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Cover pictures

Buccaneers of Nos 12 and 208 Squadrons RAF

Front cover: No 12 Squadron
Back cover: No 208 Squadron

The Buccaneer was designed to a naval requirement for a low-level, high-speed carrier strike aircraft for the Fleet Air Arm (FAA). The first prototype made its maiden flight in 1958, and the aircraft formed part of the FAA front-line between 1962 and 1978.

In 1968 the Buccaneer S2 was also selected by the RAF to serve in the low-level strike/attack role. A total of 111 new and ex-FAA Buccaneer S2s were received by the RAF. Nos 12, XV, 16 and 208 Squadrons and No 237 Operational Conversion Unit flew the Buccaneer in the UK and Germany during the 1970s; a fifth squadron (No 216) formed to operate former Royal Navy Buccaneers in 1979, only to disband in 1980.

RAF Buccaneer units based in Germany transitioned to the Tornado GR1 in 1983-84. However, Nos 12 and 208 Squadrons continued to fly the Buccaneer in the anti-shipping role for another decade. During the Gulf War (Operation Granby), a Buccaneer detachment operated from Muharraq, Bahrain, using their Pave Spike laser designators to mark targets for Tornados armed with Paveway LGBs.

Operation Granby was to prove the swansong of the Buccaneer. No 12 Squadron re-equipped with Tornado GR1Bs in 1993 and in the following year No 208 Squadron disbanded, bringing to an end the twenty-five year career of the Buccaneer in the RAF service.

Main cover picture: AHB(RAF)

CONTRIBUTIONS TO THE ROYAL AIR FORCE AIR POWER REVIEW

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

Contribution from both Service and civilian authors are sought which will contribute to existing knowledge and understanding of the subject. Any topic will be considered by the Air Power Review Management Board and a payment of £200 will be made for each article published.

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

Submissions can be sent in any Microsoft Word IBM or AppleMac format, on floppy disk, Zip or CD and should be accompanied by numbered page copy plus any photographs and illustrations. Digital pictures should be saved as TIFFS or JPEGS @ 300dpi.

Final design format for article presentation on the printed page will be at the discretion of the editor.

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FOREWORD

In his foreword to the inaugural issue of the Royal Air Force Air Power Review, the then CAS, Air Chief Marshal Sir Richard Johns, stated that the articles were intended primarily to provoke debate and to feed our thinking about the future, and the part the Royal Air Force will play as an independent service and within the framework of joint operations; Mr Eric Thale's article on Dresden in the Spring 2002 issue has certainly done the former. In his article Mr Thale quotes David Irving's figure of 135,000 people killed in the attack on Dresden, however Irving later rescinded this figure stating that civilian casualties were more in the 50-60,000 bracket. More recent research, including examination of the records of the city of Dresden, puts the figure at around 25,000, as my predecessor stated in his article in the Spring 2001 issue. More recently, if one looks at the Kosovo conflict initial statements by such people as Mary Robinson, the UN High Commissioner for Human Rights, were to the effect that "Thousands of people were being killed by NATO air action". Subsequent research by Human Rights Watch showed that the casualties were actually around 560. The lesson, then, is that we should not take supposedly authoritative figures at face value, particularly when collateral damage and casualty figures are such a sensitive issue as they are today.

This issue starts with an article by Group Captain Peter Gray on the asymmetric edge that air power can apply in conflicts and in which he makes the point that to be successful all warfare should be asymmetric. There is no point taking an enemy head-on when one can exploit differences of equipment or tactics, and this is the essential nature of manoeuvrist warfare.

The second article, by Dr David Hall, traces the development of the air support system from 1914 to 1945, which culminated in the formation, and employment of the 2nd Tactical Air Force. The article, unsurprisingly, has a Canadian flavour. It is a very useful exposé of the arguments concerning the command and control and ownership of aircraft used in the direct support of the land battle, and of the relevance of the concept of battlefield air interdiction.

Lieutenant Colonel Paul Boag's article on Operation ROLLING THUNDER, the strategic bombing of Vietnam from 1965-1968, also examines command and control issues but from a more strategic perspective by examining the views of senior air force leaders on the conduct of that campaign. His article is particularly pertinent in the questions it poses concerning increasing political involvement in what, up until then had been seen as tactical decisions.

The fourth article is the second part of a 2-part work by John Sweetman examining the contribution of Barnes Wallis to World War II technology. The article examines in detail the development of a smaller version of the bouncing bomb. The 'Highball' weapon was to be delivered by Mosquito against the Tirpitz. However, Highball never got beyond the trial stage, in one instance bouncing up and taking the tail off the delivering aeroplane with fatal results. The article provides an object lesson in the difficulties of conducting trials when under the pressures of combat, and one has only to think of the trials that took place on the GR1 Tornado in the months leading up to the Gulf War air campaign to see that lessons such as the article identifies are equally applicable today.

Dr Richard Lock-Pullan is a member of the Defence Studies Department at the Joint Services Command and Staff College. The trigger for his article was the desire to understand more about the concept of the use of air power for strategic effect as it is expressed in AP3000, and the current Staff College teaching on centre of gravity analysis. The article is deliberately provocative and will hopefully trigger both debate and deeper thought on the fundamental differences between strategic bombing and the use of air power, in its broadest sense, for strategic effect.

Dr Alfred Price's article is a detailed examination of the employment of air power at El Alamein. It is interesting to compare his comments on the advantages of huge numerical superiority in the degree of control of the air that was achieved at the start of the battle, with the employment of air power over Kosovo and more recently Afghanistan where similar levels of control of the air were achieved.

The final article is an extract from *The Aeroplane* magazine from 17 December 1919 by its editor Charles Grey Grey. CGG was, as Marshal of the Royal Air Force The Lord Trenchard said after his death, "A supporter of aviation, both military and civil, since its earliest days, and everyone in the Royal Flying Corps and later the Royal Air Force appreciated the great help he gave to the air service by his pungent pen". 'The Trenchard Memorandum', as it has become known, is the model of a pithy and analytical service paper and does much to counter the generally held view of Trenchard as a poor communicator. The closing paragraph of CGG's introduction is particularly prophetic.

D Def S (RAF)

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AIR POWER

The Asymmetric Edge

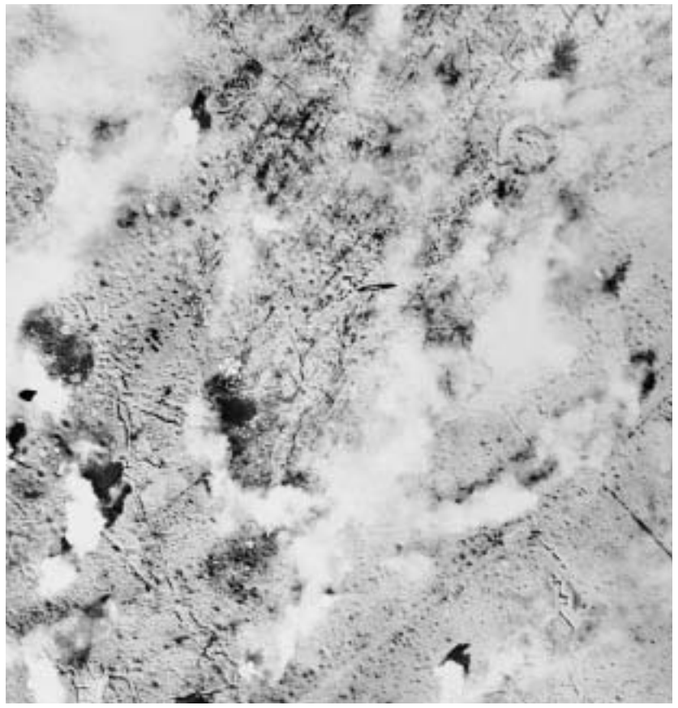
By Gp Capt Peter W Gray RAF

The tragic events of 11 September 2001 brought renewed emphasis to the dangers of asymmetric warfare. The fear of such an attack, for the cognoscenti, had long been a very real contingency.[1] The apparent immunity of the United States, and her allies, was such that few actors – whether they are nation states or lesser groupings – could sensibly consider a force-on-force option. Although the potential for China eventually to rise to peer competitor status has been generally acknowledged, the scope for serious conflict has tended to be downplayed.[2] Beyond scenarios such as a NATO Article V defence of Turkey (possibly following water disputes with Syria), the most likely conceivable conflict therefore tended to boil down to some form of asymmetric attack. This is not in the least surprising as it could easily be argued that this should be the norm. After all, only the bold, or the foolish, would engage in a wasteful exchange of men and materiel for little apparent gain. Images of the carnage of the trenches of the First World War, over-lain by the Blackadder interpretations of mindless strategy, collectively commend an asymmetric or indirect approach.[3]

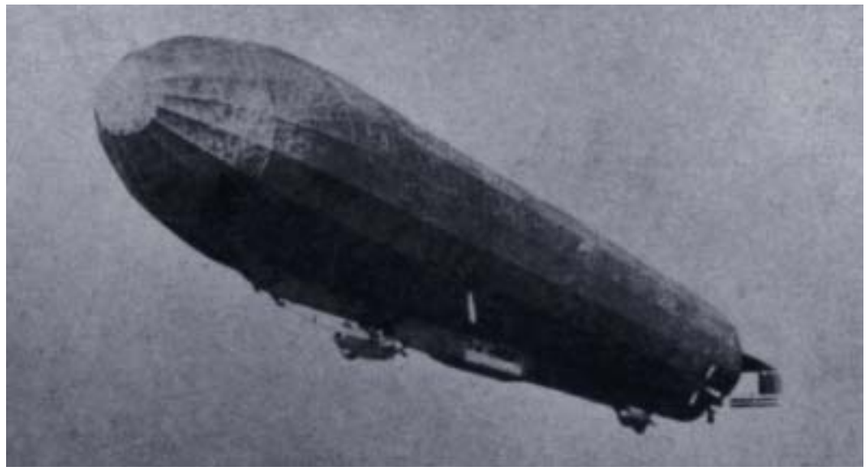
The dictionary definition is simple and straightforward – asymmetric merely betokens a lack of symmetry. The quest for advantage is therefore an integral part of warfare and has been for as long as mankind has resorted to force for the settlement of disputes; indeed according to Professor Sir Michael Howard, it is peace that is the modern invention.[4] Beyond the heavyweight boxers content to slug out their differences, mankind has resorted to numerical superiority to gain advantage over otherwise peer competitors. The alternative approach has been to develop more capable weaponry either to avoid pawn for pawn attrition or gain both qualitative and quantitative advantage. Some of these quests for the edge have failed; others have been part of an arms race of which the Cold War was an ideal example. Some developments have been so successful that the ensuing improvements have been categorised as being revolutions in military affairs.[5] Of all of the step changes, revolutions or transformations that have occurred, the use of the third dimension has invariably had considerable appeal. This paper will review the asymmetric edge that air power has provided to the battlefield and will then analyse future potential.

The first military use of air power occurred during the revolutionary wars where Mauberge was under siege by Dutch and Austrian forces whose disposition was reported in detail by the aeronaut.[6] This success was repeated on 26 June 1794 when the French used a balloon to observe Austrian troop movements at the Battle of Fleurus.[7] The need to know your enemy extends beyond the psychological imperative of understanding his mindset; one must also attempt to ascertain his dispositions, strength and where possible his intentions. Although the early balloonists were constrained to reporting strength and obvious movement, the efforts expended on gaining the aerial perspective provide eloquent testimony to the benefits that could have accrued. It may, however, be overstating the case to say that the balloons actually gave their side an asymmetric edge; but the potential was clearly there.

The First World War saw powered flight and balloons being used extensively for reconnaissance purposes



A reconnaissance photograph taken on 3 June 1917 by No 6 Squadron, Royal Flying Corps, showing part of the artillery bombardment which proceeded the British Army attack at Messines. This photograph was one of 975 taken by the RFC on the Western Front that day.



Imperial German Navy Zeppelin.

From the outset of the War, the shadow of the Zeppelin exerted a real and decided influence over those in London

The advent of powered flight in 1903 gave an irreversible impetus to the exploitation of the third dimension. The First World War saw powered flight and balloons being used extensively for reconnaissance purposes. As early as August 1914, British and French aircraft spotted the German dispositions that led to the Battle of the Marne.[8] The next month saw the first use of aerial photography providing direct evidence of the emerging German trenches in the Aisne Hills. Wireless reduced the time lag in the decision-making cycle or what was eventually to become known as the OODA-loop (Observe, Orientate, Decide and Act). But it rapidly became evident that the Germans were playing the same game with no absolute asymmetric edge for either side. As the trench lines became more established, and the deadly concentration of fire between opponents, so the need for some form of advantage became more crucial. Attempts to use artillery were frequently thwarted by lack of information as to what was on the 'other side of the hill'; this led rapidly to the regular use of the Royal Flying Corps in conjunction with the Gunners. The ability of air power to provide a disproportionate advantage through information superiority inevitably stimulated the need for a counter. Surface-to-air gunnery was only part of the solution and air-to-air combat (the sport of kings) became an integral part of the quest for control of the air. The symbiotic relationship between control of the air and the asymmetric edge became firmly established as early as October 1914 with the first conclusive aerial combat.[9] This form of fighting developed in oncert with, and often at the forefront of, aviation design and technology. As aircraft became more robust, and engines more powerful, the ability to prosecute the enemy directly was finally realised. Small bombs were dropped on the trench positions and on more distant communications targets. Parallel developments within the Royal Naval Air Service ensured that air power was active in support of the Fleet. With the increasing scope to attack the homeland, all of the core capabilities of air power were in place by 1916.[10]

From the outset of the War, the shadow of the Zeppelin exerted a real and decided influence over those in London. As with many things where anticipation is high, the reality does not always live up to the promise. The first airship did not appear over the United Kingdom until early 1915 occasioning little real damage.[11] The RNAS attempted to tackle the problem at source with attacks on the Zeppelin sheds and home defence was enhanced. As even the primitive air defence systems (including ground artillery) had effect, so the raiders took cover under darkness. A very young Lieutenant Harris (later to be better known as 'Bomber' Harris) was just one of those destined to feel the frustrations of night air defence in the days before ground and airborne radar.[12] The switch to night raids had an immediate effect on accuracy with a diminution of the asymmetric edge. The clamour in London for reprisals ensured that the trend towards symmetry was maintained. The reality of the actual damage done has been well covered elsewhere, as have the implications for future conflicts.[13] Suffice it to say at this juncture that the quest for real strategic impact developed a momentum of its own. That this movement was considerably accelerated by the desire for independent air arms – in Britain and America – only tells part of the story. For many airmen, air power in general and the bomber in particular was the epitome of the Holy Grail in the search for the ultimate asymmetric edge.

The popular perception is that RAF inter-war doctrine was dominated by the strategic bomber. This generalisation, like all of its kind, is fraught with danger. There has long been a tendency, especially in America, to link Trenchard with Douhet and Mitchell as prophets of air power. The reality is that Trenchard actually wrote little in the way of air power theory. What he, or more prosaically his staff, did put together had more to do with the survival of the fledgling Royal Air Force in the face of hostility from our sister Services and the Treasury. Nevertheless, central to their theme was that air power was essentially offensive. All thoughts were coloured by the trinity of offensive action, cost effectiveness and avoidance of the carnage of trench warfare. It must also be remembered that British national interests still centred on the Empire.

Thoughts in Whitehall in 1919 would have been largely shared between domestic matters and concern over the Empire – Europe was by no means as central as it was to become in later years. A combination of wishful thinking, economic necessity and opportunism gave rise to a defence policy based on there not being a war in Europe for the foreseeable future – ten years or more. All planning was therefore based on this premise. The primary function of the Army would be maintenance of law and order at home with Imperial policing as the overseas commitment for the next decade.[14] Britain was absolutely determined that its routes to India would not be jeopardised by instability, misrule or foreign intervention (Turkey or Russia). Furthermore, increasing dependence on oil reserves with the wane of the age of steam meant that the middle-east region was, even then, taking on its own strategic importance. But it is evident that the chosen modus operandi was not just a simple acquisition of territory – economic activity and strategic stability did not require such a blunt approach. But stability could not be guaranteed by diplomatic means alone and garrison forces were required in many critical locations. Notwithstanding the evident potential for trouble, Churchill as Secretary of State for War and Air warned that the garrison in Mesopotamia would have to be cut from its existing level (25,000 British and 80,000 Indian troops).[15] His attempts to find novel, and cheap, solutions fell on ground as stony as the desert. Even after the first round of cuts, the garrison was still costing over £18 million per year. In mid-February 1920, Churchill asked Trenchard if he would be prepared 'to take Mesopotamia on'. The deal would involve the reduction of the standing garrison to 4,000 British and 10,000 Indian troops, but with an Air Officer as C-in-C and an extra £5 million on the air estimates. The Air Staff plan envisaged ten squadrons mainly based around Baghdad.

After the inevitable round of bickering, his proposals went before the Cabinet in August 1921 with the suggestion that eight squadrons take over the policing duties in October 1922. They would be supported by 2 British and 2 Indian battalions, 3 companies of armoured cars and various ancillary units. (On the due take-over date there were actually 9 battalions.)

Air Vice-Marshal John Salmond took over as AOC in less than auspicious circumstances. The Turks were threatening the northern province of Mosul and the Kurds were fighting a guerrilla war in Sulaymaniyah. A small-scale bombing attack on Turkish positions achieved striking success that was quickly capitalised on by Iraqi levies.[16] The air control method was very much a joint operation involving considerable co-operation between air and land assets, often with the Royal Air Force ferrying troops, dropping supplies and evacuating the wounded – as well as bombing. By May 1923, Salmond had achieved what Maurice Dean has described as a 'tremendous victory'.[17] For those unfamiliar with the 'finer points' of air control, a part of Salmond's despatch to Trenchard gives the details and is repeated below:

'*No action is ever taken (wrote Salmond) except at the request of the British civilian adviser on the spot, and only after this request has been duly weighed by the (Iraqi) Minister of the Interior and by the British Adviser and by the High Commissioner (in Baghdad). Even after a request has passed this three-fold scrutiny, I have on more than one occasion, as the High Commissioner's chief Military Adviser, opposed it on the military grounds that I did not consider that the offensive action which I had been asked to take would lead to the result desired; and His Excellency has always acceded to such advice on the acknowledged basis that I am more perfectly acquainted with the effects it may be expected to achieve…*

It is a commonplace here that aircraft achieve their results by their effect on morale, and by the material damage they do, and by the interference they cause to the daily routine of life, and not through the infliction of casualties. The casualties inflicted have been most remarkably small. A tribe that is out for trouble is

Germany deployed 20 Junkers-52 transports to Morocco (refuelling in Italy en route). These aircraft provided the airlift necessary to transport Nationalist forces loyal to Franco back to Seville

well aware when the patience of Government has reached breaking point; and negotiations inevitably end in what is in effect an ultimatum in some form or other. Complete surprise is impossible and the real weight of air action lies in the daily interruption of normal life which it can affect, if necessary for an indefinite period, while offering negligible chances of loot or of hitting back….

It (air action) can knock the roofs of huts about and prevent their repair, a considerable inconvenience in wintertime. It can seriously interfere with ploughing or harvesting – a vital matter – or burn up the stores laboriously piled up and garnered for the winter. By attacks on livestock, which is the main form of capital and source of wealth to the less settled tribes, it can impose in effect a considerable fine or seriously interfere with the actual sources of the tribe – and in the end the tribesman finds it is much the best to obey the Government.'

Occasionally the house or fort of a rebel leader like Sheikh Mahmud would be selected as a target of individual attack and this called for a high degree of bombing accuracy. Otherwise it was unnecessary, and indeed undesirable, to inflict serious or extensive damage. The object was really the air blockade of the recalcitrant village by means of intermittent light attacks, which were never delivered without due warning to the villagers so that they could leave their dwellings. After they had surrendered, troops or police would be flown in, with medical staff, to restore order, stop looting, treat the sick and the injured, distribute food and rehabilitate the area generally.' [18]

It can be seen from this description that air power avoided the not inconsiderable casualties that had resulted – on both sides – from force-on-force police actions; it was financially cost effective; and was sufficiently offensive in nature to satisfy honour on both sides. In short, air power provided the Empire with the asymmetric edge. Control of the air was not contested and had no need therefore to be considered a campaign decisive point.

The Luftwaffe gained similar experience in Spain during the Civil War. Early in the conflict, Germany deployed 20 Junkers-52 transports to Morocco (refuelling in Italy en route).[19] These aircraft provided the airlift necessary to transport Nationalist forces loyal to Franco back to Seville. Between the end of July and mid-October 1936, over 20,000 troops and their equipment were moved representing what James Corum has described as one 'the decisive military operations of the Spanish Civil War'.[20] Air power thus played, not only a decisive role in the Civil War, but arguably in European history: it certainly provided the asymmetric edge, albeit not in the manner envisaged by the air power prophets. What the Germans hoped would be a quickly decisive edge became force-on-force when the Soviets intervened on behalf of the Republic. Both sides used air power in support of their armies for the duration of the campaign.

Similarly both sides attempted to use their aircraft in the quest for the Holy Grail – strategic bombing. The weight of bombs dropped occasioned little damage and only temporary erosion in morale. Furthermore, Franco was wily enough to realise that heavy civilian casualties could be counter-productive.[21] The Italian attempt to vindicate Douhet's theories by bombing Barcelona failed. The irony of this policy was that ' lesser' targets – if one accepts this de facto dogmatic, orthodox view of their importance – such as munitions factories and central communications' nodes were attacked with some success.

Over the course of the campaign the Luftwaffe shot down 327 Republican aircraft and flak accounted for a further 59

A Polikarpov I-16, as operated by Republican forces.

Over the course of the campaign the Luftwaffe shot down 327 Republican aircraft and flak accounted for a further 59.[22] They only lost 72 of their own aircraft. in the meantime, the relative control of the air allowed the concentrated use of air power in the 1938 campaign. This saw the Republican front lines completely shattered and the Nationalists able to exploit open country. The scope for manoeuvre warfare, again with control of the air, allowed the nationalists to split their enemy forces from the Atlantic to the Mediterranean. When the inevitable counter-attack in force came in July 1938, the inherent flexibility of air power allowed the Luftwaffe to regroup and contest the local air superiority that the Russians had gained over their own troops. With enemy fighters thus distracted, the Luftwaffe was able to conduct an intensive interdiction campaign against lines of communication. The counter-attack failed and the Republicans were forced back, eventually surrendering Madrid in March 1939.[23] From the initial airlift through to final push on the capital, air power provided the cutting edge both by providing control of the air per se and by disrupting the symmetry of matched forces supported by peer benefactors. Both sides took lessons forward.

Luftwaffe HE-111s over Poland.

German aggression against Czechoslovakia and then Poland amply demonstrated the warfighting potential of their army with the Luftwaffe providing control of the air

German aggression against Czechoslovakia and then Poland amply demonstrated the warfighting potential of their army with the Luftwaffe providing control of the air. France suffered a similar fate under the cosh of Blitzkreig. The ability to contest control of the air had a significant impact on the beaches and moles of Dunkirk as the British desperately attempted to withdraw their shattered army. Air Vice-Marshal Keith Park's fighters from 11 Group provided 'Big Wings' (notwithstanding the later controversy) at dawn and dusk to provide some degree of air parity for the crucial periods of embarkation. Thousands of lives were saved and the kernel of the Army was retained because the lack of control of the air prevented the Luftwaffe from acquiring the asymmetric edge. The Battle of Britain consolidated the overall position preventing full-scale invasion.

A blow-by-blow account of the Second World War – and the role of air power therein – is clearly outside the scope of this paper, due in part to the reality that major offensives such as the war between Russia and Germany were fought as a classic force-on-force war of attrition. That said, control of the air was of vital importance throughout – not least to prevent the other side gaining advantage.

Much ink has been spilled on the efficacy, or otherwise, of the strategic bombing campaign - or more correctly the bombing offensive against a wide range of targets in Germany, not all of which had real strategic value. To some extent, the early bomber raids amounted to something akin to force-on-force attacks – albeit by proxy. Cities were attacked because of their industrial potential, or occasionally out of spite (such as the so-called Baedeker offensive against places of cultural worth in England). Control of the air was largely established by day over the respective homelands forcing the bombers to operate by night. There was nevertheless no lack of determination to take the war to Germany.

Writing in July 1940, Churchill was unequivocal in his determination that the only way to get through to the enemy was through 'an absolutely devastating, exterminating attack by heavy bombers from this country upon the Nazi homeland'. The move to area bombing was consolidated by the Air Ministry in a directive to Sir Richard Peirse (Harris's predecessor as C-in-C) dated 9 July 1941. This missive accepted the difficulties of finding and hitting precise targets in Germany by night; it proposed that, in reality, concentration on large towns and cities would mean that the military installations and economic facilities contained therein would be suitably attacked. The move to 'area' targets also allowed morale of civilian workers, and of the population as a whole, to be attacked.

As the combined weight of the USAAF Eighth Air Force and Bomber Command were brought to bear, the gruelling contest for control of the air was won – not over the beaches of Normandy as Leigh-Mallory expected, but over the heartland of the Reich

How much this could be termed an asymmetric edge is, at first sight, open to conjecture. The reality, however, was that the increasingly effective bomber offensive left the Hitler and the German High Command with no option but to defend the homeland. As anti-aircraft artillery units were reinforced, front-lines in Russia, and subsequently in France, were depleted.[24] Likewise, fighter units were concentrated in Germany and were increasingly required to specialise in night air defence. As the combined weight of the USAAF Eighth Air Force and Bomber Command was brought to bear, the gruelling contest for control of the air was won – not over the beaches of Normandy as Leigh-Mallory expected, but over the heartland of the Reich. The asymmetric edge could then be applied in support of Overlord and the ensuing breakout.

Notwithstanding the often vitriolic debates over bombing priorities, some unity of purpose was imposed on the scene in the lead-up to the Normandy landings with the attacks on the German transportation system. Once the land offensive was established, however, differences of opinion again surfaced over priorities. Tedder (as Deputy to Eisenhower) advocated that priority continue to be given to transportation and communications targets. Spaatz (Commander of the USAAF Eighth Air Force) favoured attacks on oil, while 'Bomber' Harris continued to insist on the maintenance of area bombing.

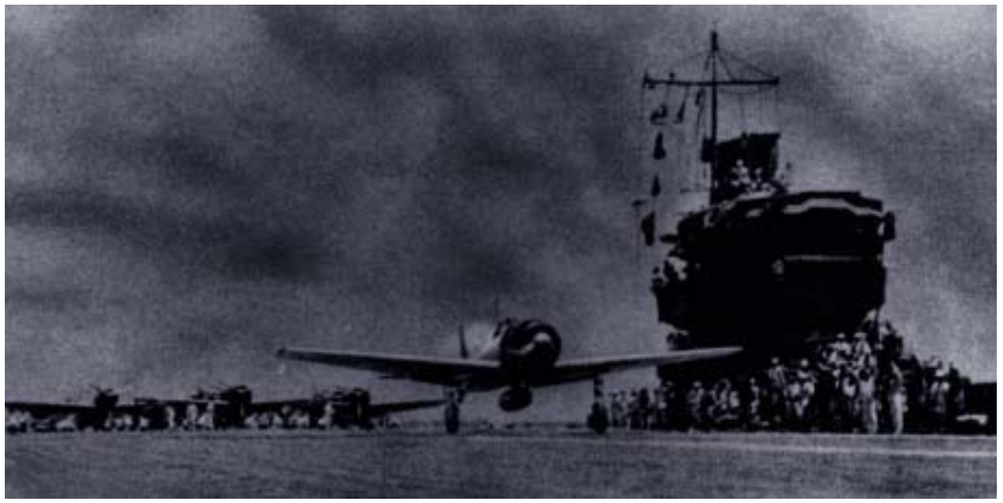
Throughout this debate, Harris fervently believed that the carnage that he had witnessed in the Great War could be avoided through the application of undiluted air power – with no diversions to panacea targets. The practitioners of air power had little doubt as to the potency of its potential – the debate was over where the most asymmetric leverage could be applied.

The devastation wrought in the fire raids on Hamburg and the destruction of Dresden provided examples in Germany of what air power could achieve

Dresden after the Allied air raids.

Asymmetry is at its most potent when the means can be applied with little risk of concomitant retribution. The near total air supremacy exercised by the allies over Northern France allowed air power to roam and attack at will with severe consequences for the ground forces who were forced to skulk in ditches by day. The devastation wrought in the fire raids on Hamburg and the destruction of Dresden provided examples in Germany of what air power could achieve. In retaliation, Hitler never finally relinquished the concept of war-winning super weapons that would provide the ultimate asymmetric edge.[25] The V-weapons achieved some measure of terror, and once launched, the V2 was invulnerable. But these weapons could be neither produced nor launched in sufficient quantity to have a real strategic effect. At the end of the day, conventional explosives and incendiaries were dropped in sufficient quantity by the allies for them to have a quality all of their own.

Japan's surprise attack on Pearl Harbor provided another example of asymmetric application of force



Japanese aircraft taking off for Pearl Harbor.

Japan's surprise attack on Pearl Harbor provided another example of asymmetric application of force. The fact that the two sides were not at war provided the necessary edge. The ruthlessness of the attack inevitably provoked a desire for retribution. The early Doolittle raids on Tokyo warned of more to come. Japanese control of the air was insufficient to deter the USAAF. Attacks on urban areas using fire bombs were therefore authorised in March 1945 (after the furore over Dresden had died down). By May 1945, incendiaries comprised 75% on the bomb load.[26] LeMay considered his strategic bombing force capable of coercing the Japanese into surrender without physical invasion. Some 58 cities were destroyed by fire-bombing between May and August 1945. In the face of such destruction – against which there was little scope for retaliation and virtually no defence – Japanese economic strength and morale crumbled. The nuclear attacks on Hiroshima and Nagasaki helped to accelerate the decision to surrender. In essence, air power had come of age and its proselytisers, and especially those arguing for an independent force, had seen the realisation of the ultimate asymmetric edge.

Notwithstanding the domestic and international impact of the advent of the nuclear age, the reality was that the weapons themselves were small and available only in very limited quantities. The devastation at the two ground zeroes was no greater than that aready achieved in many other Japanese cities. But the potential was huge, and the young superpowers began to race for the ultimate edge.

The implied threat of nuclear attack, allied with credible means of delivery, is at the heart of deterrence theory

In the immediate aftermath of the Second World War, it was far from obvious that Britain would go down the nuclear weapons route. The recently elected Labour government formed a committee of senior ministers (known as Gen 75) to discuss atomic energy policy.[27] This body first met on 10 August 1945 – the day after the second bomb was dropped on Japan. Gen 75 was soon supplemented by the Advisory Committee on Atomic Energy which focused attention on the need to iterate major policy on weaponisation. Prime Minister Atlee recognised that warfare had changed fundamentally and expressed the importance of having the ability to retaliate: 'The answer to an atomic bomb on London is an atomic bomb on another great city'. Deterrence theory was thus expounded.[28] Attlee derided the feasibility of keeping the technology secret and this view was independently endorsed by the Chiefs of Staff. Means of retaliation had to include the weapons and their delivery systems – manned bombers for at least the next ten years. It is interesting though not surprising, to reflect that in the United Kingdom at least, the atomic bomb was not sought as the 'ultimate edge' but as the deterrent thereto. That said, it was undoubtedly significant that the first Controller of Production of Atomic Energy (within the Ministry of Supply) was Marshal of the RAF Lord Portal of Hungerford – former CAS and C-in-C Bomber Command.

In the United States, The McMahon Bill was passed in August 1946 effectively prohibiting the transfer of nuclear secrets to Britain (notwithstanding the earlier sharing of research). Portal pointed out the stark reality that Britain would have to 'think big' if she was not to be left far behind America, and probably Russia. Notwithstanding the dire financial circumstances, Cabinet approval was eventually given for the secret stockpiling of some 1,000 such weapons and the development of suitable bombers.[29] Work then commenced at Fort Halstead in Kent on the development of *Blue Danube,* a weapon similar to the plutonium device used at Nagasaki.

Optimism that Britain would be the second nuclear power was shattered on 29 August 1949 when the USSR exploded its first atomic bomb. Britain's first test – Operation Hurricane - followed on 3 October 1952.[30] Parallel work continued apace in the development of the Canberra, Victor, Valiant and Vulcan aircraft. Deterrence theory was similarly developed and expounded; defences were bolstered against massive attack; and huge stockpiles were manufactured along with ever more sophisticated means of delivery. What started as an asymmetric edge rapidly moved towards massive and dreadful symmetry.

The implied threat of nuclear attack, allied with credible means of delivery, is at the heart of deterrence theory. Perceptions, security and credibility were crucial in the early days of development when the scope to call bluffs was at its greatest. The Soviet Union imposed a surface blockade on Berlin on 24 June 1948. The United States almost immediately deployed B-29 bombers to the UK. As Professor Mason points out, it was widely believed that these aircraft were nuclear capable despite the reality that few weapons could have been scraped together and even fewer technicians to prepare them.[31] The Russians either did not know this or want to risk the consequences because they refrained from interfering with the ongoing airlift. Air power, but not in the sense normally advocated, provided the strategic level asymmetric edge. 'Trash-haulers' won the day: but nuclear weapons provided the backdrop.

International conflict broke out in Korea in 1950...Allied air forces flew over a million missions dropping nearly half a million tons of ordnance

The transformational nature of nuclear weapons has, of course, been reflected in the extreme reluctance to employ them – even in the early days of development when their attributes were still aligned to conventional means of warfare. International conflict broke out in Korea in 1950; conventional strategic bombardment was impractical because of paucity of targets and nuclear usage was politically unacceptable. Nevertheless air power was used in quantity and with considerable effect. Allied air forces flew over a million missions dropping nearly half a million tons of ordnance.[32] Opportunities for asymmetry were relatively few – not least because of the political constraints on attacking airfields in China. Control of the air was therefore an ongoing process and air power was only decisive on a small number of occasions.

A B-29A unloading its bombs over North Korea.

Advocates, and so-called apologists, of air power have had considerable scope to discuss the utility of air power over Vietnam. The generally accepted consensus is that American air power – equipment and doctrine - (deliberately phrased to avoid the tribalism prevalent at the time between the Services) was more attuned to nuclear weapons delivery than to conventional attacks against a very unconventional army. The political constraints were evident throughout the process from selection of individual targets to the overriding need to avoid escalation. This latter factor precluded strategic targeting or overt action outside home borders. Air power effectiveness was limited in the early part of the conflict due to lack of suitable target arrays. The Vietcong operated on the basis of insurgency tactics with limited scope for interdiction of materiel. After the evident failure of Rolling Thunder, Linebacker (I&II) was more successful. North Vietnamese tactics had evolved to a more conventional military approach thereby providing more lucrative targets; similarly political restrictions were increasingly relaxed.[33] Some air power advocates still claim that bombing could have provided the war-winning edge to the Vietnam conflict. The reality is that the whole mess was so lacking in symmetry that only a combination of factors could ever produce a solution.[34]

The years between Vietnam and the Gulf War did little to assuage the bitterness felt by many over the conflict in South-east Asia. The Cold War ensured that defence budgets, doctrine and concepts would remain at best conservative. Some moves were made to foster the manoeuvrist approach with highlights emanating from the British Army in Germany and the US Marine Corps.[35] Matters were inevitably exacerbated when the Berlin Wall had collapsed and the ensuing euphoria gave way to strident demands for peace dividends. Competition for ever-scarcer funding left Ministries of Defence with the prospects of

The ensuing conflict through Desert Shield into Desert Storm was manna from heaven for air power advocates

internecine warfare that had, for example, dominated relations between Trenchard and Beattie in the aftermath of the Great War. Or, alternatively, they were forced to take on a joint or purple view. This was cynically portrayed by one commentator as the colour that most people go when nooses are tightened; he added that when the pressure is relieved a more normal complexion is quickly restored. Saddam Hussein relieved the pressure, at least temporarily, with his invasion and occupation of Kuwait. Rapid coalition response was effected by the almost instant deployment of air power to a seriously worried Saudi Arabia. This provided an asymmetric response to a potentially disastrous situation.

The ensuing conflict through Desert Shield into Desert Storm was manna from heaven for air power advocates. For one expert commentator, 'The Gulf War marked the apotheosis of twentieth century air power'. This elevation of a form of warfare to divine status has been subsequently cited and approved by others.[36] But these advocates were not alone in their praise: President George Bush stated that 'Gulf Lesson One is the value of air power'; and Secretary of Defence Dick Cheney confirmed that 'the air campaign was decisive'.[37] The synergy in names and appointments is obvious to students of air power a decade later.

From the Yugoslav perspective, air power was primarily used for local reinforcement with helicopters in frequent use

A Yugoslav Mi-8 HIP.

Air power cannot be said to have won the war on its own as the Iraqi regime, its allies and, arguably most importantly, the fellow members of the coalition must have been impressed by the deployment of ground forces on a serious war fighting scale. The willingness to be prepared to take casualties on an equally serious scale was obvious. The subsequent hundred-hour offensive was a vindication for the totality – not just air power. Manoeuvre warfare, on a large scale, swept the board. But the impact of weeks of air power changed the level of the victory, taking us beyond manoeuvre warfare to genuine manoeuvrist conflict – cohesion and will was shattered.[38]

Furthermore, air (and aerospace) power had reached into the heart of Iraq itself where no target was immune from scrutiny, surveillance and attack. Control of the air was not ceded, as some detractors imply with a casual, myopic sweep of a very large hand over a small map of Iraq - and of history. It was fought for, won and then had to be maintained. Those who recall the early losses in the Tornado force recall that these were tense times. Clodfelter's concern over a 'Verdun in the air' could have become a Somme for control of the air. Once this contest, or to stretch a point the potential for the fight, had been decisively won, air power certainly produced the asymmetric edge: ground force on force was avoided until cohesion and will were shattered.

The Gulf War also generated new conceptual thinking on the deployment of air power with Colonel John A Warden's work on targeting and planning the Air Campaign.[39] This book originally started life as a research paper in the US National War College (thereby demonstrating conclusively that such exercises have the potential for real value) and subsequently formed the basis of the air campaign plan presented to General Schwartzkopf. Warden was moved quickly into the Air Force planning staff in the Pentagon where he ran the planning staff, better known as 'Checkmate'.[40]

No sooner was the euphoria in the process of evaporation when Yugoslavia started to unravel in a serious manner. In this conflict force on force was deliberately eschewed – by all sides; and there were no heroes, only bad guys and victims. The low level of the fighting did not mask the viciousness and the brutality with arson, rape and murder the norm. This was Hobbes rather than Clausewitz. From the Yugoslav perspective, air power was primarily used for local reinforcement with helicopters in frequent use. The air defence was largely dormant, albeit with odd exceptions.[41] Fast jet operations using Galeb and Jastreb aircraft were of limited utility with more psychological effect than military impact. James Gow points out that there were occasional attacks on towns such as Brcko and Gradacac, but by mid-1993 these fixed wing sorties had largely stopped following attempts to transfer aircraft to Serbia.[42] That said, each sortie caused uproar, frustration and indignation in various segments of the international community (especially America) and with those involved in the negotiation process.[43]

The relatively small scale of the air operations did not, however, prevent an increasing clamour for the imposition of a no-fly zone over Bosnia. This stemmed in part from a wish to level the playing field slightly given the imbalance of weaponry (especially artillery and heavy mortars) between the Bosnia-Herzegovina Government forces and those of the Bosnian Serbs[44], who had inherited much of the JNA equipment and command structure. Some also considered that robust implementation of the no-fly zones would show resolve on the part of the international community. Operation Deny Flight was instigated following the passage of UNSCR 816 on 31 March 1993 and replaced the less aggressive Operation Sky Watch that had been monitoring the air space.

The nature, and scale, of the violence within Bosnia-Herzegovina, coupled with the immediate access to media, raised the stakes with increasing demands for peace enforcement. There was considerable oncern, however, that a rash NATO air attack, possibly fuelled by high-level political frustration, could seriously endanger the lives of the peacekeepers on the ground.[45] This resulted in the so-called dual-key approach under which a given target had to be approved at high level in both organisations.[46] Ambivalence in Washington over the desired end-state versus the art of the achievable was also evident.[47] Coalition air power was used on occasions such as the attack on Ubdina airfield in late 1994; NATO proudly

announced that this had been the largest air raid in Europe since World War II – Richard Holbrooke described it in horror as being closer to 'pinpricks'.[48] General Sir Michael Rose defended similar actions as being 'textbook examples of the precise use of force in a peacekeeping mission'.[49] From these two viewpoints, it is evident that perceptions are all-important.

Deliberate Force was unleashed on 30 August and continued through to 14 September 1995. NATO air units flew 3,535 sorties, dropped over 1,100 bombs with the loss of one aircraft

F-15E Eagles formed the backbone of the strike force, Operation Allied Force.

Continued political intransigence, and a worsening situation on the ground, increased the demand for resolute action. Deliberate Force was unleashed on 30 August and continued through to 14 September 1995. NATO air units flew 3,535 sorties, dropped over 1,100 bombs with the loss of one aircraft.[50] For presentational purposes, the NATO attacks were carried out as part of the campaign to protect the safe

areas – directly and indirectly. It is obvious from Holbrooke, however, that any coercion of the Bosnian Serbs towards a peace settlement would be beneficial.[51] Furthermore, the air campaign was materially assisting an ongoing Croatian Army[52] /Muslim ground offensive – much to the discomfiture of the Bosnian Serb Army who found that the concentrations of tanks and artillery necessary to counter this assault made excellent targets for air power. Holbrooke suggested to Milosevic that the air campaign was not coordinated with the ground offensive, but later in his account admits to having advised President Tudjman of Croatia as to which towns his troops should occupy to facilitate later negotiations.[53] The marked escalation in external military involvement resulted in a new momentum for the talks' process.

Subsequent reaction has varied from restrained suggestions that air power achieved far more than could have been expected,[54] through confirmation that it was a decisive element in shaping the outcome (emphasis in the original),[55] to suggestions that the air campaign had delivered the Dayton peace accord. This was challenged unequivocally by General Sir Michael Rose who commented that:

'Tragically, NATO came to believe its own rhetoric that it was the air campaign that had delivered the Dayton Peace Accord'.[56]

Similar bold statements followed success in Allied Force with exaggerated claims over what air power had achieved.[57]

A radio relay station destroyed by Nato air strikes.

The air campaign began with a series of strikes on air defences across Serbia and Montenegro and against a limited number of military targets in Kosovo and elsewhere in Southern Serbia

Regrettably, some of these statements were taken to heart, and with an unhealthy dose of optimism, politicians and planners had again to turn to air power in the hope of pressurising Milosevic into backing down over the situation in Kosovo. What had effectively degenerated into a 10-year cycle of 'call my bluff' failed to produce a result that was satisfactory to any of the sides. Military action seemed to be the only

way forward. Allied Force commenced at 1900 GMT on 24 March 1999 and continued for 78 days. Some 38,004 sorties were flown of which 10,484 were strike missions. The UK flew 1,618 sorties of which 1,008 were strike.[58] The air campaign began with a series of strikes on air defences across Serbia and Montenegro and against a limited number of military targets in Kosovo and elsewhere in Southern Serbia. Targeting policy was under political control in NATO and nationally. Fond hopes that Milosevic would ollapse immediately were quickly shown to be wrong as his special forces and para-military units set about an ethnic cleansing operation of unprecedented brutality.[59]

This scope for air power to be employed remote from land and naval forces was part of the original rationale for its employment to be in the hands of a separate service with its own staff

As the Campaign continued, the range of targets was gradually expanded and, with no sign of NATO disintegration, the Serbian economy was gradually worn down to the point where it is almost certain that Milosevic and his cronies were running out of influence and black market profits. Settlement was reached, albeit on looser terms than had been tabled prior to the start of hostilities.[60] Whatever the sceptics may say about both Deliberate and Allied Force, the reality is that air power did make a major and significant contribution.

Furthermore, for many governments, air power was the only game in town. There was an unmistakeable reluctance, or inability, on the part of most governments not to deploy serious numbers of troops on the ground with a genuine war-fighting mandate. Control of the air, certainly in the later campaign, had again to be fought for, won and then maintained. Thereafter, it could easily be argued that air power was not only the asymmetric edge – it was the only feasible option.

The events of 11 September 2001 rocked much of the Western world and left many wondering how quickly the President of the United States would resort to air reprisals. Surrounded by senior and seasoned colleagues, the response was largely measured and reasoned (some rhetoric such as references to a ‘ crusade’ were less than wise). The subsequent operations were inevitably based around air and space power using the widest spectrum of capabilities. Air power was used extensively for the projection of special forces, with carrier air in support. Long-range attack aircraft were again deployed direct from the continental United States. Close co-operation with indigenous forces enabled rapid progress to be made in restoring Afghanistan to some semblance of civilised governance. An interesting element of the contest for control of the air came with Warden’s prediction coming true that this need not be done air-to-air, or even air-to-ground, but could be achieved by ground troops clearing out surface-to-air missile cells. In terms of providing the asymmetric edge the range of sensors deployed, either air/space-borne or air-delivered coupled with witheringly accurate fire, have again proved their value beyond reasonable doubt.

The foregoing account cannot take every skirmish, conflict and war into consideration. It is nevertheless a comprehensive overview of warfare from the earliest use of air power. Control of the air has been a key factor in its effectiveness – a true decisive point – from the point where Austrian commanders considered observation from balloons an affront to the laws of war and attempted to shoot them down. Even the opposition achieving air parity can blunt a commander’s intent – as was shown at Dunkirk. Air superiority or supremacy must therefore be the aim. This does not happen by accident; and it certainly will not be ceded. As Professor Tony Mason has pointed out, land and naval commanders should look to their plans in the event that command of the air is not achieved.[61]

Air power has therefore increasingly become the weapon of first political choice

As air power and technology have matured hand-in-hand, so the capability has increased many-fold. Even after Allied Force, however, only the very bold among air power advocates would suggest that air power could ‘do it alone’. Furthermore, there remains considerable scope for air power to act in close, and indirect, support of other components – often providing them with the asymmetric edge. Nevertheless, it is the ability to react rapidly and to operate over long distances that gives air power the scope for independent action.

This scope for air power to be employed remote from land and naval forces was part of the original rationale for its employment to be in the hands of a separate service with its own staff. Amidst considerable controversy, the Royal Air Force was formed on this premise. It is submitted that the case for professional airmen to be at the forefront of the planning and execution of this capability is more overwhelming now than it was in 1918, or in the aftermath of World War II when the United States Air Force came into being. The lower the scale of conflict, or the more intransigent the foe, the broader based the strategic planning will need to be. This will necessitate more conceptually based and more visionary approaches to conflict resolution. Doctrine, in both the joint and environmental arenas, will need to evolve to meet these challenges, lest it descend into dogma. This will need pro-active intellectual effort beyond Professor Richard Overy’s admonition that the process should be subject to ‘constant and critical interrogation’.[62] No aviator, of whatever colour cloth, would claim a monopoly on wisdom on air matters. Nor would any air power advocate, academic or apologist stake a claim to be the only voice. Nevertheless, operational experience carries its own weight in air power debate as it does in any field of military endeavour. In most fields of study, the opening perspective of the student will colour her or his analysis of the subject area. A real understanding of air power history, of doctrine and, most importantly, of conceptual thinking is therefore best done by air-minded folk.

One of the prime sources of air power conceptual thinking will therefore be from air forces, and clearly from those closely associated with them. Likewise air campaign planning is best done by those intimately aware of the nuances of aircraft systems, weapons and doctrine; this will invariably mean aviators and, with due respect to those in other colour suits, the truly independent capabilities of air power are best exercised by those from the air force. In these days of financial stringency, the ideal may be sacrificed for the economical. But woe betide the ‘purple commander’, the civil servant or the contractor who risks not having control of the air. Similarly the crisis manager needs to guard against the descent from conceptual thought into quantitative management-speak in which counting the number of tanks ‘plinked’ is regarded as a more meaningful exercise that analysing the real effect achieved on the enemy.

Air power has therefore increasingly become the weapon of first political choice. Indeed over the last decade it has often been the only weapon acceptable to some nations, their politicians and their people. Some may argue, and this author does, that casualty aversion has been overstated in the aftermath of the American experience in Somalia. It may well be that history will regard that regrettable episode as a blip rather than a watershed. Nations, and their media, will always be ready to criticise governments for hasty intervention where national interests (however defined) are not evidently at stake. But support for military action, with the ensuing consequences, can be very robust when the stakes are high. That said, unnecessary waste of life should be eschewed whenever possible. Air power will therefore frequently offer the safest way forward – especially in conjunction with precision weaponry. As has been shown, the wise will always elect to avoid symmetric conflict. The asymmetric edge should therefore always be sought.

One could therefore argue that Trenchard's trinity of offensive action, cost-effectiveness and avoidance of symmetric force-on-force carnage have either come full-circle – or have been an enduring theme of air power utilisation. There can be little doubt that for politicians either in search of 'something to be done', or in the quest for 'the force for good', air power will provide immediate scope for offensive action. For detractors of an earlier age, its impermanence has become a virtue. Whilst not, at first sight, a cheap option, modern air power can be cost effective – especially when set against the alternative of fielding large and highly manoeuvrable armies equipped for network centric warfare. For the casualty averse, however, it is the asymmetric edge – the avoidance of mass casualties – that gives air power the greatest appeal. When action is taken in defence of national security – 'in clear and present danger' – public support will be immediate. Where action is taken in pursuit of more nebulous national interests, rather than national security, there will be greater need for precise, and often long range, offensive action which can only be provided by air power.

In sum, air power — in its widest form — is likely to remain the weapon of first political choice. With control of the air it will be the most likely form of military force to achieve the asymmetric edge and hence the most efficient victory. If air power is to be used to best effect, it is best exercised by airmen, and most of them come from air forces. Air power is therefore destined to remain — to borrow the esteemed John Terraine's title — 'to the right of the line'.[63]

Notes:

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