6 Apr 22.









Her Majesty The Queen makes a speech during the Diamond Jubilee Muster Parade, 19 May 2012, Windsor Castle. (© Crown Copyright)




From Buckingham Palace Queen Victoria Memorial on 17th June 2017, featuring the Trooping of the Colour Parade and the Queen's Birthday Flypast by the Royal Air Force. (© Crown Copyright)



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