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Manoeuvre Theory

Dear Editor,

The Army Doctrine Centre article on manoeuvre theory (DFJ Mar/Apr 95) was apparently intended to stimulate discussion across the ADF. It is therefore unfortunate that, by its unsophisticated treatment of this important subject, the Doctrine Centre did little to lead or inform subsequent debate. The article presented was little more than a regurgitation of Bolger's article in Hooker's "Anthology of Manoeuvre". Where Bolger's thoughts were expanded, a profound lack of understanding was apparent.

In particular, having described the difficulty of agreeing a definition of manoeuvre theory, the Doctrine Centre fudged the issue by posing a definition restricting manoeuvre theory to the interaction of tactical forces. It went on to criticise the popular reliance on German examples to illustrate manoeuvre concepts and then referred to manoeuvre theory as "simply the articulation of most of the principles of war" arguing that it complements rather than replaces reliance on the principles. I shall address each of these errors in turn.

It should first be noted that Manoeuvre theory is not one of a number of theories of war. It is, as far as I know, the only unified theory which ties the levels of war together and provides a guide for action for commanders at all levels. There is, for example, no "attrition theory": attrition is the result of warfare conducted in the absence of theory. There is therefore no "manoeuvre-attribution dichotomy": only the interaction of knowledge and ignorance.

Manoeuvre theory is premised on the Clausewitzian dictum that "war is a free creative act resting on a clash of wills". It attempts to provide a guide for action for all commanders, from individual rifleman locked in mortal combat with their enemy counterparts to national rulers, to assist them to win that clash of wills. It is not about movement, troops, firepower or terrain but about the interaction of the two opposing commanders — the components of war merely influence the clash of wills. Contrary to the assertions of the Doctrine Centre, Manoeuvre does not attempt to avoid battle but seeks to provide an intellectual filter enabling the identification of battles which need to be fought. It then provides a number of analytical tools to understand the dynamics of battle and thereby provides some guidance for the application of judgement by the individuals involved. Manoeuvre is about assessing an opponent's vision of the future and his preparations against its exigencies and then attempting to render them irrelevant. The tools of battlefield manoeuvre; OODA loops, tempo, main efforts, directive control etc. do not define manoeuvre any more than electrons define relativity.

J.F.C. Fuller was not the first to espouse Principles of War. The desire to establish the scientific principles underlying the conduct of war grew out of the Age of Enlightenment's commitment to scientific method. Reliance on principles is not universal. Napoleon for example did not subscribe to any set of principles. Against this background, the attempt to explain Napoleon's success to uninformed audiences in public presentations and at military academies led Jomini to propose a set of principles: it is to him that we owe the modern anglophone infatuation with them. Napoleon's other primary interpreter: Clausewitz did not attempt to explain Napoleon by the use of principles but rather conducted an a priori examination of the nature of war and, from that basis, explained that Napoleon was a genius in that he apparently had an instinctive understanding of the dynamics of conflict. From this basis, supported by some streams in German philosophical thought, Clausewitz argued that the inculcation of principles was pointless and that success in war required the application of informed judgement by properly educated individuals. Therefore it is wrong to argue that manoeuvre theory complements the Principles of War.

The existence of principles rests on the Enlightenment premise that there must be some underlying order to War. In contrast, manoeuvre theory accepts that war is characterised by the interplay of chance, uncertainty and friction and is therefore fundamentally and immutably chaotic. This chaos provides the opportunity for a creative individual to defeat a less creative opponent: ultimately this is the promise that manoeuvre theory offers. This suggests that if there are principles of war then manoeuvre theory is groundless and vice versa. It is logically not possible to accept that one complements the other. In my experience and reading, principles have little use beyond filling the first instructional period of any tactics course.

The German Army does not have, and I do not think ever has had, doctrine which could be labelled as Manoeuvre Theory. However, since at least Frederick the Great and down through Schamhorst, Clausewitz, Continued on page 44
Giulio Douhet’s ‘The Command of the Air’
An Enduring Strategy?

By Squadron Leader A.J. Forrest, RAAF

In truth, whoever has control of such irresistible force will be lord over all nations and no human skill will be able to resist his destructive power.

Leonardo Da Vinci

Introduction

The development of the aeroplane as a component of a nation’s fighting force preceded any commensurate theory on air power and its application. Barely a decade had separated the maiden flight and the introduction of the aeroplane into intensive continental warfare in 1914. In those twelve years, aircraft development had been based more on demonstration than on theory, and oriented more toward the element of ‘flight’ than the element of ‘fight’. The fighting roles developed during the war arose, of necessity, from the pragmatic and immediate dictates of the battlefield rather than from any philosophical body of ideas. Only with the relative normality and stability of the post-war period was it feasible to attend to a theoretical basis for the deeds of the practitioners.

The formative air power theories attracted critical attention, particularly from the two traditional services whose cultures and canon were historical; even ‘classical’. One of the more prominent and controversial of the pioneer writers was the Italian, Giulio Douhet. Douhet’s first and arguably most influential work, Il Dominio dell’ Aria (The Command of the Air), met with a hostile response when it was published in 1921, not least within the Italian Ministry of War for which it was produced. Beyond Italy, the air power doctrine of The Command of the Air subsequently received more, but far from complete acceptance, polarising the wider military community into supporters and detractors. Yet Douhet has been regarded as foremost of the classical air power theorists, arguably acquiring the status for aviators that Alfred Mahan enjoys among mariners, and according to Warner, becoming a household name. What, then, were the principles and strategies contained in The Command of the Air; why were they so contentious, and are they valid? This article examines the air power strategy as expressed in The Command of the Air in order to determine whether the survival of Douhet’s reputation is based on demonstrable theory, or whether it can be attributed to other factors. This examination will follow brief biographical details of the author, and will include a summary of Douhet’s main thesis on air power, a review of the impact of Douhet’s writings on the development of air forces between the two world wars, and an assessment of the basic principles of The Command of the Air against the only valid criterion for theory — practice over time.

Giulio Douhet

Douhet (1869-1930) began his military career as an artillery officer in the Italian Army. Following attendance at the Italian Command and Staff School in 1900, he was assigned to the General Staff as a technical adviser on the development of motor vehicles for military use. Douhet’s growing professional interest in aviation inspired him from 1909 to write on the potential applications of military aviation. He was commander of Italy’s first military aviation unit, the Aeronautical Battalion, from 1912-1915. During this time he completed a manual on Rules for the Use of Airplanes in War (1913) and supervised the introduction of the three-engined Caproni bomber into the armed services at the time of Italy’s entry to the war (1915). In 1916 Douhet was court martialled and imprisoned for vigorous criticism of the Italian Staff. Douhet’s view that the military lacked any vision of total war and had mismanaged Italy’s war effort was vindicated by the inquiry into the army disaster at Caporetto in 1917. Following a pardon, Douhet was appointed head of the Central Aviation Bureau in February 1918 and promoted to the rank of general in 1921. He was appointed Commissioner of Aviation immediately after the fascist march on Rome (October 1922) but resigned soon after to focus on developing and publishing his views on aerial warfare. In addition to The Command of the Air, Douhet’s other significant literary works include Probable Aspects of a Future War (1928), Recapitulation (1929) and a prophetic view of a future war between France/Belgium and Germany, The War of 19- (1930).
Douhet’s Thesis

Douhet’s rationale for The Command of the Air has its genesis in his own understanding and direct experiences of World War I. Douhet is appalled by the land war carnage that occurred when outdated offensive strategies were plied against defensive patterns bolstered by high-technology weapons. In order to avert a repetition of the 1914-1918 deadlock, Douhet advises in The Command of the Air that new strategies of war will be needed, based on “...the character and form future wars may assume”. The character of future war will be dominated by the technologies available to wage it. Douhet notes that in land warfare “...every development or improvement in firearms favours the defensive.” Since war is ultimately won through offensive action, only technology developments that transcend the land war will be decisive in the future. Two complementary technologies in their infancy but with the potential to “…upset all forms of war so far known” are poisonous gases and the aeroplane. Douhet’s aim for The Command of the Air is to assess the value of these technologies to the conduct of future war.

Douhet’s advocacy of air power proceeds from this aim, and is based on his assessment of the total nature of war. According to Douhet, war has become an activity that embraces the entire population and resources of a nation. Moral and legal distinctions between the armed forces that fight and the civilian forces that provide the means to fight have become artificial and redundant. Because the combatants cannot be clearly defined, nor can the battlefield, the scope of the battlefield can no longer be equated with the extent of the front line. The limits of the battlefield have become the borders of the nations involved in the conflict. Douhet presents this image not only as a philosophical view, but also as a practicable view of war. The means exist to render land and sea defences incapable of protecting the nation at its source. It is “…air power which makes this possible.” Air power will overpass the stalemated defensive lines of army and navy, restoring the advantage of offensive action and consigning the traditional services to subordinate roles in the resolution of future wars. The focus of air power will be on decisive action calculated to break the will of the enemy to resist. This, according to Douhet, is the fundamental objective of modern warfare.

The air power strategy that will achieve this war aim is mass, long-range offensive bombing. Bombing raids at the onset of war will be directed at population centres, industrial complexes, transport junctions, manufacturing sites and government buildings. Such a strategy will require a large scale and largely self-defending bomber fleet, capable of striking targets with a weapons combination of high explosive, incendiary and poison gas. Douhet’s rationale for the nature of the bomb load is clinical:

The explosives will demolish the target, the incendiaries set fire to it, and the poison gas prevent fire fighters from extinguishing the flames.

Douhet predicts that a campaign of this nature will achieve the war aim, spreading “…terror through the nation and quickly breaking down its material and moral resistance.” He invites us to “…envision what would go on among civilian populations of congested cities once the enemy announced that he would bomb such centres relentlessly.” He speculates that, dissimilar to an army unit that will still offer some resistance after heavy losses, factory personnel will abandon production at the sight of minor damage. Merely the sound of a single aeroplane will stampede the population into panic. The day following an attack, a city will cease to function industrially and administratively, amounting to a complete breakdown of its social structure. This scenario could be repeated in all cities within the nation. Under such conditions, the populace will soon demand an end to the war. Douhet admits that the haunting scenario of a society materially and psychologically crippled is a tragic consequence of his air power strategy. He judges, however, that war is amoral, and that nations have a duty to wage it as expeditiously as possible:

These future wars may yet prove to be more humane than wars in the past in spite of all, because they may in the long run shed less blood.  

Douhet advises that a precondition exists for the success of his strategy — a nation must firstly achieve command of the air. Douhet defines command of the as the ability to prevent the enemy from flying while retaining that ability oneself. Clearly, the bombing strategy can be decisive only if the enemy is incapable of inflicting reciprocal damage in the nation’s heartland, and such immunity can only be guaranteed through an offensive initiative. He is not impressed with the potential of intercept aircraft to defend against enemy bombers that may strike at any time and place; nor is he impressed by anti-aircraft technologies employed on the ground. The only way to prevent an enemy using his aircraft is to destroy his air force on the ground, and to do so as the first action of war. Using the same bomber assets that he is going to use for follow up attacks against civilian targets, Douhet’s strategy emphasises the bombing of airfields, supply
depots, and fuel installations to neutralise the enemy forces at its source:

*It is not enough to shoot down all birds in flight if you want to wipe out the species; there remain the eggs and the nests. The most effective method would be to destroy the eggs and the nests systematically, because ... no species of bird can remain continuously in flight without alighting.*\(^{15}\)

Command of the air is, therefore, the first principle of Douhet's air power strategy. A second principle is the independent nature of this command. Douhet makes his claim for an independent air arm based on the prerequisite of command of the air for victory, and on the assessment that neither army nor navy will be able to materially affect the achievement of that condition. He claims that auxiliary air assets under navy or army command would be squandered on frontline objectives, rather than devoted to the strategic objectives where command of the air is won, or lost. Instead, Douhet insists on an independent air arm having equal status with the other services, but attracting funding at their expense:

*A progressive decrease of land and sea forces, accompanied by a corresponding increase of aerial forces (will occur) until they are strong enough to conquer the command of the air.*\(^{14}\)

### Reception

Although advocates of Douhet's strategic vision have sought to elevate *The Command of the Air* as a general theory of air power, it was prepared with Italy's strategic situation specifically in mind. Douhet said, *"...my first thought is of our own situation ...the theories I expound have that in the background ...to offer a general recipe for victory would be downright presumption on my part."*\(^{16}\) He was aware that in any offensive, Italy's tanks and warships could easily be contained in the alps and the Mediterranean respectively, and that the assistance hitherto provided by the North Italian topography to Italy's defence had been eroded by the advent of military aircraft. *The Command of the Air* was prepared to inform a specific audience on how Italy should adapt to the new form of warfare.

The initial response within the Italian Ministry of War, bolstered by army and navy influences that had most to lose if Douhet's recommendations were accepted, was hostile. Douhet's concepts were dismissed as theoretical speculation. Despite Douhet's assertion that present capability (1921) would be sufficient to apply elements of his strategy (or that the capability was easy to come by), the Ministry of War rated the overall strategy as a theory-technology mismatch. Furthermore, much of the theory was regarded as erroneous, based on simplistic calculations, fictional assumptions and unsupported by evidence. For example, damage calculations presented to show bomber-force effectiveness consisted of multiplying the destructive effect of a single bomb by the total number of bombs delivered, to arrive at a total effect. The basis for the calculation was the fanciful assumption that the bomb-fall pattern would be perfect — orderly, precise, and without redundancy. Perhaps another reason for antagonism was the challenge issued in *The Command of the Air* to the senior services, not just for recognition but also for funding. Douhet's challenge for the way in which wars of the future would be conducted contained tacit criticism for the futile methods with which the military hierarchy had conducted the previous war. It could not have been easy for the War Ministry to accept that a strategy aimed at dealing with the two main problems of full-scale warfare — the superiority of the defence and the attrition that the ensuing stalemate produced, should be seen so clearly by a single advocate. Although Douhet's theory later became '...the proclaimed (my emphasis) lodestone of Italian policy',\(^{17}\) for political and economic reasons neither Mussolini nor Air Minister Balbao would take steps to implement it at the expense of the army or navy.

For other air power nations, any decision to embrace Douhet was similarly affected by geographic, economic and political factors. However, there was also the question of exposure, since it was not possible to adopt Douhet's prescription for aerial warfare unless his work was available to be read. Aside from excerpts, translations of *The Command of the Air* came relatively late — into French in 1932; that in turn was translated into English in 1933 (for the United States Army Air Corps)\(^{17}\) and into German in 1935. Its first widespread exposure in England was in abstract form in a British periodical in 1936, and in the same year, Swedes were exposed to its central thesis through a translation of a French study on Douhet's works. In the Soviet Union, the air force was trained by German officers who '...were essentially tactically oriented... (and) the 1936-38 purge of general officers... ended any chance that those who had read Douhet... would have power'.\(^{18}\) Whether Douhet's works were available to the Japanese is not clear, although Japan's geographical isolation from other air powers would have made Douhet's strategy impossible to implement in any event. Nor did Japan have the economy. Only major industrial nations had
the resources to build Douhet’s strategic bomber fleets — that ruled out Italy (ironically) and the Japanese, leaving the United States, Germany and Great Britain as the only nations that could realistically adopt Douhet’s strategy, if they elected to do so. The United States developed a precision bombing strategy that “...was a long way from Douhet’s casual assertion that great accuracy did not matter”, and vested the responsibility to implement the doctrine in an air arm that was not independently organised. The Luftwaffe, although technically a separate service, remained subordinate to the German High Command; its doctrine and development linked exclusively to support of the Wehrmacht. Only the independent Royal Air Force (RAF), under Trenchard’s directorship, embraced in any unequivocal way the Douhet air war philosophy by placing a priority on the policy of developing a long-range strategic bomber force. However, the architects of Britain’s air power strategy disclaimed any knowledge of Douhet, maintaining they arrived at their conclusions concurrently. Furthermore, British aviation policy was not matched by the reality of implementation. At the time that the British Cabinet launched its rhetoric about a weaker democracy able to deter a potential aggressor by threatening to bomb its cities, “...the RAF ceased to issue specifications for long-range heavy bombers. Instead the cadre force maintained was equipped with medium bombers ...inadequate for any target beyond Paris.”

The Crucible of War

It is quite clear that by 1939, although familiar enough in an academic sense within air tactical schools and other air power discussion circles, Douhet had registered little impact on the development of the major air forces. Yet, until World War II, the association of air power with Douhet’s concept of massed bomber force impregnability, was relatively easy to accept. Little had justified any great faith in air defence. Intercept aircraft lacked endurance to patrol, power to climb, and speed to chase. No nation had any sophisticated or highly effective form of early warning system. Only in the late 1930s with the development of up-rated engines, improved airframes, and with radar, could the intercept aircraft be rated a viable counter to the strategic offensive of the bomber.

The viability of air defence assets was one of several challenges to Douhet’s strategic theory posed by the acid test of large scale war. Douhet’s command of the air strategy was based on the strength of an offensive bomber force rather than the mobility of a fighter force, because he rated firepower more decisive than speed. However, Douhet erred in interpreting firepower and speed as mutually exclusive qualities. The harsh reality faced by strategic bombers throughout World War II was that intercept aircraft possessed both qualities. Douhet had failed to account for the possibility that developments in fighter aircraft might keep pace with or exceed the development of bombers. Perhaps the most poignant example of the success of counter air defence during the war was the defeat of the Luftwaffe bomber offensive over Southern England during the Battle of Britain, in spring 1940. Bomber Command losses at the brink of sustainability also served as contradiction to Douhet’s optimistic estimation that “...any means of defense against an enemy aerial action will fail...”

Consequently, the attrition rates encountered during German and Allied strategic air operations belied Douhet’s concept of massed bomber force impregnability. To minimise the severity of aircraft and aircrew losses, bomber commands were forced to adopt new tactics; switching to night-time, high altitude bombing, varying aircraft formations, adjusting the focus of target selection, and introducing fighter escorts. Contrary to the decisive assault that Douhet’s bombers were to deliver at the beginning of the conflict, these tactics were part of a five-year struggle during which offensive and defensive air vied for dominance. Accordingly, command of the air and the ability to exploit that advantage were not achieved as readily as Douhet had projected. A combination of numerical and technical superiority, long-range fighter escort, and the dislocation of German defensive capability was required before strategic bombing could batter the national heartland to the degree (although certainly not in the manner) that Douhet had forecast. Such a combination was not manifest in Europe until the end of 1944, by which time the war against Germany was all but won.

What compounded Douhet’s error of under-estimating the impact of air defence forces was his over-estimation of the effects of strategic bombing itself. In general, strategic bomber offensives throughout the war were directed, as Douhet advocated, at industrial, communications, transport, and at times population centres in preference to front line military targets. However, the purely strategic campaigns were rarely completely successful for reasons of inaccuracy, redundancy, and bomber force vulnerability. Even when high level destruction resulted, Douhet’s vision of a broken enemy will was not fulfilled. Douhet under-estimated the resilience of a civilian population to terror bombing, and failed to allow that anger and an increased
resolve could be the more likely human responses than despair:

"The Germans poured so many bombs on London, Coventry and other targets in 1940 and 1941 that if any people had reason to lose their will to fight, the British certainly did. Instead, the bombing strengthened their resolve and made heroes of the Royal Air Force fighter pilots who defended the country."  

Douhet proposed that the swift attack on morale would prompt a civilian clamour for cessation of hostilities, which in turn would obviate the need for a destructive and indecisive land war. Although it is difficult to identify which raids were specifically targeted at morale, it is nevertheless clear that this outcome did not occur. The atomic attacks on Japan resulted in surrender, but that surrender was not prompted by the citizenry, nor did it pre-empt the mobilisation of the American and Japanese armies. That had occurred three years earlier in late 1941 and early 1942.

In spite of Douhet's air power strategy, World War II witnessed the most decisive use of aerial offence, at the tactical level in support of ground and naval forces. The scenarios in which air offence was indisputably a decisive factor included the Luftwaffe's part in the Polish and Low Countries campaigns and in the Battle of France; the RAF's part in the North Africa campaign and in Operation Overlord; and Coastal Command's part in the Battle of the Atlantic. Offensive air power had an overwhelming vindication in World War II, but "...it was Mitchell's conception of it — 'anything that flies' — rather than Douhet's that was vindicated."  

Possibly the strongest rebuff offered by World War II for Douhet's brand of air power was that airforces predominantly operated alongside the other two services and as a part of their pattern of warfare. It was not a form of warfare apart; and it alone did not win the war. With very few exceptions, war in all theatres of World War II was terminated by forces on the ground. In Douhet's defence, his bombing theories may not have been vindicated by the airforces of World War II because they did not fully practise them. No airforce possessed a genuine strategic bomber force, with the possible exception of the United States Air Force B17 and B24 bombers introduced into the European theatre in 1942. Nor were the bomb loads as Douhet advocated. Incendiary was used only periodically, and poison gas not at all. Whether the presence of these factors would have made any difference is a matter of conjecture, although it seems fair to concede that Douhet was not trialed during World War II to the letter of his strategy.

The immediate post-war development of nuclear forces suggested that the rhetoric of Douhet's air strategy might be matched by the reality of warfare where at least one of the belligerents possessed nuclear weapons and the means to deliver them. Nuclear weapons technology seemed to offer the destructive power, materially and psychologically, to enable air war victories in the way in which Douhet envisaged. For example, the response of the United States Government to the new form of threat contained an overt 'first strike' principle that was a latter day echo of Douhet's command of the air strategy:

"While this country must employ all of its physical and moral force in the cause of peace, it must recognise that real security against atomic weapons in the visible future will rest on our ability to take immediate offensive action with overwhelming force."  

In 1946, the United States Air Force inaugurated Strategic Air Command to provide (initially) a nuclear first strike capability, lending weight through this massive material commitment to the interpretation that "...because of atomic weapons ...Douhet was probably more correct than ever."  

Such was the primacy of Douhet's concept of strategic bombing that United States' air doctrine neglected the development of a tactical air force — an oversight that was to prove costly in Korea, the first major conflict of the nuclear age.

Since 1946, however, the application of air power, albeit in the nuclear age, has done little to endorse Douhet. In nuclear terms, Douhet's air power strategy is contingent upon an absolute first strike has become as much a romantic fiction as Douhet's command of the air. Furthermore, there has (fortunately) been no practice of strategic nuclear war, making any verification of Douhet purely hypothetical. Douhet's strategy cannot be validated by the massive destructive power of nuclear weapons as long as the nuclear nations accept that they have no moral mandate to use them. Furthermore, no political objective has emerged to justify their use, revealing a significant gap in Douhet's theory — his failure to account for limited war aims and for political constraints.

Similarly, conventional warfare has failed to sustain Douhet's principles. The Korean War demonstrated the effectiveness of air power linked with ground operations, and the Arab-Israeli wars of 1967 (where no attacks were made on civilian
Douhet's Enduring Appeal

If the application of air power to date has departed in a substantial way from Douhet's air/war strategy, perhaps the key to Douhet's durability is to be found in alternative, less empirical factors. A judgement in a recent Australian publication on air power doctrine that "...airmen have not been well served by their theorists," is an undisguised jab at Douhet in particular. What Douhet fails to do is to provide an intellectual basis for air power, presenting less an air power theory (a simplification and ordering of reality; a classification of experiences into principles and generalisations to account for behaviour) than painting an imaginative and fantastic vision of great deeds that airman will be able to accomplish in future wars. In this sense, he is a prophet; a "...seer, a visionary, a standard bearer, a great teacher, a passionate advocate for a cause." His writings comport to the character of prophetic works by proclaiming a revelation of the future; the aim not to provide a blueprint of what the future will hold but to warn and inspire.

And inspire he does, in both style and message. His style is compelling. While the rhetoric contains references to common sense, and the logic includes a veneer of technical argument and mathematical calculation, the overall appeal is primarily an emotional one. There is a profusion of rhetorical devices. He makes extensive use of analogy (When a mad dog runs amok in a village...), metaphor (The surface of the earth is the coastline of the air); he poses rhetorical questions (What civil or military authority could keep order...?), he pauses for confirmation with his readers (I ask... I ask again, is it true or not true?); he "...studs his arguments with startling declarations, dicta, aphorisms and vivid images" and he appeals for acceptance of his reasoning by comparing it with the approach of astronomers, and with physicists such as Hertz. Because the total effect of Douhet's style is "...arresting, charming, seductive," we can add to prophet the label 'propagandist'. The message he propagates is precisely the one that airmen want to hear. A reading of The Command of the Air resurrects the early vision of air power — its independence, its imperviousness to surface forces, its horizons, its ability alone to defeat the enemy swiftly and decisively; its omnipotence. Douhet has survived because he continues to give authority to the deepest wishes and instincts of aviators:
concluding view on the independent nature of a nation's air arm have been supported in the command structures of the major post-World War II airforces.

However, it is not enough. Douhet's theories have not been demonstrated in a number of critical respects. Strategic bomber aircraft are extremely vulnerable in any environment where air superiority has not already been achieved. Bombers have not been able to establish air superiority/command of the air, let alone exploit it. Without the development over time of a range of alternative tactics, the historical lesson is that the destruction of the bomber fleet arises before the destruction of either production or morale. Any successes of strategic bombing have generally occurred where other forces, principally fighter escort, have made the environment sufficiently benign for the safer operation of a bomber force. Strategic bombing has failed as a swift, short-term measure to achieve the destruction necessary for long-term interruptions to the material capability of the enemy's fighting forces, and has failed to affect in an adverse and decisive way the resilient war spirit of civilian populations. Weapons of mass destruction do little to advance Douhet's case because world nations recoil from the prospect of committing such weapons to war. Due to moral imperatives and political realities, any such commitment would more likely be an act of final resort than the product of the first hour or war.

Douhet continues to command an enormous appeal, borne out by the chorus of post-Gulf War claims that (finally) Douhet's air power concept was vindicated. But like previous attempts at a Douhetian interpretation of the conduct of war, it is a confusion of sentiment and logic. Perhaps, like most prophets, Douhet's time is still to come. For now, acceptance is more an article of faith than a matter of fact.

NOTES
1. Some commentators have labelled followers 'Douhetists'; others have used the term 'The True Believers'.
5. ibid., p.12.
6. ibid., p.6.
7. ibid., p.9.
8. The term 'strategy' is used throughout this article, although Douhet did not employ it himself.
10. ibid., p.57.
11. ibid., p.20.
12. ibid., p.61.
13. ibid., p.34.
14. ibid., p.30.
15. ibid., pp.252-253.
17. It was available as early as 1923 according to Flugel, R. United States Air Power Doctrine: A Study of the Influence of William Mitchell and Giulio Douhet at the Air Corps Tactical School (University of Oklahoma, 1965) pp.201-2. This view was forcefully rejected by a former Air Corps Tactical School officer at the international air power conference held in Canberra, 29-31 March 1994.
24. Third Report to Secretary for War, 12 November 1945. Cited in Emme, E. The Impact of Airpower: National Security and
With the development of ICBMs, SAC was retained as a second strike asset, presumably through doubts about the Douhetian promise of first strike success.

See Higham, op cit., p.227.


There were, of course, civilian casualties from collateral damage. However, the factors in this unfortunate consequence were inadequate intelligence and the reality that PGMs are not as precise as they need to be, rather than any conscious decision to include war on civilians through strategic air strikes as a part of the war strategy.

Segre, op cit., p.351.


Squadron Leader Athol Forrest completed a BA at the University of Canterbury in 1977 and a Diploma of Teaching at Christchurch College of Education in 1978. Following three years secondary teaching, he enlisted into the Royal New Zealand Air Force (RNZAF) in 1981. Appointments have included Base Education Officer, Commanding Officer Training Systems School, Staff Officer Education, and Staff Officer Training Development, and Director of External Studies Programmes. Completed the RNZAF Staff Course in 1993. Sponsored by the RNZAF to complete a Master of Defence Studies at ADFA in 1994. Squadron Leader Forrest was appointed to the Directing Staff, RNZAF Command and Staff College in early 1995.
Who supports the power behind many world navies?

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Air Power Can Win Wars

By Air Commodore Norman Ashworth (Ret)

The contention that air power can win wars is one that is not widely held in the defence community. Far more popular is the contention that only armies can win wars. Yet air power can win wars, and has done so!

To claim that air power can win wars is not to claim that air power acting alone can win wars, or that air power can win any and every war. Nor is it an ambit claim for all of the defence vote to be devoted to the air force. Certainly, there is no contention of the fact that only armies can hold ground. However, not all wars are won by taking or holding ground. Nor are armies the only means of destroying or neutralising opposing armies. Air power can also do so in some circumstances, as it did in the recent Gulf War.

The early prophets of air power, writing in the 1920s, had unbound faith in what could be achieved in war through the use of air power. That air power has not always achieved these claims has as much to do with how air power has been used in war as with their validity. Clearly, not all of the claims of the early air power prophets are valid. In particular, their idea of the likely effectiveness of strategic bombing was grossly overestimated. However, the basic contention that air power can win wars is still valid. Why it has not done so more often is central to this article.

Air power has had the ability to win wars since 1917. By that year the aeroplane had developed sufficiently to have enabled either side in the stalemated ground war in Europe to break the deadlock by the bold and imaginative use of air power. The key to air power is the attainment and subsequent exploitation of air superiority. Air power is unlike land power in that the complete destruction of an enemy’s air force is far easier to achieve than the complete destruction of his army. Further, the effectiveness of air power is increased many fold when applied under conditions of complete air superiority. Having complete air superiority achieves two purposes. Firstly, it protects one’s own land, sea and air forces from attack by the enemy’s air forces; and secondly, it enables one’s own strike air power to operate effectively against the enemy’s land and sea forces, and against their supporting infrastructure and support base.

Another tenant of air power is that the most effective way in which to destroy an enemy’s air force, which is the basis of his air power, is to attack his air bases, rather than to attempt to deliberately meet him head on in air-to-air combat. While air-to-air combat, which is to many the high point of any air war, may be unavoidable, it should not be the primary means used in the struggle for air superiority.

What would have been required in 1917 to win the war through the use of air power would have been for one side or the other to have decided to concentrate its effort on building up its offensive and defensive air power. The offensive effort would then have had to be concentrated on attacking the opponent’s air bases, with the defensive effort being concentrated on protecting the attacker’s own air bases. All other requests for air support would have had to be denied until such time as air superiority had been achieved. Such a strategy would have required one side to rapidly seize the initiative, for had both sides attempted the same strategy at the same time it is likely that the result would have been a further stalemate, again with fearful losses on both sides.

Another instance in history when air power could have won a war is the Second World War’s Battle of Britain. This battle resulted from the attempt by Germany to attain air superiority over Britain in preparation for a seaborne invasion across the English Channel. In the event Britain won, due in part to the failure of Germany to heed the doctrine of air power. While initial German air attacks were directed against the British air bases, effort was soon switched to bombing London and other cities. The German attempt to gain air superiority through air-to-air combat, rather than concentrating on destroying the defender’s air bases, failed. This failure clearly lost Germany its one clear opportunity to win the war. With air superiority, the task of capturing Britain would have been relatively easy, such were the state of Britain’s land defenses at that time. Thus air power could have won the Second World War for Germany.

One instance in history when air power did win a war was the defeat of Japan by the Allies in 1945. The surrender of Japan came not as a result of the defeat of her armies in the field, but as a result of the use of air power in its most awesome form. Certainly, Japan at the time was all but defeated, mainly by Allied sea power. What remained in prospect was a seaborne invasion of the islands of Japan, itself a daunting task. While all three forms of combat power played their part in the defeat of Japan, it was in the
end more due to air and sea power than land power.

Many regard the recent Gulf War as the supreme example of air power being responsible for winning the war. In the Gulf War, while air power was used to great effect, the overall strategy of the war was still based on the concept that only armies can win wars. Thus a large land army was assembled to retake Kuwait. Correct air power doctrine was applied in that the first objective of the air campaign was the attainment of air superiority. That having been done, with great speed and effect, all effort was then turned to “softening up” the Iraqi army for the planned land attack. The prime exception here was the diversion of effort to destroying Scud missiles. So successful was the “softening up” process that the subsequent land invasion was very much an overkill.

One issue from the Gulf War that has not been clearly addressed is the question of the necessity for the final massive land attack by the Coalition ground forces. Had the air attacks on the Iraqi army been concentrated solely on its means of transportation and resupply, and had these been kept up until all means of mobility had been removed and resupply effectively cut off, then the surrender would only have been a matter of time, or at worst a task for a small land force. Air power is far more effective against machinery and facilities than against personnel. Thus it is far better that it be directed against an army’s means of transport and resupply than against the troops themselves.

Another example from history of the failure to apply air power to its best effect comes from the Second World War’s Strategic Bombing Offensive in Europe. Most look to this offensive as proof that air power cannot win wars through the destruction of the enemy’s war making capacity and the moral of his civilian population. Of greater significance was the Allies’ failure to obtain air superiority over Europe before embarking on the campaign against Germany’s cities and industry. The lack of Allied air superiority over Europe had two consequences: the first was a serious degradation of bombing accuracy; and the second was a high level of loss of aircraft and crews. This in turn meant that the results of the bombing campaign were in no way up to the vast effort expended, and were in total not decisive. Yet, had there been an initial concentration of effort to destroy the Luftwaffe and other elements of the German air defences, the subsequent campaign could have achieved its aim of destroying Germany’s ability to wage war, and have done so with far less collateral damage and far fewer Allied losses, both in the air and subsequently on the ground. As has happened on so many occasions, air power effort was diverted too soon from the task of winning air superiority.
Wg Cdr C.R. Samson, who maintained a particularly energetic, and effective, war in the Dardanelles, culminated his outstanding achievements by dropping the first 226.8kg (500lb) bomb on a Turkish barracks between Anzac and Kumian. He is seen about to depart with the bomb in a Henry Farman F27 from Imbros on 18 December 1915.

Air power is essentially offensive, rather than defensive, in nature with its prime weapon being aerial bombardment. This in turn requires air superiority to be effective, with air superiority being best attained through aerial bombardment. Thus air power must first be applied to obtain the required condition for its own continuous effectiveness, which is air superiority. Under such a condition, air power can win wars, or can make such a contribution as to greatly increase the effectiveness of land and sea forces.

As has been claimed throughout this article, air power can win wars. That it has not done so is due in large part to a failure to understand its essential nature and to exploit what it has to offer. Here a major stumbling block has been the belief that only armies can win wars, a belief that has tended to relegate air power to the role of support for the land battle. An associated difficulty has been the failure to appreciate the vital importance of air superiority for the effective use of air power. Air power, like surface based sea power, needs air superiority even more than does conventionally based land power. Where the difficulty arises is in accepting that the attainment of air superiority requires priority to the exclusion of all but the most vital of other air power tasks. Air power can do so much in direct support of the land and sea battle that it is difficult to resist the temptation to share it around, rather than concentrate on the one important task, that of first obtaining, then maintaining, air superiority. Once gained, air superiority is much easier to sustain.

Having made the claim for air power that it can win wars, it is important to acknowledge its very real limitations. War is a political act and must be conducted within the political constraints imposed upon the relevant governments. Air power can be vastly destructive and often there are limits to how far a government may be willing to go in allowing air power to realise its full potential. Also, air power takes time to achieve its effect. For example, air power can destroy an army in the field, but not in one decisive blow. More often the process is one of attrition. On some occasions such time may just not be available. Further, air power, which demands the employment of the best available technology, is very demanding of resources.

At no time in the history of warfare in this century, since the advent of the aeroplane in 1903 and the birth of air power, has air power been used to best effect. Much has been expected of it, but the results have not always met the expectations. Some would argue that this is because the expectations were too high; I would argue it is because air power has never been allowed to concentrate on the task of attaining and exploiting air superiority. Air power can win war; all that is needed is the resources and the will and foresight to allow it to do so.

Air Commodore Ashworth retired after 37 years as a General Duties officer in the RAAF in 1988. Since then he has been active in the study of military history and defence issues, including in particular air power and the history of the RAAF. He has, over many years, been a regular contributor to the Australian Defence Force Journal.
The Technological Edge.
Key Concepts in Air Power

By Dr Alan Stephens, Air Power Studies Centre

Introduction

Written doctrine includes the formalised and structured expression of a number of key concepts, tempered by the lessons of experience. Those concepts may or may not be recognised explicitly within a particular manual of doctrine, but their influence on the combination of theory and practice which is presented should be evident.

This article suggests that there are seven key concepts in air power, as follows:

- Control of the Air.
- Offensive Action.
- Unity of Air Power.
- Ubiquity of Purpose.
- Force Multiplication.
- Substitution.
- The Technological Edge.

Those terms are used here as concepts, not as maxims, principles, tenets or, in the case of control of the air, to identify an air power campaign. Each of the concepts rests on the inherent characteristics of the air weapon; that is, speed, range, responsiveness, flexibility, mobility, pervasiveness, high relative military effect, and the ability quickly to concentrate massive amounts of firepower. The thinking they represent and the actions they imply thus constitute the essence of air power.

The concepts have both an historical and a general, enduring relevance. Each had been identified at the latest by the mid-1920s, and each seems likely to retain its importance for the foreseeable future.

Two points must be made before examining the concepts. First, air power does not exist in a vacuum. Like most human activities it has a political dimension. Thus, the weighting an individual places on each of the concepts is likely to depend directly on his perception of the national purpose for exercising air power.

Second, it is unlikely that the concepts could be converted into sustained action without the support of a national logistics effort. That does not make ‘logistics’ a key concept in air power, any more than ‘aircraft’ or ‘pilot’ or ‘bomb’ or ‘training’ is a key ‘concept’. However, it does recognise that in the translation of theory into practice, which takes place at another level of planning, ideas must be supported by resources.

Control of the Air

Control of the air is a campaign conducted for the purpose of gaining freedom of action in the air. Once control of the air has been established, other air, sea and land operations may be conducted free from enemy air attack. This article discusses control of the air as an idea in air power, rather than as a campaign.

The first major role for air power in war was reconnaissance. Both the Union and the Confederacy used balloons for reconnaissance during the American Civil War (1861 to 1865), while Britain and Germany had both developed balloon observation units by the 1880s. When the Australian Flying Corps was established in 1915 as an army corps, its prime role was reconnaissance in support of land forces. Little, if any, consideration was given to using aircraft in other than a supporting role, even though the Italians had given a hint of the offensive potential of air warfare during limited bombing operations against Arab forces in Libya in 1911-12; and notable air power theorists like the Italian General Douhet and the English mathematician and aeronautical engineer F.W. Lanchester were already speculating favourably on the future prospects of the air weapon.

Air power in general and Australian air power in particular were, however, to find establishing a legitimate independent role very difficult in the face of army and navy opposition. Through to the end of the 1920s at least, the Australian Military Forces (AMF) and the Royal Australian Navy (RAN) continued to insist that air forces could only be a subordinate arm of navies and armies.

Despite that opposition, sharp divisions soon emerged between theory and practice. Even though army support theoretically remained the RAAF’s major task for most of the inter-war period, the evolution of air warfare during World War I and the force structure of air forces indicated otherwise. Once the crews of reconnaissance aircraft started shooting at each other to try to prevent reconnaissance from
having been carried out, control of the air had become a pre-requisite for all air activities, regardless of whether or not it was accorded formal priority.

That first airborne exchange of shots was the crucial moment as far as control of the air as a concept was concerned. Whether that control was to be achieved by defensive means (fighter aircraft, antiaircraft artillery [AAA] or, later, surface-to-air missiles) or offensive means (attacks on enemy aircraft on the ground, airfields, factories, and so on) was an operational rather than a conceptual issue.

In the event, specialist fighter aircraft were rapidly developed, and were supplemented by purely defensive measures such as AAA batteries and barrage balloons. When those fighters (also known initially as pursuits and scouts) started to use their enhanced attack capabilities to increasing effect against ground targets, another compelling reason to make control of the air the first priority existed.

While that operational imperative may not have been recognised in official doctrine, it was implicitly recognised in force structures, as fighter and attack aircraft began to enter air forces in increasing numbers. A force development program proposed by the RAAF in 1925, for example, comprised nine army and navy support squadrons and 18 air superiority and attack squadrons, even though support for the other two Services remained the RAAF’s prime formal responsibility.

The Battle of Britain during World War II is the best-known example of a campaign for control of the air, with the RAF’s victory averting the planned invasion of the United Kingdom. That battle, incidentally, is one of the few examples of a successful defensive control of the air campaign. In general, airmen would prefer to wage an offensive counter air campaign; that is, to destroy an enemy’s air force on the ground rather than fight a war of attrition in the air. It is noteworthy that the Germans had been on the verge of achieving an offensive counter air victory during the Battle of Britain when Goering made his fateful decision to shift the focus of the Luftwaffe’s bombing attacks from the RAF’s Fighter Command to British cities and port facilities, thus giving the RAF time to recover and regroup.

Control of the air has remained a prime concept in subsequent wars. In Korea, Malaya and Vietnam, Western forces enjoyed a degree of air supremacy which made all other air, land and sea operations far easier and far less costly than would otherwise have been the case.

During the Falklands War of 1982, it was essential for the Royal Navy (RN) Fleet Air Arm and the Royal Air Force (RAF) to achieve and maintain local air superiority over the British Task Force; while in the 1991 Gulf War, control of the air was the first objective of the Coalition air campaign which preceded the ground campaign.

Nevertheless, gaining control of the air need not in itself ensure victory, as the North Vietnamese demonstrated against the US and its allies in the 1962-75 Indochina war. While the allies enjoyed air supremacy (that is, complete command of the skies) over the South and air superiority (that is, sufficient command to conduct effective operations) over the North, they still lost the political war.

Perhaps the major conceptual issue for control of the air today is the weighting placed on offensive or defensive action. The inherent air power characteristics of speed, pervasiveness and mobility all work strongly in an attacker’s favour in terms of achieving surprise and a favourable force-to-space ratio. Those characteristics favour the offense and make it very difficult for a defender to protect a large area, to achieve a general air superiority. Consequently, many air forces, including the RAAF, base their air defence plans on achieving local air superiority; that is, control of the air over a specific location for a specific period of time.

The emergence of low observable (‘stealth’) technology could have a profound effect on the battle to control the air. While stealth technology may be expensive, it seems to be neither especially difficult to develop nor exclusive. During the Gulf War, some of the RAF’s strike Tornados were quickly modified to achieve a reasonably effective degree of ad hoc stealth qualities. If it becomes increasingly difficult (and, therefore, expensive) to track and target stealth aircraft, the emphasis in a control of the air campaign inevitably will have to focus even more on offensive operations, with the objective being the destruction of the enemy fighter force on the ground. Further, an air force with stealth has de facto control of the air (that is, it achieves control without having to fight for it), and therefore may be able to place greater emphasis on and divert resources to other campaigns. Deciding how to best deal with those issues represents a major conceptual challenge for air force strategists.

## Offensive Action

The most widely-read and influential military strategist, Carl von Clausewitz, believed defence to be the stronger form of warfare, as it is intrinsically easier to defend than attack. Exactly a century after Clausewitz started writing his classic work *On War* in 1816, airmen turned that concept on its head.
"It is the deliberate opinion of those most competent to judge" wrote the immensely influential air power theorist, General Hugh Trenchard, in September 1916, 'that an aeroplane is an offensive and not a defensive weapon.' At the time Trenchard was commander of the Royal Flying Corps in France. He recorded his judgement in a brief instruction to the Corps titled Future Policy in the Air, a document which has since become recognised as the classic statement on the offensive use of air power.\(^\text{10}\) Trenchard drew his conclusion partly from the conditions which prevailed in France at the time, and partly from the inherent qualities of aircraft. His judgement was correct in 1916, remained so during World War II, and holds true today.\(^\text{11}\)

At the risk of generalising, in most instances it is difficult to defend against an air threat. Few armed forces would confidently expect to defeat modern attack aircraft like the F-117, F-15E, F/A-18 and the F-111 armed with stand-off weapons and supported by Electronic Combat systems. Again, at the risk of generalising, victory in war is likely to require offensive action at some stage; in other words, a purely defensive posture is unlikely to succeed. That imperative, in combination with the particular qualities of aircraft, has underpinned the airman's preference to use air power offensively.

Thus, notwithstanding air power's modest beginnings in reconnaissance, the idea of using aircraft offensively was never far beneath the surface. By the end of World War I, offensive air action was so wide-ranging it had become an integral component of warfare.

Air strikes were not confined to the front-line, but already comprehended a strategic dimension. Indeed, it was only seven weeks after the declaration of hostilities that Sopwith Tabloid aircraft from the Royal Naval Air Service attacked a Zeppelin shed at Dusseldorf. By January 1915, Zeppelins in turn were bombing English cities.

The bombing raids on London in June and July 1917 by German Gothis probably caused more panic in the UK than any other single event during the war.\(^\text{12}\) While the material damage was slight, the psychological effect was profound, and came to be epitomised in the new concept of "terror" bombing. As a direct consequence of the public and political reaction to those raids, the Royal Air Force came into being as a separate Service within nine months, while within three months a British strategic bomber force under the personal command of General Trenchard had been established in France for the express purpose of carrying out reprisal raids against the German homeland.\(^\text{13}\)

In response to the Gotha attacks, General Trenchard's Independent Force (as it was known) carried out long distance night raids against strategic targets in Germany with a degree of daring that makes gripping reading and, incidentally, in the process demonstrated a level of conceptual, technical and individual professionalism not always associated with aviation in World War I.\(^\text{14}\)

The commitment to the offensive was also evident in the rapid development of formation flying and its associated tactics as a method of concentrating force. Thus huge formations of fighter aircraft massed to seek combat — to take the initiative, to act offensively — over the Western Front, the best known example being von Richthofen's Flying Circus.

Incidentally, the symbolic effect of massed formations should not be overlooked. They were clear evidence that air warfare had become an end in itself; that air power was far more than simply an adjunct to land and sea power.

The belief in offensive action continued to dominate air force thinking during the inter-war years, especially in the context of strategic bombing. Building on the ideas of men like Trenchard and two other early theorists, Douhet and the American General Billy Mitchell, a school of thought developed which believed future wars could be won by air power alone, through the means of a quick and decisive strategic bombing offensive. Seeming paradoxically, that notion was based in part on humanitarian logic, as it was thought that the rapid conclusion of war which was postulated would minimise human and material losses.\(^\text{15}\)

The new concept of war fighting ostensibly did not rest on a planned campaign of "terror" bombing, but rather on an assumed ability to attack key elements of an enemy's war potential (especially his air forces) with precision and devastating force, which would as a secondary effect undermine public morale.\(^\text{16}\)

That was the theory and the official position. In practice, the threat of indiscriminate terror attacks on civilian populations loomed darkly over international relations throughout the 1930s.\(^\text{17}\) That threat was given substance during the Spanish Civil War by the horror bombing of Guernica by the German Condor Legion on 26 April 1937. The perceived menace of the Luftwaffe played a significant part in the appeasement of Hitler during the Munich crisis of September 1938, during which air raid trenches were dug in London parks and nearly one third of the population of Paris evacuated the city.

In the event, the Strategic Bombing Offensive waged by the RAF and the United States Army Air
Force against Germany and Japan during the Second World War remains probably the most contentious issue of the war. The offensive encountered considerable operational and technical problems and did not meet the exaggerated expectations of its most enthusiastic advocates. It did not achieve a quick and decisive victory, and, in the case of the RAF's Bomber Command at least, was based essentially on a campaign of terror. By the same token, there is no doubt that the overall bombing campaign made a major contribution to the eventual allied victory. The official United States Strategic Bombing Survey concluded in September 1945 that allied air power had been 'decisive in the war in Western Europe... It brought the [German] economy... to virtual collapse'. 18

According to the Nazi's Minister of War Production, Albert Speer, if attacks of the scale of those made against Hamburg in the week of 25 July to 2 August 1943 had been repeated against six more major cities, Germany's armaments production would have been brought to a 'total halt'. 19

It is significant that, unlike the allies, neither the Germans nor the Japanese ever developed a genuine strategic air offensive capability. The Luftwaffe was structured essentially to support the army, and Japanese air power the navy. That deficiency was a major factor in the eventual inability of the Axis powers to prosecute the war to maximum effect. 20

The idea of 'terror bombing' mentioned above clearly had a psychological foundation. All warfare, of course, rests on a psychological base to some extent, but none more so than offensive air action. Following the two atomic attacks on Japan — the ultimate example of offensive air action — the concept of 'deterrence' dominated global strategic thinking. Although deterrence was defined primarily in terms of a nuclear capability, it was extended by some planners to include conventionally armed air forces. Thus, the RAAF, for example, has persistently referred to its bomber fleet as a 'deterrent' force. Both the Canberra and the F-111 were acquired for the perceived 'deterrent effect' they would create through their explicit threat of offensive action. 21

In the section of this article on the concept of control of air, the difficulty of establishing a general level of air superiority was noted. That difficulty arises largely from the inherently excellent offensive capabilities of strike aircraft, and the consequent difficulty of mounting a reliable defence. That observation is also relevant here, as it illustrates why, in many circumstances, offensive action will be the most cost-effective way of fighting a war, as well as being the best way of taking the initiative. Notable examples include the highly successful pre-emptive strikes by the Israeli Air Force in the 1967 Six-Day War and against the Osirak nuclear reactor in Iraq in 1981.

The point can be taken further. While control of the air is properly recognised as the prime air campaign, it is questionable whether it is the most deeply held belief of airmen. There is strong evidence that the first conviction of airmen has always been, and remains, one of offensive action. The RAAF provides a good case study.

From the earliest days of World War I, the RAAF has appreciated the tactical and operational necessity to gain the command of the air. However, at the final emotional level (which does not necessarily exclude rationality and military logic), it has been offensive action, expressed through strike/bomber aircraft, which has been considered the heart of air power. It was, after all, the belief of the classical theorists that wars could rapidly be won by air power alone which was the main justification for the establishment of independent air forces, and on which the alleged/perceived/actual dominance of the air weapon continues to rest. In the RAAF, former Chiefs of the Air Staff Air Marshal Sir George Jones, Air Marshal Sir Donald Hardman, Air Chief Marshal Sir Frederick Scherger, Air Marshal Sir Valston Hancock, Air Marshal Sir Charles Read and Air Marshal Sir James Rowland have all argued the pre-eminent place of the bomber in air power. 22

Recent strategic and force structure thinking in Australia suggests that the concept of offensive action retains its primacy in air power doctrine. One of the most influential defence planning papers in recent years, the 1986 Review of Australia's Defence Capabilities by ministerial consultant Paul Dibb, proposed an essentially defensive strategy for Australia, which Dibb called 'denial'. Largely because of his preference for a defensive strategy, Dibb questioned the place in the ADF's force structure of the RAAF's prime strategic strike assets, the F-111 bombers. 23

One positive consequence of Dibb's outlook — which flew in the face of 70 years of air power thinking — was the pressure it placed on the RAAF to re-examine the importance of, and its commitment to, offensive action. That the RAAF (and other like-minded Defence strategists) was successfully able to meet what was a considerable intellectual challenge became apparent in two subsequent major government policy documents.

The first was the 1987 Policy Information Paper The Defence of Australia, which was based on the Dibb review, but which rejected 'denial' in favour of a strategy of 'defence in depth', in which the place of offensive action by the F-111s was explicitly recognised. 24 The second document was a major ministerial
statement made in 1989 by the Minister for Foreign Affairs and Trade, Senator Gareth Evans, titled *Australia's Regional Security*. In that statement, Senator Evans acknowledged the need to retain in the ADF a mix of offensive and defensive capabilities, with the latter constituting 'a strong message of deterrence against any attack on Australian territory'.

The stunning application of offensive air power during the 1991 Gulf War indicates that the dominance of the offense over the defence in warfare in general and air warfare in particular is likely to continue, and that the concept of offensive action will remain pre-eminent in air power strategy.

**Unity of Power**

The concept of unity (of command) is probably the most politically sensitive of those under discussion in this article, as it is sometimes perceived as nothing more than a self-serving attempt by airmen either to retain or gain control of all air assets. The occasional use of terms such as 'indivisibility' or 'independence' as synonyms for 'unity' by advocates of the concept has perhaps contributed to the problem, which often is manifested as inter-Service rivalry.

The medium in which air power is applied — space — 'is an indivisible field of activity'. However, some airmen seem to confuse that physical fact with the application of air power. Air power itself manifestly is not 'indivisible' — the United States, for example, maintains four separate, very powerful air forces, while even Australia has three. Nor is 'independence' an exclusive characteristic of air power. Clearly, any of the three forms of military power can be applied independently if necessary, just as they equally clearly can be applied in various combinations of jointness. Any suggestion that air power is either inherently 'independent' of 'indivisible' thus is illogical.

'Unity', however, is a different matter. There are two main justifications for the concept, one concerned with organisational effectiveness and the other with combat potential. Those justifications have particular relevance for a small defence force which must minimise cost while maximising flexibility and the ability to concentrate force.

In a small defence force, expensive and valuable air assets are likely to be at a premium. Thus the advocates of unity argue that air power should not be 'penny-packeted', but rather should be controlled at the highest practicable level to facilitate the allocation of the right amount of air power to the right place at the right time.

The second justification rests on the need to maximise combat potential, and can itself be broken down into three components. First, the application of military power is a highly specialised business, which is based on environmental — that is, land, sea and air — expertise. The three environments are unique, and demand the unique skills of the three single Services. Taking the example of the air environment, modern aircraft and air weapons systems are complex, versatile and flexible, and can bring enormous firepower to bear. Those are factors which demand the expert matching of crews and capabilities to tasks, which in turn dictates that the control of air assets should be vested in a commander with a deep understanding of air power and its application. The principle applies equally to the management of scarce and valuable land and sea assets.

Second, a specialist organisation is more likely to develop innovative uses for its platforms and systems, not only because the application of the particular form of military power is its *raison d'être*, but also through its access to a wider range of people and experiences. A good example of that belief in practice was the RAAF's successful development during the Vietnam War of the Iroquois helicopter gunship, a process in which the Air Force was able to draw on the weapon expertise of its fighter pilots.

The final justification for 'unity' in terms of combat potential turns on the operational practice of 'surge', or rapidly building up specific elements of a fighting force. The campaign of 'control of the air' is used here to illustrate the point. While control of the air is the prime air campaign, there are no hard and fast rules in war. The possibility always exists that, in a particular set of circumstances, priority might have to be shifted to other air missions. For example, the need to resupply army units for a protracted period might assume such importance that a maximum airlift effort becomes essential, regardless of any other consideration. Alternatively, there might be no requirement to fight for control of the air; an enemy might have powerful land or sea forces, but no air power. Unity of command alone confers the ability quickly to reinforce particular force element groups by transferring assets (including pilots and support personnel) to the area of greatest need.

From the foregoing, it should be clear that the concept of unity applies to all forms of military power — land, sea and air.

Like any concept, unity must be applied with judgement. A strong argument can be made that the Royal Australian Navy's Seahawk helicopters are so important to the operations of its surface warships that they should be considered 'organic' to that role, that
is, they cannot be placed in a 'unified' pool of air assets, but must always be allocated to the fleet. Those kinds of decisions involve a conscious acceptance of reduced efficiency (the application of 'unity' is diminished) for the sake of effectiveness (the RAN's warships are far more effective with helicopters embarked).

Several concluding observations on the historical background to the concept of 'unity' are worthwhile. First, the decision to form the RAF as the world's first independent air force in 1918 was based largely on the dual needs of specialisation and organisational efficiency. Second, the decision to form the RAAF in 1921 was partly an Inter-Service and political compromise, and partly an acknowledgement of the need for efficiency and economy. Finally, the decision to establish the USAF in 1947 was taken on the grounds of organisational efficiencies and specialisation. In other words, the importance of the concept of 'unity' was implicitly recognised in each of those decisions.

**Ubiquity of Purpose**

'Ubiquity of purpose' in aircraft design and, therefore, capabilities, became an article of faith in air forces in the period between the wars. The idea was to develop 'general purpose' aircraft which individually would be capable of performing a range of different roles. It was an idea which gained some substance in the late 1930s, when aircraft with a reasonable general purpose performance, such as the Anson, the Blenheim and the Hudson, began to enter service.

In the modern era, the terms 'multi-role' and 'multi-mission' have been adopted to describe the concept and the capabilities it allegedly confers. 'Multi-role' describes an aircraft which can perform a number of different roles, but not necessarily during the one mission, while 'multi-mission' describes an aircraft which can conduct a number of roles during one mission. A prime example of a multi-role aircraft is the variable geometry F-111 which, during its development in the early 1960s, was promoted by US Defence Secretary Robert McNamara as a platform which would be able to undertake many of the combat missions of the USAF and the USN.

The significance of 'ubiquity' as a key concept rests simply on its potential to maximise that most valuable, innate quality of air power, flexibility. An incident from the 1991 Gulf War illustrates the idea. During a bombing mission against an Iraqi airfield, four USN F/A-18s were attacked by two Iraqi MiG-21s. Although configured for air-to-ground operations and loaded with 8000 lbs of bombs, the F/A-18s quickly changed to the air-to-air mode and shot down both MiGs. They then reverted to the air-to-ground mode and successfully completed their task.

Similarly, an RAAF B-707 deploying a fighter squadron from southern to northern Australia could be completing three roles simultaneously: troop lift, cargo carrier and air-to-air refueller.

The development of multi-role aircraft can be seen as a reaction to the ideas of one air force. First, it reflects the flexibility and mobility which are inherent characteristics of air power. Second, it is a product of technological development in platforms and systems. Third, cost savings are likely to be achieved by operating a single, versatile aircraft type instead of a number of special-purpose types. Finally, the idea of developing aircraft which have a range of roles effectively was a response from airmen who, in the early years of military aviation, were formally committed to supporting surface forces (tasks which, like any, have implications for aircraft performance), but who wanted to apply air power in its fullest sense.

Thus, in 1936, the CAS of the RAF, Sir Edward Ellington, stressed to the RAAF the need to avoid acquiring aircraft which were suitable solely for roles 'ancillary to land and sea forces'. Ellington urged his Australian colleagues to equip their air force with 'general purpose' aircraft which, while still capable of meeting their primary role of army and navy support, would also be able to produce 'an offensive air effort'. As Australia embarked on a rearmament program with World War II approaching, Ellington again took the opportunity to remind the RAAF of the need to incorporate 'ubiquity of purpose' as a prime characteristic in any aircraft they acquired, making the interesting observation that while the 'striking power' of the RAAF seemed rather weak on paper, the fact that the RAAF could supplement its bomber force with its army cooperation aircraft made that weakness 'more apparent than real'. In other words, by acquiring aircraft for army support which were in fact multi-role, the RAAF had at the same time strengthened its strike potential.

The concept of ubiquity was not without its shortcomings in the early years. The problem was a familiar one in air power theory: the inability to match ideas with suitable hardware. For example, the types of aircraft Ellington had in mind were the Anson, Hudson and Beaufort. As twin-engine, retractable undercarriage monoplanes, those machines represented a significant advancement in performance and capability over the previous generation of general purpose aircraft. However, their lack of specialisation (such as high speed, or large bomb load, or extreme
KEY CONCEPTS IN AIR POWER

range) limited their utility in the intensely hostile operating environment of a world war. The demands of combat quickly exposed the need for specialised, essentially single role aircraft. Nevertheless, in the crucible of war, several outstanding multi-role aircraft did eventually emerge, with the Mosquito being perhaps the best example.

In recent years attempts to develop a genuine multi-role aircraft have been more successful, while still not producing a weapons system that is the best in each of its intended roles. For example, the F-111 is an outstanding strike and electronic warfare aircraft but has a mediocre air defence capability; the Tornado is a good rather than an outstanding aircraft; and the F/A-18 provides an excellent air-to-ground capability but is inferior to the specialised takeover F-15C in the air defence role.

Multi-roling is not restricted to attack aircraft. The Lockheed Hercules is capable in at least six roles, including airlift, anti-submarine, air-to-air refuelling, attack, reconnaissance and AEW&C. It is noteworthy that the prototype C-130, which was designed primarily to carry cargo and troops, first flew in 1954.

The question of how to make weapons systems both more versatile and technologically superior is one of the most important confronting air power planners in a period of extreme financial stringency. It is a problem which essentially turns on the choice of either paying for new platforms or fitting new systems to old platforms. The Rand Corporation's Ben Lambeth has argued that in some roles — notably air-to-air combat — air forces will continue to need new, highly specialised platforms. On the other hand, there is great potential for existing platforms to be given impressive multi-role and multi-mission capabilities through the use of pods (for example, electronic warfare reconnaissance and weapon systems) which can be fitted as required. There are few better examples of the 'old platforms, new systems' approach to achieving ubiquity of purpose than the RAAF's F-111s. Ordered 30 years ago as strategic bombers, the F-111s now also have excellent close air support, precision strike, maritime strike and reconnaissance capabilities. Largely because they have been made so versatile, the F-111s are likely to remain in front-line service for 40 years.

Force Multipliers

Force multiplication is a relatively new description of an old idea. Air Vice-Marshal R.A. Mason has suggested that while Lord Trenchard would not have recognised the term, he was familiar with the concept: 'to expand the effectiveness of man and machine without increasing the numbers of either; in that way lies economy'. In current terminology, the term also comprehends notions like 'smaller but larger' and 'doing more with less'; that is, as well as enhancing force effectiveness, it recognises the need for financial economies.

Force multiplication is relevant to any form of military power, but the inherent speed and pervasiveness of aircraft give the concept particular force in relation to air power. The enhancement, or multiplication, of the combat effectiveness of a military asset which can be in Melbourne at 8:00 am and Learmonth by noon assumes an exponential value.

Mention has already been made of the multi-role aircraft, which is itself a form of force multiplication. Other force multipliers include air-to-air refuelling; precision guided munitions; precision attack and navigation systems; night vision equipment; airborne early warning and control aircraft; wide bodied aircraft; electronic warfare; real time, secure, data link communications; maintenance practices which produce a high percentage of serviceable aircraft; R&M (reliability and maintainability); good training; and good people. The relationship between theory and practice of force multiplication is apparent in those examples. Night vision equipment facilitates the conduct of around-the-clock tactical operations; a high percentage of serviceable aircraft enables more missions to be flown by a given number of platforms; PGMs can destroy in one raid a target which may have required hundreds of sorties using dumb bombs; and so on. In sum force multiplication describes the kinds of capabilities which 'expand the effectiveness of man and machine'.

Substitution

Like many effective concepts, substitution is simple but not simplistic. It involves the substitution of one form of combat power for another. Because the concept is most likely to arise as a planning consideration when resources are limited, it tends to favour systems which are inherently flexible and provide a range of options. In general, therefore, it applies to the substitution of air power for land and sea power. Indeed, because air power is so flexible, it can be substituted for the other kinds of military power to an extent which is not possible in reverse.

The point must be made that substitution should not be used to promote one Service at the expense of
another. Rather, it offers a method by which defence planners can manipulate the force structure so that capabilities are consistent with strategic policy and funding.

Substitution as a strategic concept was developed by the CAS of the RAF, Sir Hugh Trenchard, in a series of campaigns conducted by the RAF in the Middle East and the Northwest Frontier of India in the 1920s. In 1921, acting on the advice of Trenchard, Winston Churchill, as Minister for War and Air, transferred responsibility for defending Imperial interests in Iraq from the Army to the RAF. Churchill’s decision was based partly on a wish to save money, and partly on Trenchard’s assurance that Imperial authority could be enforced through the strategy he called ‘Air Control’. Consequently, a garrison of 33 Imperial battalions costing 20,000,000 pounds a year was replaced by five RAF squadrons, without any army forces in support, at a cost of less than 2,000,000 pounds a year.

As well as exploiting the pervasiveness, speed and striking power of aircraft, Air Control or the ‘Air Method’ of policing territories relied heavily on the moral effect of a population’s fear of aerial bombardment. Before an errant tribe or community was actually bombed, well-defined procedures were followed, with a sequence of warnings being given, often by proclamation dropped from the air. If that procedure did not work, a ‘punishment’ air raid was carried out.

Air Control amounted to the substitution of air power for land power and was highly successful. Not surprisingly, however, the ‘substitution’ debate, as it became known, also generated the most intense opposition from naval and military quarters. That did not deter Trenchard, who in 1929 prepared a paper titled The Fuller Employment of Air Power in Imperial Defence, which declared unequivocally the belief of the Air Staff that real economies with at least no less efficacy could be secure by the substitution of Air Forces for the other arms over a very wide field.

With its unmistakable implications for the other Services, substitution has remained a contentious issue over the years, while also retaining its operational and economic logic.

The experiences of the 1991 Gulf War indicate that substitution could once again emerge as a keenly debated topic in defence circles. In the initial phases of Operation Desert Shield (which preceded Desert Storm), it was air power which the Coalition first deployed to the Middle East. When dissatisfaction arose over Saddam Hussein’s apparent refusal to comply with United Nations directives following Iraq’s defeat, it was again air power which the Coalition threatened to send back to the Gulf as the means of enforcing compliance. In each crisis, air power was substituted for the old Imperial strategy of gunboat diplomacy. Some senior military officers have described the AWACS aircraft as the gunboat of the late 20th Century. General John Shalikashvili, Nato Supreme Allied Commander Europe, has noted that in a crisis, Nato’s AWACS fleet can be deployed to demonstrate concern, responsiveness and multinational solidarity, while at the same time monitoring events. Varying levels of concern could be signalled by supporting the AWACS with combat aircraft.

The application of substitution could be taken further. As the promised massive defence cuts start to take effect in the next five years, the fight between Services for resources is likely to be intense; indeed, in the United States it has as already been described as a ‘turf war’. The continuing improvement in multi-role aircraft and force multipliers seems certain not only to confer a quantum leap in air force capabilities, but also to broaden the potential to substitute air power for land and sea power. Additionally, with the growing ability of aircraft to sustain a presence and protect large areas (through more efficient engines and aerodynamic shapes, and enhanced sensors and weapons), the next generation of aircraft can be expected to intrude further into traditional naval roles such as long range patrol, surveillance and escort. An aircraft may not perform those tasks as well as a surface vessel, but it will provide a reasonable capability and relatively high survivability while not losing any of its unique primary effectiveness. For small nations with constrained budgets, such considerations should assume central planning importance.

The Technological Edge

Individual and collective human excellence is the basis of organisational achievements. Nevertheless, the application of air power is an intensely technological business. All else being equal, the air force with a technological edge is likely to win wars. It is for that reason that enormous amounts of resources have been, and continue to be, poured into research and development. The remarkable advances made in aviation during the two world wars provide concrete evidence of the importance of the technological edge.

One of the first noteworthy examples of the power of technology used the emergence of the Fokker Eindecker over the Western Front in late 1915. With its unique, synchronised, forward firing gun, the
Eindecker suddenly and dramatically swung the advantage in the air war to the Germans, to the extent that the Royal Flying Corps had to modify its tactics until British engineers produced a synchronised gun.\(^6\)

Technology was one of the keys to the allied victory in the air in World War II, through such equipment as radar, precision navigation equipment, and advanced aircraft design and weapons. There were also reverses when allied equipment was significantly inferior to the enemy’s, notably for the RAAF when its Buffalo, Wirraway and Hudson aircraft were hopelessly outclassed by the Japanese Zero fighter in the early stages of the war in the Southwest Pacific Area.\(^7\) The RAAF also suffered in Korea, when its straight-wing Meteor fighters were no match for the communists’ swept-wing MiG-15s.

While the importance of high technology is difficult to overstate, the human contribution must never be forgotten, as the North Vietnamese demonstrated from 1962-1975 when a peasant-based army defeated the most advanced military technology in the world, by winning the political war and fighting the war on the ground with tactics which maximised those of their vastly technologically superior opponents.

The 1991 Gulf War represents the best example to date of the war-winning qualities of high technology, especially as applied by air power. The platforms, weapons and systems available to the Coalition, when applied by skilled operators, provided the foundation for a crushing victory. While the initial successes claimed for high technology were later modified, the original judgement stands.\(^4\) High technology generally was reliable and effective. It worked, and continued to work, in demanding conditions on a sustained basis. As The Economist concluded, the high-technology equipments which were in the main employed by air forces were ‘war winners’. Those equipments and the strategies which they facilitated were also primarily responsible for the extraordinarily low number of casualties sustained by the Coalition forces.

Belloc’s aphorism from another era, suitably modified for the developments in weapons systems, could be transposed to the late 20th Century:

> Whatever happens, we have got The Maxim gun, and they have not.

This article has suggested that there are seven key concepts underpinning air power doctrine: control of the air, offensive action, unity of air power, ubiquity of purpose, force multiplication, substitution, and the technological edge. Those concepts rest on the essential characteristics of the air weapon. That should not be surprising; nevertheless, it seems a necessary point to make. Perhaps because of the exaggerated claims sometimes made by the early air power theorists and their inability to match ideas with capabilities, qualities which may seem self-evident to airmen are sometimes viewed with scepticism by others.

Given that background, it is noteworthy that six of the key concepts had been identified by the end of the Great War, and the seventh (substitution) by the early-1920s. Whether or not they were fully understood in air forces then and later remains problematic. There is no doubt, however, that the concepts were appreciated by those airmen who planned the air war in the Gulf in 1991, when their application — either tacitly or explicitly — provided the intellectual foundation for the most successful air campaign yet conducted.

## NOTES

1. My thanks to Air Marshal R.G. Funnell for his valuable comments on the draft of this paper.
2. That is, compared to the other forms of military power (land and sea power), very few friendly forces are placed at risk in relation to the amount of force applied.
4. Douhet’s classic work, The Command of the Air, was published in 1921. However, it contained ideas which he had been developing for over a decade. See Colonel Phillip S. Meilinger, Giulio Douhet and Modern War, Unpublished Paper, School of Advanced Airpower Studies, Maxwell Air Force Base, 1992. Lanchester was presenting his vision for the employment of air power publicly by 1915; see Robin Higham, Air Power: A Concise History, Sunflower University Press, Manhattan, 1988, p 177.
6. ibid, pp 29-49.
8. Waters, op cit, p 272.
11. For judgments on the essentially offensive nature of air power 

## Conclusion

The effectiveness and availability of such technologies as precision-guided munitions, night vision goggles, infra-red designators, global positioning system, air-to-air refuelling, low observability, AEW&C, J-STARS, advance missiles, and space-based surveillance and communications, can only increase. It is difficult to imagine how a conventional war could be won in the future if one side had access to advanced systems and another did not. Hilaire
15. William Mitchell, in *Winged Defense*, Doover Publications, New York, 1988, p xvi, wrote that air power’s unique ability to ‘strike immediately at the enemy’s ... centres’ would result in a ‘tremendous’ saving of lives and expenditure.
29. In addition to the USAF, the US operates powerful air forces in its Navy, Marines and Army; while in the ADF both the RAN and ARA operate significant numbers of aircraft.
34. The concept also raises images of Douhet’s ‘Battleplane’, a machine which the Italian envisaged would combine the capabilities of bomber and fighter aircraft. See Douhet, *op. cit.*, pp 117-20.
43. ‘Tight Budgets Mean Services Now Openly Fighting for Other’s Cash’, in Defense Week, 2-7-90, pp 12-13.
44. The Economist, September 5th 1992, esp ‘Endangered Species, and others’.
47. ‘We Have the High Tech, They Have Not’, in The Economist, September 5th 1992.

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Air Bases

By Group Captain Gary Waters, RAAF

‘It’s as simple as one, two, three.
Air “force” consists of three elements: the air base from which aircraft are launched and recovered, the aircraft themselves, and the air-to-air and air-to-ground munitions that make the sorties productive’.

The generation of air power is more than aircraft in the air. Air bases are also essential as they provide a platform for training an operational force and as a springboard for operations. That is, air bases are essential for the projection of air power, but because they are static, difficult to conceal and open to surveillance, they are prime targets in time of conflict. Moreover, where bases contain large operational and support elements, they become more attractive as targets.

This article presents an historical view of the importance of air bases and consequent attacks on them once conflict has been joined. The concept of an air base is explained, including its value as an operational entity, its vulnerabilities, and current basing philosophies of the RAAF.

History

In World War I, airfields could be constructed such that they “exceed the requirements of aircraft and were relatively simple to repair”. Airfields were not really considered to be critical targets. That was to change some 20 years later. In fact, examples abound from World War II where air bases were destroyed by medium-altitude carpet-bombing attacks. Specific targets were not discriminated and the air base itself was the target. Most nations’ inventories today boast significant stocks of conventional iron bombs, hence such attacks should not be discounted with the passage of time and technological improvements in precision attack systems.

Germany certainly recognised the value of attacking airfields early, and launched a concerted campaign in May 1940. Airfields in Belgium, the Netherlands and northern France were attacked on 10 May 1940, with attacks against French airfields to the south being prosecuted on the 11th and 12th. After this, the French redeployed their aircraft which reduced the effectiveness of further German attacks. These deployment airfields were located by 3 June and over the three days (3-5 June 1940) almost 900 French aircraft were destroyed, effectively nullifying the combat capability of the French Air Force. On 22 June 1941, the Germans destroyed almost 800 Soviet aircraft on the ground. Similar examples can be found in the Pacific theatre, such as the attacks on Pearl Harbor, the Philippines, and British and Australian airfields in northern Malaya and Singapore.

In mid-1943, Allied forces conducted offensives from the Solomon Islands and New Guinea which drove the Japanese backwards. These offensives which relied on air power for their success, also depended on the availability of forward air bases. By 20 February 1944, all Japanese air forces had withdrawn from Rabaul. The following three comments by two noted Japanese authors – Okumiya and Horikoshi – on the importance of Allied air bases in the Japanese rout deserve to be quoted in full. The implications are obvious and further words would be superfluous.

“These successive withdrawals from our air bases could be regarded as nothing less than major disasters. Every base which was abandoned meant another enemy advance toward the heart of Japan, and another key point from which the enemy could dispatch his far-ranging bombers. Each air base lost involved not only ground installations taken over by the Americans, but a never-to-be-regained loss in our ability further to resist the enemy.”

“A world of difference existed between the ability of the Japanese and Americans to construct air bases in the combat theatres. Basically, we relied upon primitive manpower to clear jungles and pound out airstrips for our planes, while the Americans literally descended in a mass mechanical invasion on jungle, coral, and rock to carve out their air-base facilities. This difference in method undeniably and seriously affected the air operations of both belligerents, much to the benefit of the Americans.”

“The construction of adequate air-base installations facilitated rapid and large-scale movement of the enemy’s air forces, thus contributing directly to a great increase in his combat strength in any theatre of action. Moreover, the vast and numerous
bases gave the enemy the capacity to maintain large groups of interceptors in the air, and deny Japanese bombers the opportunity to destroy enemy planes on the ground.\textsuperscript{10}

When North Korea invaded the south in June 1950, the US boasted an aircraft – the F-80 Shooting Star – that would maintain air superiority. However, once the major air bases that could support the F-80 were captured by the North Koreans, the USAF had to operate from bases in Japan, thereby compromising effectiveness in maintaining air superiority. The USAF was forced to bring its Mustangs out of storage (as well as recalling some from the Air National Guard) so that it had aircraft which could operate from air bases in South Korea. Air forces the world over learned that ‘increased airborne performance alone will not guarantee the combat effectiveness of an aircraft’.\textsuperscript{11}

During the Six-Day War in 1967, Israeli aircraft dive-bombed Arab airfields and by the end of the war, 391 Arab aircraft had been destroyed on the ground (a total of 469 Arab aircraft were lost).\textsuperscript{12} This marked a turning point in airfield attack as the missions were flown at low-level, with jamming and evasive tactics used to penetrate the air defence systems. By the war of October 1973, the Arabs had learned to use hardened aircraft shelters. But that did not stop attacks against air bases – the Israelis now targeted the runways.

The Viet Cong recognised the value of air bases during the Vietnam War and launched ground attacks against Bien Hoa on 1 November 1964 and Tan Son Nhut on 31 January 1968 (during the Tet Offensive). They were successful in the former, but failed in the latter. The importance of the Vietnam War was that it showed that threats to air bases could be mounted from the ground, as well as from the air.

During the India-Pakistan War of 1965, Pakistan Air Force Sabres conducted several raids against Indian airfields. For example, they destroyed nearly all India’s MiG-21s in an attack on Pathankot airfield on 6 September 1965, and forced heavy losses on India’s Canberra bomber fleet at Kalai Kunda the next day. On the 10th, four Indian aircraft were destroyed and buildings and hangars damaged at Bagdogra. Adampur airfield was also attacked, on the 14th, but this time one of the Pakistani crews (from a B-57) was forced to eject and the two airmen became the first prisoners of war of the 1965 War.\textsuperscript{13}

In 1982, RAF Vulcans bombed the Port Stanley runway in the Falklands. The effectiveness of such attacks is not so much the issue, but the fact that the attacks were conducted in the first instance lends weight to the validity of the attractiveness of air bases as likely military targets in time of conflict. Certainly, the British could have used other aircraft and weapons in-theatre to destroy the air base if they had so wished.

Conventional wisdom earlier had recommended that attacks against air bases be conducted from medium to high altitude. After 1967, the wisdom suggested low-level attacks with special weapons that would both penetrate runways and lay scattered anti-personnel minelets; yet, the Gulf War of 1991 witnessed the use of iron bombs from medium altitude against Iraqi runways (although special weapons such as JP-233 were also used).\textsuperscript{14} Technological advances will continue to provide improved means for attacking air bases, using different tactics and diverse attack profiles. While runways are difficult to destroy, an air base provides an abundance of targets, and while attacks against an air base may not halt air operations completely, they can be very effective in disrupting operations.

The Iraqis had undertaken significant hardening and survivability measures to dissuade an enemy from attacking its air bases. However, the coalition was not dissuaded in 1991. Coalition planners determined the significance of each Iraqi air base and assessed whether its attack would contribute to the overall strategic goals of Desert Storm. Hence, only selected bases were attacked – those within easy reach of the Kuwaiti Theatre of Operations and those which housed Iraq’s sophisticated aircraft such as the MiG-29 Fulcrum, Su-24 Fencer and Mirage F.1.\textsuperscript{15}

From the coalition’s point of view, operations from Middle East air bases provided one important experience that is noteworthy in its relevance to the safety of personnel. The increased tempo of operations created several potential safety hazards, not only to the aircraft, but also to personnel on the air bases, in terms of live-weapon loading.\textsuperscript{16} While there are many other examples of risks to personnel, the important issue is that the level of risk increases substantially in time of conflict.

This level of risk and threat of attack will affect personnel, and even well-trained military personnel will react in unusual ways. One observation from the Gulf War was that ‘it was interesting to see the effects of the stress placed on personnel by separated service, 12-hour shifts, no leave or R and R, and the threat of air or Scud attack – all occurring over an extended period of time’.\textsuperscript{17} While aircrew sometimes exercise under simulated operational conditions against enemy aircraft in peacetime, such is not the case for ground personnel. Hence, it should be expected that the reaction of ground personnel, who are subjected to fire for the first time, will require close management.
The Concept

While the historical perception has been important to show that air bases and the personnel on them have been attractive targets in the past, and will continue to be in the future, the importance of the concept of the air base should not be missed. Understanding an air base as an entity is the first step, which then leads to the essential elements of an air base that contributes to the effective generation of air power. From this, a clear comprehension of air base vulnerabilities and RAAF basing philosophy can be gained.

Operational Entity

An air base is an operational entity that consists of a multitude of supporting systems, and as the operational capacity of the air base is nullified, the ability to generate air power is reduced accordingly. These substantial supporting systems include infrastructure, logistics, C2 and personnel. The combination of platforms, weapons and supporting systems makes the security of air bases a high priority for any defence force. Air bases must have the capability to respond to the unexpected and hence must be designed, equipped and manned with adaptability in mind, just as would be expected of operational combat forces.

If only one base is in an area, the disposition of aircraft will be predictable. However, as the number of bases increases, not only does the level of predictability decrease, but mutual support between the bases, redundancy and overall effectiveness increase (such is the case with the use of satellite airfields). There are obvious advantages of horizontal dispersal, but one not so obvious advantage is that the enemy is presented with more bases to attack and so achieves less benefit from each individual air base attack. Therefore, increasing the number of bases not only increases flexibility but also adds depth in time of conflict. Improvements in the operability of existing air bases would have a similar effect. Therefore, improvements that may appear to be inefficient in peacetime may be critical to the effective generation of air power in war, when attacks could be expected against the air bases.

Whether operating from home base, a forward airhead, or a remote deployment airfield, air forces depend entirely on the air base. Consequently, recognition of the importance of air bases and the need for improved operability leads naturally to the need for resilience which can be achieved through redundant operating surfaces and airfield services, active and passive defence measures, and other physical security measures and air defence systems.

Active defence measures should lead to the detection and destruction of enemy ground forces far enough from the air base to prevent reconnaissance or use of weapons. Passive defence includes the use of decoys, camouflage, hardening, dispersal, redundant runways, and training of personnel, all of which constitute pre-attack measures. Post-attack measures of passive defence include rapid runway repair, damage control and explosive ordnance disposal. Physical security measures include policing to protect personnel, prevent unauthorised access and safeguard against espionage, sabotage and theft. Air defence systems include command and control, surveillance and weapon systems (such as fighter aircraft and SAMs).

Air Base Vulnerabilities

As observed by Colonel Ross Bishop, Australian Army, in 1986: ‘Air Power is an essential element of the Australian Defence Force (ADF) and will be a vital component in any future defence of Australia. As a consequence, aircraft, airfields and associated installations will constitute high value high priority targets for an enemy’. Colonel Bishop’s analysis of the possible nature of the threat to Australia draws primarily on Dr Paul Dibb’s work of 1986, with Bishop’s final assessment being that the threat to air bases would be substantial in any level of conflict. Most duties and functions of a military flying base are geared around generating airborne sorties. The air base itself is a ‘microcosm of an armed force with administrative, intelligence, communications, logistics, medical, maintenance, security and ‘teeth arms’ not only supporting each other but also collocated. Consequently, an air base provides an abundance of targets to an attacker. It is a ‘target rich’ environment. As mentioned earlier, it is not necessary to destroy all targets on an air base to disrupt air operations. Even with passive defence measures such as camouflage, tone-down and use of infra-red reflecting paint, the location of an air base would still be easy to ascertain by patterns of aircraft activity and associated radar and radio transmissions, as well as from satellite imagery. That probably would not be necessary anyway as most air base locations are well-known.

Knowing the coordinates of an air base is one thing; attacking it successfully is quite another. For example, as McCoy has observed: ‘when an attack pilot is streaking in low at near the speed of sound, worried about the prospect of one of our SAMs flying up his tailpipe, and looking over his shoulder for the Combat Air Patrol, it won’t take much to fool him. Subdued paint and camouflage netting, properly placed, can do much to hide real assets, and dummy
These defence systems and their manpower also contribute elements of an air defence system mentioned earlier. For routine inspections of dangerous and hazardous stores. Again, these personnel and these services expect to be targeted, LOAC provisions with respect to medical personnel notwithstanding.

As well as transportation and warehousing concerns during the Cold War era, discussed the most likely targets, everything and anything from aircraft and shelters can look, from the brief glimpse the attack pilot will have, very much like the real thing. Not much indeed, but one must ask the question – how much of this ‘not much’ does Australia field currently?

In time of conflict, an air base may have to contend with launching and recovering aircraft and preserving its operational integrity under fire. This occurred at Kontum and Da Nang during the Vietnam War. The point here is that all elements of the air base will have to control the damage and recover the integrity of the base by clearing and repairing runways, taxiways and parking areas, possibly under fire, so that aircraft can continue to take-off and land.

An air base will be characterised by the number and diversity of vehicles and engineer plants, and hence, repair personnel will be required to maintain this prime equipment, as well as aircraft. Generators, fuel transporters, forklift trucks, portable fuel and water trucks, servicing vehicles, graders, bulldozers, and runway repair vehicles all have to be operated and maintained on an air base. As well, sophisticated C3I systems (including aircraft and ground systems) have to be operated and maintained. In peacetime, the task of keeping such specialists current is formidable enough – in wartime, they also have to be kept alive, especially since they become legitimate military targets in time of war.

Medical, para-medical and emergency services (such as fire-fighters) will have different expectations placed upon them at a military flying base than at a civilian one. In times of conflict, triage sites as well as normal medical services will be required. Emergency services and medical personnel too could expect to be targeted, LOAC provisions with respect to medical personnel notwithstanding.

Fuels, lubricants, weapons, spares, water, clothing and food all have to be stored and resupplied to ensure an air base’s continued operational integrity. As well as transportation and warehousing concerns in time of conflict, there will also be a requirement for routine inspections of dangerous and hazardous stores. Again, these personnel and these services constitute attractive targets.

Defence of air bases, against air attack, will necessitate a robust and integrated system involving the elements of an air defence system mentioned earlier. These defence systems and their manpower also constitute valuable and attractive targets.

While runways, taxiways, aircraft and maintenance hangars, fuel farms, ammunition dumps, the control tower, base operations centre, and aircraft themselves would be the most likely targets, everything and every person on an air base could be considered a potential target. For this reason, all personnel should be competent in ‘the use of weapons, medical aid and field craft’. To this, we should also add firefighting. Moreover, they should be prepared to continue functioning even when deprived of shelters, running water, electricity, food and other amenities.

Comment on potential casualties would not be complete without citing the Israeli experience in 1973 in respect of psychiatric casualties. The Israelis suffered 30 psychiatric casualties for every 100 wounded. Furthermore, without appropriate treatment, those psychiatric casualties not only could not return to combat, but became chronically disabled.

Lieutenant Colonel Bingham, a USAF officer, argued that the US was ignoring air base survivability and stated that the vital role of the air base in the application of air power was being neglected, despite the key role that air power plays in national strategy. He argued that two methods could be used to enhance survivability – hardening, active defence and rapid repair capabilities on the one hand (for conventional take-off and landing aircraft), and dispersal, mobility, concealment and deception measures on the other (for Vertical/Short Take-Off and Landing (V/STOL) aircraft). Colonel Bingham was certainly of the opinion that the importance of an air base makes it a likely target in conflict and that this importance is so fundamental that the air base must be made survivable. Similarly, Australia cannot afford to ignore the importance of its air bases and the likelihood that, in time of conflict, they may be targeted and attacked.

Since Colonel Bingham’s observation in 1987, the type of munition and the delivery method have both improved considerably through technological advances. As Dr Alan Stephens has observed: ‘the dominance of the offence over the defence in warfare in general and air warfare in particular is likely to continue, and the concept of offensive action will remain pre-eminent in air power strategy’.

In another article, Colonel Bingham, when writing during the Cold War era, discussed the most likely form of attack that could be expected against a US air base. He suggested that American forces would be provided little opportunity to use their superior training and technology because a Soviet attack would aim to prevent them from generating the air capability that they expected to be able to use, and indeed, of which their campaign planning would be predicated. He went on to suggest that attacks would probably use chemicals and mines, and thus, the only way to regenerate air capability rapidly...
would be to move to another air base. Current US thinking suggests that such attacks may come in the form of cruise missiles (with GPS-type navigation accuracy) and armed Unmanned Aerial Vehicles. Such an attack would be extremely difficult to counter currently.

**RAAF Basing**

Australia has never experienced direct threats to its air bases, except for the attacks on Darwin and Broome in World War II. The American experience has been similar (viz the attack on Pearl Harbor and the Philippines, although continental US has not been attacked). In the US, this has led to airborne performance requirements (airspeed, range and altitude) dominating aircraft design, to the exclusion of basing considerations. Australia uses predominantly American aircraft and the observation is applicable for this country as well.

Despite this apparent ‘safety at home’, the US and Australian experiences in the south west Pacific during World War II should give rise to concern. The allied advance towards Japan saw the need for air bases to be captured and re-developed to allow air cover to be provided for the advancing forces. Once operations began from these air bases, air garrison and ground defence forces had to be provided to afford protection.

In generating air power today, the RAAF has to minimise the dependence on highly-prepared bases and maximise its flexibility in operating from a limited number of geographically separated air bases. Air base support must remain flexible, consistent and mobile to allow responsiveness in augmenting, deploying to or activating different bases as necessary. This flexible approach to maximising the use of a limited number of bases and minimising dependence on any one prepared base is fundamental to optimal use of Australian air power.

Combat elements of most air forces usually deploy with their own home base support organisation, or use, sometimes with augmentation, the host base support structure. In contrast, the RAAF’s forward deployment concept centres on the activation of bare bases at Learmonth, Curtin and Scherger, in addition to possible augmentation of northern air bases at Darwin, Tindal and Townsville. The support organisation for the affected bases will be manned by ‘shadow posted’ personnel deployed from the various established bases in the south. Immediately on arrival, these deployed personnel will be expected to form part of a combat-ready structure. There may be little or no time to acclimatisate. The RAAF’s operational concept is predicated on limited resources, including manpower, and the geography of widely dispersed areas of interest.

Australia cannot afford, for budgetary reasons, full and continuous operation of all its air bases nor the conduct of frequent major exercises to augment, deploy to, and activate bare bases while operating from home bases. Nor can additional new bases, bare or otherwise, be developed in the near to medium term. Air power is normally a first choice option by government to respond quickly to contingencies. This requirement for responsiveness and the necessary work-up period for drawing capabilities from home air bases and augmenting, deploying to, or activating bare bases seem to be incompatible. Therefore, the establishment of a standardised air base support framework, from which elements can be drawn at short notice to augment selected home bases or allow deployment to bare bases, provides the consistency in organisation, systems and personnel to allow the integration and adaptation of different components with minimal disruption. As Edition 2 of the *Air Power Manual* states:

> ‘Such a framework provides a practical, effective and efficient means to combine personnel from different bases in order to augment base support at any given air base. The way in which air base support is organised to meet the RAAF’s unique needs directly affects RAAF operational capability.’

While it is obvious that an air base’s functions of operations and support are distinct, it is not so readily obvious that fundamental differences exist between operational support and domestic support. Similarly, it is not so obvious that important differences exist between support at a flying base and that at a non-flying base.

The RAAF commissioned a study in April-June 1993, entitled Review and Restructure of Air Base Support (RABS). The study was unequivocal in its findings about the differences between base support at a flying base and that at a non-flying base. In fact, it proposed different designations - for the former, ‘RAAF Operations Support Unit’, and for the latter, ‘RAAF Support Unit’.

That said, however, there are support functions and activities that should be common to all flying bases. An overriding objective must be to ensure that support is not allowed to consume a disproportionate amount of the Defence budget. In this, the RABS study set out to determine an optimum structure for that support. In doing so, it identified some structural inconsistencies and put forward recommendations to rectify them. The study identified essential and non-essential base support functions and mapped these against organisational principles to determine its optimum structure.
The minimum organisational structure to support a flying base was determined to comprise the following:\(^1\)

- Headquarters (for discipline, Ground Defence Operations Centre, intelligence services and legal services);
- Administrative Support (for administration, base combatants, chaplaincy services and security);
- Operational Support (for air traffic control, fire services, flight planning, telecommunications and radio);
- Health Support (for clinical services (including dental), medical administration, theatre resuscitation and surgical care); and
- Logistics Support (for catering, engineering, GSE maintenance and fuel quality control, facilities, movements and stores).

Another point that needs to be made here is that base support should not be viewed geographically as this can be misleading. The RAAF has not helped its case by continuing to refer, for example, to F-111 support as support from Base Support Wing, Amberley. These are elements of base support that must accompany F-111 deployments and such elements should form a numbered entity. In this way, those operational support elements would not be viewed as tied to Amberley air base, but rather, as being linked to F-111 operations from any airfield. The RAAF has addressed this issue recently, and base support organisations are now numbered and referred to as Air Base Wings.

Maintaining several air bases has a significant operational impact in that the RAAF can change operating locations as necessary to confuse the enemy or to provide enhanced responsiveness for operations with surface forces as these surface forces move. Thus, there are sound operational reasons for the RAAF to maintain an ability to operate from several air bases at once, including the forward operating bases across the north of the continent. The availability of several air bases improves mobility and increases the adaptability and responsiveness of the RAAF to react to uncertainties associated with conflict.

This carries with it a concomitant cost in infrastructure and a concomitant risk for deployed personnel. Such risks virtually insist on deployed personnel being in the Australian Defence Force. Winston Churchill was unequivocal in his view that an air base must be a 'stronghold of fighting air-ground men, and not the abode of uniformed civilians in the prime of life protected by detachments of soldiers'.\(^2\) Colonel Bishop related this personnel issue very well to the Australian scene when he suggested that personnel may even be subjected to subversion and harassment (off-base) in attempts to 'decrease their capability to maintain flying effort'.\(^3\)

An operational air commander exercises his skills to translate strategic objectives to tactical achievements. Some argue that these skills of the air commander should be viewed as operational art, the dependence of which centres around movement of aircraft. Effective generation of air power, therefore, centres around this concept of movement, which depends on availability and operability of air bases.\(^4\)

Operability of air bases encompasses more than survivability. An air base, once attacked, must also be capable of recovering and regenerating its air capability.\(^5\)

Location of air bases is important as increased distance reduces responsiveness. In cases of long distances separating air bases from areas of operation, responsiveness can be improved through combat air patrols, but airborne alert is very expensive and can quickly deplete resources. Moreover, the need to carry fuel will reduce the number of weapons that can be carried. While the problem of lengthy distances can be ameliorated through air-to-air refuelling, such operations add to the cost, complexity of C2 and predictability of operations.\(^6\)

### Conclusion

Douhet argued that 'it is more effective to destroy the enemy's aerial power by destroying his nest and eggs on the ground than to hunt his flying birds in the air'.\(^7\)

Historically, heavy attacks on airfields have had a decisive effect on subsequent military operations 'conferring aerial superiority over to the attacker'.\(^8\) In Soviet Cold War doctrine, airfield attacks 'in the initial period of war enable significant strategic results to be obtained'.\(^9\) Furthermore, the aerial superiority so gained by the attacker also enables operational goals to be met as the campaign develops.\(^10\)

'The airfield attack mission will continue to be a major part of warfare and the defender will thus, have to provide an effective airfield defence system'.\(^11\) Australia should ensure that not only is its air base defence system effective, but that its air bases can continue to operate under fire.

The mission of the RAAF is to generate air power and it can only do that if its air bases retain their operational integrity. This necessitates the recognition that air bases could be subjected to attack in time of conflict, and that the air base infrastructure and personnel are prepared to withstand such attacks.
NOTES

1. Tidal W. McCoy, 'Task One: Air Base Operability', in Armed Forces Journal International, September 1987, p.52. Tidal McCoy was the Assistant Secretary of the Air Force for Readiness Support at the time.


3. Ibid, p.163.


10. Ibid, pp.185-186.


14. France used BAP100 (Bombe Accelerée de Penetration) against a runway in Chad. The Matra Durandal, Hunting Engineering JP-233, German MW-1 (Mehrzweckwaffe), and US CBU 98/B Direct Airfield Attack Combined Munition have been developed and refined for runway attacks. Developments are now underway to provide a stand-off capability for launching such weapons. See Roy Baybrook, 'Airfield Defence', in Defence, May 86, pp.232-236.


17. Ibid, pp.28-29.


19. See Tidal W. McCoy, 'Task One: Air Base Operability', p.56. There are also disadvantages, recognised by McCoy, such as increased operating and logistics costs.

20. So important is this notion of numbers of bases, the USAF concentrates on it in its doctrinal comment on basing. See Air Force Manual 1-1, March 1992, pp.202-203.


22. Ibid, p.163.

23. These are discussed in AAP1000, Edition 2, pp.83-88. Specifically, the C2 system centres around the National Air Defence Operations Centre (NADOC) and Sector Air Defence Operations Centres (SADOCs), and the surveillance system includes over the horizon radar, airborne early warning aircraft, anti-air warfare ships, ground-based air defence radars, air traffic control surveillance radars, electronic warfare systems, visual observation posts, and airborne aircraft.


34. Lieutenant Colonel Price T. Bingham, 'Fighting from the Air Base', p.34.


37. The options for the RAAF in determining its optimal use of air bases are discussed in more detail in AAP1000, Edition 2, p.62.


40. Ibid, pp.2-3, in which the organisational principles are discussed as: focus (grouping of like functions and activities), responsiveness, consistency, adaptiveness, flexibility and innovation.


42. While the use of Base Combatant Personnel (BCP) is important, one obvious restriction on their use, which tends to be overlooked too easily, is that training of BCPs and performance of associated tasks must not degrade the performance of the BCPs' primary tasks.


44. Colonel R.B. Bishop, 'The Defence of Air Bases', p.528.


46. This is discussed in more detail in Tidal W. McCoy, 'Task One: Air Base Operability', p.56, in which the concept of Base Recovery After Attack (BRAA) is explained.

47. Ibid, p.2.


50. Ibid.

51. Ibid.

52. Ibid, p.29.

BIBLIOGRAPHY


Lieutenant Colonel Price T. Bingham, 'Air Base Survivability: An
Hussaini, Air Warriors of Pakistan, Ferozsons (PVT) LTD, Lahore, Pakistan, 1992.

Group Captain Gary Waters joined the RAAF in January 1969. His more recent postings have included Bracknell UK, where he attended the RAF Advanced Staff Course in 1985, and RAAF Staff College, Fairbairn Canberra from 1986 to 1988, where he served as an instructor and then Director of Air Operations Studies. In January 1989, he was appointed Director of Studies at RAAFC for the review of the RAAF’s Command and Staff Course. In June 1989, he was posted for six months to the newly formed Air Power Studies Centre, where he contributed to the writing of the AAP 1000, Royal Australian Air Force Air Power Manual.

From January 1990 he was the RAAF visiting Fellow to the Strategic and Defence Studies Centre at the Australian National University, where he produced two books: RAAF Air Power Doctrine: A Collection of Contemporary Essays and The Architect of Victory: Air Campaigns for Australia, both published by SDSC. In May 1991, he was posted back to the Air Power Studies Centre, where he undertook a study of the Gulf War and produced a book entitled Gulf Lesson One — The Value of Air Power: Doctrinal Lessons for Australia, published in June 1992.

He was employed in the Directorate of Logistics Development and Planning during 1992, where he produced several papers on logistics doctrine and strategic planning and a book entitled Line Honours: Logistics Lessons of the Gulf War, published in December 1992. In January 1993, he was posted as the Director of the Air Power Studies Centre.
An attack on a flying boat base in the Pas de Calais on 6 July 1944.

Battered docks at Leghorn.
Douhet’s Theories and the World War Two Air Power Campaign — An Enduring Argument

By Major R.J. Easton, ANZIM, RNZAOC

‘Victory smiles on those who anticipate changes in the character of war, not upon those who wait to adapt themselves after the changes occur.’

Introduction

On air warfare, Guilio Douhet was amongst the most outspoken and influential thinkers of the time. In his major work *Command of the Air*, first published in 1921, Douhet called for an independent bomber biased Air Force, which he believed would become the instrument of victory in the next war because ‘in wars to come the decisive field of action is the aerial field.’

When World War Two (WWII) broke out in 1939, it appeared this would be the perfect test of air power and Douhet’s ideas. After the war, there were three schools of thought on Douhet’s theories and whether WWII was a good test. The first school of thought led by Bernard Brodie and J.F.C. Fuller claims WWII was a good test of Douhet’s theories and his theories are wrong. However, they felt nuclear weapons may salvage his ideas. The second school claims that WWII was not a good test and nuclear weapons will vindicate Douhet completely. The third school claims the war was a good test and Douhet’s fundamentals, especially strategic bombing, were correct.

This article examines the validity of Douhet’s theory in the WWII air campaign. A resume of Douhet’s theory precedes a brief outline of strategic bombing in WWII. The major assumptions and essential components of Douhet’s theory are then analysed against the WWII air campaign. This analysis shows that Douhet’s theory was not borne out in a number of critical areas, but demonstrates those areas of the air campaign which were not a fair, nor a conclusive test of Douhet’s theory. The article concludes that the WWII air campaign should not be used to discredit Douhet’s theory, for although specific technical aspects of his theory maybe wrong, his concept of air power, an independent airforce, and strategic bombing remain valid today.

Douhet’s Air Power Theory

Douhet’s contributions to military thought are summed up in his major work *The Command of the Air*. His ideas were formulated and grew between 1909 and when he first published his book in 1921. His second edition in 1927 changed some of the fundamental ideas of the first edition (there are four parts in this book as we know today; Books I-IV were released in 1921, 1928, 1929, and 1930 respectively).

Douhet based his theory of warfare upon two main assumptions. The first was that the airplane was an offensive weapon without equal, one that no effective defence could counter. Douhet said ‘viewed in its true light, aerial warfare admits no defense only offense.’ He felt that anti-aircraft guns were ineffective describing them as behaving ‘much like a man trying to catch a homing pigeon by following him on a bicycle’.

The second assumption was his belief that civilian morale would be shattered by aerial bombardment on population centres; so wars could be won by aerial attacks on cities.

Based on these assumptions, Douhet concluded that the country which had air superiority or command of the air would win the next war. He wrote ‘In order to assure an adequate national defense, it is necessary - and sufficient to be in a position in case of war to conquer command of the air.’ To him command of the air meant keeping the enemy from flying while assuring your own ability to fly. Command of the air meant victory and the loss of it defeat. He believed a country’s industry should be devoted to developing an air force and that:

*Any effort, any action, or any resources diverted from this essential aim [an independent air force] makes conquering command of the air that much less probable; and it makes defeat in case of war that much more probable. Any diversion from this primary purpose is an error.’

Once command of the air is achieved, the primary objectives of strategic bombing should not be military targets, but industries and centres of population, remote from contact with surface armies. Douhet believed this strategy would paralyse the enemy’s
ability to wage war, and in the face of repeated air attacks, his morale and will to engage in war will collapse and he will be forced to surrender with minimum resistance.

Douhet contended that the enemy air force should be dealt with, not in the air, but by destruction of the air power infrastructure that supports them. He stated that

...it is not enough to shoot down all birds in flight if you want to wipe the species; there remain the eggs and nests. The most effective method would be to destroy the eggs and the nests systematically.9

Thus Douhet's answer to defence against air attack was to knock out the opponents air force before he has a chance to use it. The most effective way to destroy the enemy's airplanes is to destroy them on the ground while also destroying his airfields. 'There is only one valid way to defend oneself from aerial offensives: namely, to conquer the command of the air, that is to prevent the enemy from flying, while assuring this freedom for oneself.'10

Douhet believed that the power and potential of the airplane meant that the war could be won by the airforce alone. According to him surface forces are relegated to a defensive role:

designed to hold a front and to prevent an enemy advance along the surface and in particular an enemy seizure by surface action of one's own communications, industries, and air force establishments, while the development of one's own aerial offensive is proceeding with it's paralysis of the enemy's capacity to maintain an army and the enemy people's will to endure.11

In line with this, Douhet called for an independent air force as early as 1909. He felt control of air assets by the army or navy would hinder their use. He proposed an air force as an equal partner to the army and navy. To coordinate strategy he recommended a body called the Supreme Joint Command whose power would be above any of the services.

He felt the air force should be composed of large bomber fleets of 'battle planes', capable of bombing surface targets as well as defending itself against enemy fighters. The only other aircraft Douhet saw as being useful was a reconnaissance plane to discover strategic bombing targets. Resources spent on other types of aircraft, such as specialised fighters for defence against aircraft, should be foregone as they would reduce the number of bombers and ultimately lengthen the war.

By using mathematical calculations, Douhet concluded that a typical target 500 metres in diameter would require 20 tons of ordnance to destroy. If ten bombers each carried two tons, they would be able to destroy the target. From this he concluded each squadron would consist of ten airplanes.12

Douhet indicated three types of bombs were needed to destroy a target. High explosives to smash buildings, incendiaries to start fires, and toxic gas to prevent fires from being extinguished. He felt incendiaries and poison gas would do the most destruction and in future wars, neither side would hesitate to use either weapons, whose effects would be potent and terrifying.

Douhet's strategy proposed that a nation must be prepared to launch massive air strikes against an enemy's social, industrial and political infrastructure, aimed at shattering their will power and capability to wage war, and forcing surrender. In this, Douhet preached the advent of total war, a war that cannot differentiate combatants from non-combatants. According to Douhet, whoever possesses preponderance of supremacy in the air will be able to conquer the command of the air more easily; to command the air means victory, to be beaten means defeat and acceptance of whatever terms the enemy may be pleased to impose.

In describing future warfare Douhet wrote:

Here is what would likely happen to the centre of the city within a radius of about 250 metres:

Within a few minutes some 20 tons of high explosives, incendiary and gas bombs would rain down. First would come explosives, then fires, then deadly gases floating on the surface, preventing any approach to the stricken area. As the hours passed and night advanced, the fires would spread while the poison gas paralyzed all life. By the following day the life of the city would be suspended. And if on the second day another ten, 20 or 50 cities were bombed, who could keep all those lost, panic-stricken people from fleeing to the open countryside to escape this terror from the air?

A complete breakdown of the social structure cannot but take place in a country subjected to this kind of merciless pounding from the air. The time would soon come when, to put an end to horror and suffering, the people themselves, driven by the instinct of self preservation, would rise up and demand an end to the war - this before their army and navy had time to mobilize at all!13

Given this short resume of Douhet's theory, the conduct and outcomes of the strategic bombing campaign in WWII can be examined to assess the validity of Douhet's theory in the campaign.

The World War Two Air Campaign in Outline

When war broke out in September 1939, the RAF recognised that long range bombardment aircraft
permitted military operations against a nation's war-making capacity. However, the RAF had neither the equipment, nor experience to successfully implement their doctrine. They also did not have the political will to carry bombing to the German heartland.

Neville Chamberlain believed that if started, strategic bombing might encourage Germany to retaliate by mass bombing France or even Britain itself. The memories of the terror bombing of WWI still haunted the British. In 1939, the Allies declared they would restrict bombing to military targets, and in February 1940, Chamberlain told the House of Commons “Whatever be the length to which others might go, the government will never resort to blackguardly attacks on women and other civilians for purposes of mere terrorism.”

In September 1939, ten Whitely bombers dropped 5.4 million pieces of propaganda leaflets over Germany. According to Air Marshal Sir Michael Harris, this campaign had “…done nothing to change the outlook of the German people; they had only supplied their [Germanys] need in toilet paper for the rest of the war.” When Churchill succeeded Chamberlain he initiated a build up of the RAF bombing fleet and wrote:

> The fighters are our salvation... but the bombers alone provide the means to victory. We must therefore develop the power to carry an ever increasing volume of explosives to Germany, so as to pulverise the entire industry and scientific structure on which the war effort and economic life of the enemy depend."

From then on the strategic objective of the allied bombing campaign, which stretched for the duration of the war, was to destroy German morale and their ability to maintain the sinews of war.

There were two distinct phases to allied strategic bombing operations. The first phase went from the outbreak of hostilities until March 1944. During this period the allies entered a campaign for which they were deficient in everything but spirit.

Initially, Britain adopted a policy of precision bombing key military targets. However, enemy fighters and anti-aircraft guns forced the British to conduct attacks at night, when visual conditions were poor, and they had to be content with relatively inaccurate area bombardment of large industrial areas. In February 1942, the policy switched to area bombing focusing on destruction of morale of the civil population by dehousing, terrorising, and killing, in particular of the industrial population.” In December 1942, the British Chiefs of Staff prescribed day and night attacks on Germany aimed at:

> The progressive destruction and dislocation of the enemy’s war industrial and economic system, and the undermining of his moral to a point where his capacity for armed resistance is fatally weakened.”

At Casablanca, in January 1943, the Pointblank directive, prescribed the combined bombing effort of the British, Americans and Russians under a combined bomber offensive. The primary goal of the directive was to reduce the strength of the German airforce and it called for intensive continuous bombing of a list of targets in priority and of the civilian population.

The results of these new bombing directives were seen in some of the most devastating bombings ever carried out by the allies in Essen, Lubrak, Dresben, Cologne, Hamburg, Berlin etc. However, in spite of lives lost and immeasurable damage done, the bombings did not constrain German production nor cause the degree of demoralisation among the German people expected. By 1944 the Pointblank objective had not been achieved, if anything German defences were stronger. The passing of control of strategic bombing assets to General Eisenhower in April 1943, to assist in the preparation of the Normandy invasion, had inhibited the momentum of the planned strategy.

The second phase began in mid-1944 when the allies finally achieved the command of the air. With the advent of better bombers, longer range escort fighters, precision targeting, the US adoption of British bombing policy and intelligence gathering, this period accounted for more than 80 per cent of the total bomb tonnage dropped. The allies targeted steel plants, ammunition factories, aircraft industries, oil and energy industries and the transportation network. With no respite, the constant bombing rendered reconstruction impossible and prevented the Germans from maintaining the sinews of war. On these attacks the US Strategic Bombing Survey commented:

> During the period from October 1939 to May 1945 the Allied Air Forces, primarily the RAF, dropped over one-half million tons of high explosives, incendiaries and fragmentation bombs... on 61 cities... These cities included 25,000,000 people... attacks are estimated to have totally destroyed or heavily damaged 3,600,000 dwelling units, accounting for 20 per cent of Germany’s total residential units, and have rendered homeless 7,500,000 people. They killed about 300,000 people and injured some 780,000... Berlin was estimated to be 60-70 per cent destroyed... three fourths of the damage was caused by fire.”

One significant effect of this bombing campaign was that it led the Germans to divert resources to cope
with the bombings. In 1944, for example, about two million soldiers and civilians were engaged in ground anti-air defence. In addition, a large quantity of war material was produced specifically for defence against air bombings. The German air defence line, comprising radars, fighter interceptors, ground control stations and its complementary anti-aircraft guns, stretched across France, Belgium and Holland.21

The effect of the bombings eventually began to dictate how the German economy should be organised, at this point the Germans lost the strategic initiative. In contrast the allies (especially the Americans) were left virtually uninterrupted to operate their war production optimally.

Apart from the Battle of Britain, Germany rarely engaged in strategic bombing. The Luftwaffes’s original aim for the Battle of Britain (from 8 August 1940 to June 1941) was to annihilate the RAF in order to facilitate an invasion of Britain. Germany may have achieved their aim had Hitler not changed his objective from destroying the RAF to bombing civilians. He remarked that ‘a systematic and long drawn bombardment of London might produce an attitude in the enemy which will make Operation Sea Lion unnecessary.’22 After the loss of the Battle of Britain, Germany conducted sporadic strategic bombing only of Britain.

In the case of Japan, US Strategy involved bombing the Japanese homeland as soon as suitable bases were secured. The allied objective was to create as much destruction to the Japanese homeland as possible, at the minimum cost. The air offensive commenced in November 1944 with precision attacks on economic targets, but in March 1945, was abandoned in favour of fire bombing urban areas with incendiaries. These attacks culminated in dropping of the atomic bombs on Hiroshima and Nagasaki and shortly after surrender.

**Was Douhet’s Theory Valid?**

The brief background of strategic bombing in WWII given above provides a firm basis against which we can test the validity of Douhet’s theories. To remind ourselves of the purpose of this analysis we should note Bernard Brodie’s warning who, when conducting his analysis, wrote: ‘We are here considering the experience of World War II as a test of Douhet’s specific doctrines, not as a test of the value of strategic bombing per se.’23

On Douhet’s two assumptions, the first school of critics led by Brodie, claims that the failure of Germany’s air power to defeat Great Britain proves Douhet’s theories were wrong. Civilian morale did not break down quickly or destroy national will. On this point it seems Douhet underestimated the toughness with which bombardment would be endured. The U.S. Strategic Bombing Survey describes the reaction of the German people to air attack:

> **Under ruthless Nazi control they showed surprising resistance to the terror and hardships of repeated air attack, to the destruction of their homes and belongings, and to conditions under which they were reduced to live. Their morale, their belief in ultimate victory...and their confidence in their leaders declined, but they continued to work efficiently as long as the physical means of production remained. The power of a police state over its people cannot be underestimated.**24

On Douhet’s assumption that aircraft are offensive weapons of limitless power, against which there is no effective defence, Brodie also points out the airplane was used as a defensive weapon. For example, during the US raids carried out from July to October 1943 over Schweinfurt, Regensburg and the four penetration raids during the ‘Black Week’, 232 (33%) out of the 706 B-17 bombers were shot out of the skies by German fighters.25 Improvements in anti-aircraft weapons destroyed Douhet’s assumption that they would remain ineffective. The invention of radar removed the element of surprise from an aerial attack. Radar enabled the defender to use the fighters which Douhet had assumed would be worthless. These developments prohibited bombers from moving unopposed to bomb depth targets in enemy territory.

Fuller takes many of the same views as Brodie on Douhet’s theories. He acknowledges radar helped Britain but feels the Germans failed because British aircraft and pilots were superior. He claims Douhet’s theories are wrong and war cannot be won by bombing. He bitterly criticises the bombing of civilians as barbaric.26

The second school of thought was expressed by Lieutenant Colonel Joseph Dickman.27 He says Douhet’s theories did not get a fair test in WWII. Air power did not possess the capabilities Douhet visualised and in the nuclear age his theories will guide warfare.

The third school expressed by some Italian Air Force historians is that Douhet’s theories were proven correct. They claim strategic bombing was the decisive factor and caused the breakdown of national morale. They claim American air power brought Japan to her knees and the air offensive, after the allies attained air superiority, mortally wounded Germany.
The analysis of the evidence that follows suggests the first shuttle of thought, and particularly Brodie's contribution, are probably the most valid criticisms of Douhet's theories.

First, Douhet overestimated the destructive effects of bombing. His calculations were mathematical analysis of the effects of bombing. He did not account for accuracy of bombing, nor the absorption effects by the construction of targets. The view that 20 tons of bombs would destroy an area 500 metres in diameter was refuted by the experiences of WWII. Improvement in bombs did not parallel the improvements in structures between the wars. Douhet, however, was correct in his anticipation of the major use of incendiary bombs. Incendiary bombs were very effective, especially in Japan.

Second, Douhet relegated surface forces to a defensive role, but his assumption that technology would produce weapons which would always give advantage to the defense was disproved by events in WWII. The strategic bombing campaign contributed to the final victory, but it was the physical defeat of the German armies and occupation of German territories by allied land forces which brought the war to an end in 1945. For example, in analysing the effect of allied bombing on the German war economy, James Huston wrote:

Not to be overlooked in the final disintegration of Germany is the defeat of her ground forces in the field and the occupation of her territory. Occupation of the Ruhr was more effective in arresting production than was bombing.3

The defensive stalemate he expected never materialised. In this regard Douhet failed to account for, or foresee improvements to the tank, armoured vehicles and other offensive weapons; blitzkrieg tactics; the development of aircraft carriers, submarines with strategic weapons, and amphibious warfare to provide mobility and overcome stalemates he had observed in WWI.

The third area in which the effects of WWII disproved Douhet involved his 'Battle Plane' theory. Brodie and others feel the Battle of Britain was a definite victory for defensive air power and the allied bombing missions over Germany proved the value of the fighter. The battleplane, approximated in the B-17 Flying Fortress, did not always get through. Without fighter escort, the bombing raids over Germany were expensive in aircraft and crews. Yet Douhet did not believe in purpose built aircraft for such roles due to economic reasons and he saw no necessity for such. Douhet had said it would be an uneconomical development of force to build machines which had no function except that of combat. Technological advances between the wars modified warfare as Douhet had never imagined it.

Finally, Douhet's failure to see the need for purpose built aircraft was probably his worst failure, and has been further accentuated since WWII. Purpose built early warning and electronic warfare planes were necessary to establish the command of the air during the Israel attack on the Syrian air force in 1982 and during the recent Gulf war. Further history has shown that Douhet was completely wrong in his indifference to speed, he said 'no emphasis need be placed upon speed'39, which during WWII and to date has remained one of the most vital characteristics of every military type, particularly in modern terms of evading surface-to-air missiles.

In defence of Douhet, it seems that Brodie and others have seriously overlooked at least three important factors. First, during the Battle of Britain, and even with radar and superior piloting by the British, the Luftwaffe might have won. Critics fail to point out, that the German command did not completely follow Douhet's theory.

Douhet felt the primary purpose of strategic bombing was to destroy strategic targets like the enemy air force and aircraft elements before attacking his cities. Initially, German planes were hitting strategic targets and having their effect, when Hitler shifted the attack to the city of London. This was one of Germany's most costly mistakes. The RAF rebuilt its forces and eventually turned the tide. The Germans never attained command of the skies '...although certainly the attack would have succeeded if the Germans had had the means to conduct it on a very much larger scale than they did, and maintain it over a longer period.'50 If they had, this may have devastated the British.

Equally, the allied strategic bombing campaign did not follow Douhet's doctrine. Initially the allies did not attempt to wipe out the Luftwaffe before commencing their routine bombing of German industries and civilian targets.

The next major point deals with the morale of the civilian populace after repeated bombing raids. Brodie points out that morale of the civilian people in WWII was much stronger in reality than Douhet had expected in theory. The post-war Strategic Bombing Surveys support this argument. Morale never reached the breaking point in Germany, Japan or Britain. However the argument takes into consideration only one part of Douhet's theory.

Douhet never expected much from explosive bombs. Incendiary and gas bombs were much more important. During the war, incendiaries were used...
with explosive bombs occasionally and gas bombs never used. Therefore Douhet’s theory on morale was not properly tested. What would have happened to civilian morale if gas bombs were used against the British, Germans or Japanese in addition to destroying their cities? If civilian morale was to be the main objective in a war, then how was WWII a valid test of Douhet’s theory without the use of one of the necessary ingredients.

The third point relates to Douhet’s vision and foresight which lead him to write:

Those nations who are caught unprepared for the coming war will find, when the war breaks out, not only that it is too late for them to get ready for it, but that they cannot even get the drift of it. Those who are ready first not only will win quickly, but will win the fewest sacrifices and the minimum expenditure of means...

If we must wait to be convinced of this until someone else sets us an example, we will be left behind; and being left behind during this period means to be defeated in case of war.

On this matter, the events of WWII proved Douhet correct. Where the allies worked hard at building a strategic bombing force, the Axis powers had concentrated on tactical forces. When Germany, for example, discovered the extent of the air threat, it was too late for them to adopt a more general air strategy. In his analysis of the strategic bombing campaign, Overy concluded:

...the lack of attention in doctrine, strategy and preparation given to air defense, bombing and the naval war paved the way not only for the Allied victory in the air but for the land victory as well.

In other areas Douhet was proved correct by events of WWII. He was correct on the importance that would be placed on the industrial objective and, as indicated earlier on, the major role played by the incendiary bomb.

Finally, in the case of Japan, one may conclude that the campaign closely reflected Douhet’s vision. For example Overy finished his analysis of the strategic bombing offensives by saying:

Both conventional and nuclear attacks on Japan confirmed that after adequate research and preparation, after the build-up of massive air superiority and the industry to back it, after the acceptance of a strategy of utter destruction, and under the best possible operational conditions for bombing attack, strategic bombing could act decisively to end a war on its own. The knock out blow, in all its horror and inhumanity, finally proved its point.

The evidence, however, suggests that Brodie and others are correct in concluding that, although the campaign for Japan closely reflects Douhet’s vision, it was not a true test of his ideas. ‘Japan was a defeated power... before the strategic bombing campaign was well begun’. Here is the U.S. Strategic Bombing Surveys conclusion:

It is the Survey’s opinion that certainly prior to 31 December 1945, and in all probability prior to 1 November 1945, Japan would have surrendered even if the atomic bombs had not been dropped, even if Russia had not entered the war, and even if no invasion had been planned or contemplated.

Brodie did however concede that the ability of the atomic bomb to quickly undermine the will of a nation to wage war, proved Douhet more correct than ever. Many commentators say the introduction of atomic weapons marked the renaissance of Douhet’s theory. Many of his critics and defenders feel this is the reconciliation between his theory and fact which WWII failed to provide. The psychological influence of nuclear attack is so great that civilian morale may collapse very quickly. This would prove his theory on the effect of bombing, but would destroy other parts of his theories. His concept of total war is probably no longer possible. In a nuclear exchange, both sides would be wiped out along with the rest of the world. Douhet envisioned no war other than total war. He never considered limited war.

Conclusion

In conclusion, Douhet’s basic theory was that war can be won in the air alone. By annihilating the enemy’s ability to command the air initially, friendly aircraft can fly to destroy the enemy’s war production capabilities, prevent him from massing his ground forces and demoralise the civilians. Such action by itself can end a war without fighting a ground war.

In the final analysis, Douhet’s theory was not borne out in critical areas of air defence, estimation of bombing damage, the defensive role of surface forces, and the ‘battle plane concept’ amongst others. However, the WWII air campaign was not a fair nor a conclusive test of Douhet’s theory on the primary objectives of an air campaign, nor of his belief in destruction of civilian morale. Thus the WWII air campaign should not be used to discredit Douhet’s theory, for although specific tech-
ical aspects of his theory may be wrong, his concepts of air power, an independent air force and strategic bombing remain with us today. The importance he placed on the industrial objective and the enemy air infrastructure as primary objectives have been vindicated, no more so than in the recent Gulf War.

Modern technology may still prove Douhet right... In the recent Gulf conflict, the use of electronic warfare, stealth technology, precision guided munitions, accurate tactical ballistic missiles, for example vindicate his calculations and his assertion that no effective defence will counter the air, rather than discredit him.

NOTES
6. *Ibid.*, p.24. Douhet states "To have command of the air means to be in a position to prevent the enemy from flying while retaining the ability to fly oneself". See also p.96 where in Part II (added in 1926 he said that having command of the air means "to have the ability to fly against an enemy so as to injure him, while he has been deprived of the power to do likewise".
11. Paret, *loc cit*.

BIBLIOGRAPHY

Books

Articles
Sergre, C.G. ‘Douhet in Italy: Prophet Without Honor?’ *Aerospace

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LETTERS TO THE EDITOR
Continued from page 2
Moltke and Schlieffen, the thought processes which underly manoeuvre have been progressively structurally and culturally imbedded in German military thought. Indeed to some extent that which we currently call manoeuvre theory has been developed as a result on analysing the relative success of the Wermacht and its antecedents. The use of German examples therefore is not based on Wermacht penis envy but rather on them providing the best examples. This is not to decry the efforts of Patton or Monash but rather to attempt to see how a relatively small nation was able to produce so many of the ilk of Guderian, Balck, Manstein etc, etc, etc. I believe it flows from a fundamentally different, and more accurate, vision of war and that consequently German officers and men were intellectually better prepared for what occurred.

Re-reading the Doctrine Centre’s discussion paper reinforces the fact that we are attempting to develop new and difficult doctrine to describe complex phenomena and that we are starting from a very low base. Hopefully it will be some time before an attempt is made to produce definitive doctrine of this complex and fascinating subject.

J.D. Kelly
Lieutenant Colonel
Commanding Officer
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EDITOR’S NOTE
The Article The Application of General Sir Brudenell White’s Command and Staff Style to the Modern Australian Army, published in the March/April issue of the Australian Defence Force Journal, was written by Major W.J. Young.
During World War One (WWI) air intelligence began to play an increasing role in military operations. Primitive camera equipments were fitted to aircraft, and balloons were also utilised for observation, and inserting 'special units' behind enemy lines. However, while there was some Australian participation, the participants were members of either the Navy's, or Army's, Royal Naval Air Service or Australian Flying Corps.

The completion of WWI and the subsequent military reductions, combined with the growth of global pacifism, led to deep reductions in Australia's intelligence services. Army intelligence virtually disappeared, being subsumed by the militia, and naval intelligence, although surviving, was reduced and merged into the Admiralty's global network. Consequently, when the Royal Australian Airforce (RAAF) was raised on 31 March 1921, there was very little chance that a separate intelligence service would be formed. In fact, there is no evidence to indicate that it was even considered.

Between the wars, the major strategic intelligence player was the Royal Australian Navy (RAN). It maintained its coastwatcher network and continued to support associated research and development of intelligence equipment, within Amalgamated Wireless Australia (AWA). The RAN also controlled the Australian Station of the Admiralty's global intelligence net. This arrangement was never ideal as it was directly controlled by British officers. The Army had no professional intelligence officers and while its militia members dabbled in counter-intelligence (CI), they could clearly contribute almost nothing to strategic intelligence.

The RAAF made no contribution to strategic intelligence between the wars. In 1928 The Salmond Report intended to review the progress of the RAAF, consciously eliminated any requirement for the RAAF to have a strategic reconnaissance capability. Consequently, Australia's only long range assets would be the RAAF manned, amphibious aircraft operating from HMAS Albatross. However, by 1931, even this was eliminated when Albatross was decommissioned during the Great Depression.

In 1936 a new urgency came into Australian defence planning, the militia was enlarged, coastal guns upgraded, new ships ordered, and armaments factories commenced. Naval intelligence was also finally brought under the control of an Australian, LCDR R.B.M. Long. However, no consideration seems to have been given to raising an RAAF Intelligence Branch. Indeed, a reorganisation of the Service Boards completed in 1936, did not even mention intelligence as a responsibility of any member of The Air Board. In contrast, intelligence was allotted to the CNS and CGS in the other services.

The closing years of the 1930s saw a quickening of pace in defence and intelligence circles. Naval intelligence upgraded its coastwatching net, construction commenced at signals intelligence (SIGINT) sites at HMAS Harman, HMAS Coonawarra, and Jandakot (near Fremantle). The Army, in conjunction with the Counter Intelligence Branch (Attorney-General), began to approach its CI task more seriously. The US upgraded its SIGINT network in Asia and the Pacific, and the US Army and USN finally began to share the intelligence that would eventually become the MAGIC process. The British had also increased their efforts in the Far East. In 1936 the SIGINT unit Far East Combined Bureau (FECB) at Hong Kong was integrated into the Government Code and Cipher School's (GC & CS) global net. Another joint M15/M16/Admiralty unit, Combined Intelligence Far East (CIFE) was also raised. However, consideration would not even be given to raising an RAAF intelligence office until August 1939. The proposal was rejected.

When war commenced in 1939, an independent Director of Naval Intelligence (DNI) was established. The other services relegated intelligence to the position of a sub agency of their Directorates of Operations. The Central War Room was established at Victoria Barracks Melbourne, served by a Combined Operations Intelligence Centre (COIC).

Initially it was intended that the RAAF control COIC, as its main task was seen as monitoring local waters. However, as only the RAN had a permanent intelligence structure, and almost all of the intelligence was naval sourced, it soon became clear that navy should manage COIC. In early 1940 Commander Long became Director of COIC.
COIC operated throughout 1940 and 1941, it's main task was collating intelligence for the War Room and activating against the occasional German surface raider. However, its progress was indifferent, and by mid-1941 it was still short of full operating capacity, awaiting such 'extravagant items' as one wall map — Australia, one telephone — black, one desk — wooden, and one carpet — green. Only the Navy provided a 24 hour watch service, the RAAF members would leave every evening at 5pm. The army would not even man COIC until after Pearl Harbor was bombed.

However, progress had been made in other areas. The RAAF had secretly constructed a SIGINT chain in the theoretically neutral Netherland East Indies (NEI). High Frequency direction finding (H/F -D/F), stations had been built at Amboi, Peinfoe (now Koepang), the Halmaheras, and Buru. An entire COIC was secretly established at Amboi, linked to the Dutch Medium Frequency (M/F) D/F unit in the Halmaheras by an online teletype, a very advanced arrangement in 1941. The operation was headed by a Group Captain at Bandung, the centre of Dutch SIGINT activity. To preserve secrecy, each member was issued with 20 pounds and ordered to wear civilian clothing.

A full time Director of Air Force Intelligence (DAFI) was finally appointed in August 1941, he was Wing Commander Gerald Packer, an RMC Graduate, and former army intelligence officer. Packer was a very competent officer, but had run foul of his former army superiors for warning about the weakness of Singapore and Japan's hostile intent. He guided RAAF intelligence through its early months, and by December 1941, in spite of official procrastination, RAAF intelligence was prepared for the war with Japan.

The advanced SIGINT sites were soon overrun and reinforced the principle that intelligence, without the forces to support it, is of little consequence. However, by mid 1942 the strategic situation had stabilised.

RAAF intelligence had lost its Director, Packer having been sent to China in January 1941 for arguing that Darwin was unprepared and likely to be bombed. However, the arrival of Douglas MacArthur, as Commander South West Pacific Area, fundamentally altered the status of RAAF intelligence. Several coordinating groups were established under General Headquarters South West Pacific Area (GHQSWPA), the Allied Intelligence Bureau (AIB) took over the 'irregular groups'; Central Bureau (CCB) became responsible for Army and Air Force SIGINT; and GHQSWPA directly commanded several other intelligence agencies including Section 22 (electronic intelligence), the Allied Geographic Service (AGS), The Allied Translator and Interpreter Service (ATIS), and The Air Technical Intelligence Unit (ATIU). Other units would directly serve Allied Air HQ and the various Tactical Air Force (TAF) groupings. The length of this article precludes detailed description of all of the activities above, but it will be shown that the RAAF was a major participant in all intelligence activities.

The AIB controlled the coastwatcher organisation which would figure so prominently in the early campaigns, particularly Guadalcanal. While prominence has been given to naval participation in this organisation, over 25 per cent of the coastwatchers were RAAF officers, and the coastwatchers were a joint and combined unit. Special warfare was conducted by another element of AIB, Special Operations Australia (SOA). RAAF officers served in SOA teams, and two RAAF units, 20 Squadron (Darwin — Catalinas) and 200 Flight (Leyburne — B-24 Liberators) served in support of special forces. The Catalinas were a vital link in special operations and were particularly flexible as they were capable of landing in estuaries, lakes, rivers and coastal fringes. The 200 Flight Liberators were permanently assigned to intelligence operations and flew 195 sorties, delivering 157 tons of stores. Over shorter distances, the RAF delivered 600 tons in 458 sorties to Poland during WWII. France received 4,000 tons before D-Day. 200 Flight's achievements are even more impressive when it is also noted that the B-24 was a notoriously difficult aircraft and they operated over enormous distances compared to their European counterparts. RAAF intelligence personnel were also active in the Far Eastern Liaison Office (FELO), another unit of AIB conducting intelligence patrols and propaganda missions behind enemy lines.

The RAAF had been a late participant in SIGINT, but it became a major player. Several Wireless Units (WU's) were progressively established throughout the war. The first, No1 WU, commenced operations from Townsville in early 1942. They intercepted Japanese aircraft traffic and later worked with US Army units searching for Japanese submarines operating off the Australian coast. Eventually the RAAF's SIGINT organisation would expand to include NO.2,3,4 and 6 WU's. Each unit was commanded by a Flight Lieutenant and had an average strength of 250 to 300. By mid 1945 they would be operating stations form Port Moresby, Nadzab, Morotai, Biak, Broome, Cloncurry, Townsville, Batchelor and Darwin. Their tasks included H/F D/F and the interception of Japanese army air traffic. The major operations centre seems to have been
Australian airmen played a vital role in signal intelligence during WWII.

Rosenheath, near Townsville. The senior RAAF officer was Wing Commander Roy Booth, formerly of the COIC. The units were totally integrated in GHQSWPA’s Central Bureau, located at Henry St, Ascot in Brisbane.

RAAF aircraft also served within the Allied Geographic Service (AGS), conducting photo-reconnaissance of enemy positions. The major aircraft employed were B-25 Mitchells, and B-24 Liberators. Examination of surviving AGS records indicates that the majority of missions were flown during bombing runs, and that most photography was by hand held cameras. Another unit, Section 22, was originally formed as an RAN operation, but in June 1942, it was also merged into GHQSWPA. RAAF aircraft were used extensively by Section 22 to gather electronic intelligence (ELINT), primarily of Japanese radar parameters. Aircraft mounted a dipole aerial on either side of the fuselage, and the radio operator was generally dual trained as operator. Missions were generally flown as a supplement to normal operations. By mid-1945, a special 201 Fight was being formed at Darwin for electronic intelligence operations.

RAAF members also served in the COIC that deployed to Brisbane in support of GHQSWPA, and its forward detachments. RAAF personnel also served in The Allied Translator and Interpreter Service (ATIS), headed by Colonel Sydney Mashbir, US Army. ATIS was located at St Lucia in Brisbane and conducted work ranging from POW interrogations, to translating captured documents, and serving individual commanders in the field. ATIS moved forward to Manila with MacArthur and its Australian members became some of the non-naval personnel to deploy out of Australia’s immediate area.

Another major RAAF USAAF unit was The Air Technical Intelligence Unit (ATIU). ATIU was located at Hangar No 13 Eagle Farm, Brisbane. Its
purpose was to deploy teams forward, to strip, pack, return, assemble, and analyse crashed and captured Japanese aircraft. As with ATIS, it was headed by an American officer, but it had a substantial RAAF component. Its work is too detailed to describe in a short article such as this, but it did achieve some significant results\(^4\). Major emphasis was placed upon engine performance, airframe design and strength, and control methods. Other intelligence was gleaned from engine and other tally plates which could reveal which factories were making aircraft, and in what numbers. One wreck revealed that a Japanese modification of a German engine had reversed the engine’s lubrication inlet, making it inoperable. ATIU happily noted that the engine would have an expected life of 20-30 hours\(^4\).

When the war finished in September 1945, the RAAF intelligence service had undergone a remarkable transformation. Between the wars there had been no intelligence service, it did not even rate a mention amongst the duties of the Air Board. However, in 1941 an embryonic organisation had been propelled into a war that threatened the homeland and had built up its structure almost from nothing. During the war it became exposed to the entire spectrum of intelligence operations including SIGINT, ELINT, photo-reconnaissance, technical intelligence, special operations, translation and interpretation, and field intelligence operations. A permanent Directorate of Intelligence was established, and intelligence would assume a profile other than that of a sub-agency of operations. Quite an evolution for an organisation that had no personnel, assets, or philosophy in January 1939.

NOTES
1. At this juncture pilots were raised by either the Navy or Army.
3. Aust Archives Melbourne (AAM), MP 1587/1, 185 A1, *Australian Naval Policy, Appendix VIII*.
5. Intelligence was directly responsible to the Assistant Chief of Naval Staff (ACNS), and immediately managed by a British Lieutenant Commander until 1938, and 1936 respectively.
7. These flying boats were manned by RAAF officers, but operated by the navy.
10. By 1939 over 800 coastwatchers had been established in Australia and the SW Pacific.
13. The US navy had been attacking Japanese Navy and diplomatic traffic since the early 1920’s, the Army had been a late starter, and had concentrated on diplomatic traffic. In 1939 they divided their efforts, the USN taking Japanese naval traffic, and the Army diplomatic.
15. N.West, *MI 6*, pp. 65 and 140.
17. Loc cit.
18. AAM, MP 1185, 1937/2/160, *Coordinated Control Of Operations and Intelligence*.
20. RAAF Historian, *RAAF AOB’s in the NEI*.
22. Loc cit.
23. Loc cit.
25. Loc cit.
26. The CCB was never part of the AIB, but was responsible to MacArthur’s Chief Signals Officer, Maj Gen Akin. The RAN and USN SIGINT units in Australia were never assigned to MacArthur, but remained under Admiral King, through Admiral Nimitz.
28. SOA was an offshoot of the British Special Operations Executive (SOE).
30. ibid, p. 222.
32. RAAF officers participated fully in clandestine FELO operations, see AAM, MP 1587/193c, *The Irregular Organisations*.
33. RAAF Historian, *Operational Histories of the RAAF Wireless Units*.
34. Loc cit.
35. Loc cit.
36. Loc cit.
37. Loc cit.
39. Section 22 was founded by the DNI Cmdr Long, and commenced operations from HMAS *Rushteler*. B-24’s were fitted with dipoles for ELINT operations.
41. RAAF Historian, *Air Technical Intelligence Unit History*.
42. Loc cit.
43. Loc cit.
44. Loc cit.
The Air Power Lessons of World War I

By Squadron Leader A.J. Forrest, RAAF

The mere presence of a hostile machine in the air inspires those on the ground with exaggerated forebodings with regard to what the machine is capable of doing.

Air Vice Marshall H. Wrigley

Introduction

For the most part, analysts of military air power and its development are disinclined to acknowledge the influence of World War I on aviation as an instrument of war. References to the aviation experiences of World War I generally comprise little more than a preface to the presentation of World War II as the genesis of modern, effective air power. This dismissive view of a link between World War I and the effective demonstration of air power arises through the interpretation that the use of aviation did not significantly affect the progress or the outcome of the war. Along the continuum of air power development that as early as 1945 could deliver annihilation, World War I is often assumed to have contributed little more than aerial intimidation. As a consequence, and despite the conjecture that the modern roles of air combat and air defence arose between 1914 and 1918, the aerial fighting of World War I is customarily rated as insufficient verification of the military value of aviation.

However, evaluating the validity of the air power experience of World War I within the narrow confines of its impact on the war at hand misses the point about the significance of this stage of air power maturation. In addition to the direct material consequences of its use, the ‘value’ of air power in World War I needs to be considered in terms of the generalisations that could be drawn for its effective use in the future. The aim of this article is to list and account for any significant generalisations that emerged from air power in World War I and to conclude who, if anyone, actually formulated them at the end of the war. The focus of the article is on generalisations of air power that could reasonably be inferred at the end of the war, i.e., without the hindsight of later experiences and developments. There is no scope to dwell on semantic definitions of ‘generalisation’ and the terms: generalisation, assumption, lesson, guideline etc have been used synonymously throughout the article.

The Lessons

Between 1914 and 1918, military aviation in the major European nations underwent a dramatic transformation. In 1914, aviation was an accessory of armies (and sometimes navies) which, in accordance with an orthodox, two-dimensional, war-fighting mind-set, influenced roles, equipment and tactics. Lacking any foresight of the potential of the airplane as an offensive weapon, army and navy commanders had contributed to the shaping of a primarily defensive air capability, as reflected by the aircraft in service at the war’s inception. By 1918, in contrast, military aviation had acquired a unilateral, principally offensive, raison d’être; was organised (in Britain at least) as a separate service; supplied through centrally organised production programmes; and equipped with the airframes, engines and armaments that induced Air Vice Marshal Henry Wrigley to comment:

It is unnecessary to emphasise the tremendous effect that would have resulted had the squadrons that crossed to France in August 1914 been equipped as efficiently as were the squadrons of 1918.

Clearly, such a metamorphoses could not have occurred without significant lessons being learnt about the nature of modern conflict, the strategic and tactical roles of air power, and the various elements that permeate each of these — strategy, technology, and the human factor. This is the curriculum that generated the most valid assumptions emerging from World War I air power; assumptions derived from failure as much as they were from success.

The Nature of Modern Conflict

Several factors distinguished World War I from the wars of the 19th and early 20th centuries — the number of participating nations, the extent of the fighting front(s) and, perhaps most significantly, the degree to which this war would be mechanised and
influenced by technology. Air power had a hand in this transformation. Submarine, surface ship and tank technology had requirements that stretched the military-industrial complex but military aviation, "...the most advanced and innovative technological arm of warfare" possibly made the greatest demands. To meet the demands of the Royal Flying Corps (RFC) and Royal Naval Air Service (RNAS), for example, required a fully mobilised war economy enmeshing "...the military, technological and industrial aspects of war — the front and the rear, the military and the civilian." World War I altered the nature of conflict by engaging the whole nation and by blurring the distinction between the military and the remainder of society. Wrigley's observation that war was no longer merely the business of the fighting services' was a truism for World War I and a defensible generalisation for the more technological wars that might follow.

The assumption that war would in future be total generated a further assumption that there could be a degree of legitimacy in attacking any asset that contributed to the enemy war effort. The notion that the civilian population was the source of a nation's fighting will as well as his soft underbelly, implied that deliberate targeting of the civilian centre of gravity could be effective in this war, and in wars of the future. Total war provided the legitimacy and the rulers, with some periodic queasiness, provided the will. Air power, in a way that maritime power and land power were unable, provided the means — to range deep into the enemy homeland; the further from the front, the more independent of navy and army short-term, tactical goals.

The Strategic Role of Air Power

A number of generalisations about the use of air power that is independent of the fighting environments of army and navy, could be drawn from the aviation developments of World War I. A clear assumption was that strategic air strikes could obviate the need to defeat enemy fighting forces in order to pressurise the decision-making centre within the homeland. Orthodox military planners of World War I may not have been sufficiently convinced by this challenge to a central Clausewitzian principle. However, there was enough empirical evidence by the end of the war to indicate to future planners that the independent use of air power had made such warfare a reality. Confidence that air power of the future would be wielded in this way was engendered through the pace of bomber development, the relative ineffectiveness of air defence, and the indications that bombing had a severe and inimical impact on the psychology of civilian populations. Each of these considerations signalled lessons for the future.

Bomber Development. During the war, bomber development proceeded from airships and underpowered, weight-restricted reconnaissance aircraft improvised for dropping light ordnance, to purpose-built, fast, high altitude, multi-engine, long-range 'flying battleships' such as the 'Giant' and the Handley Page V/1500. Improved navigation techniques, self defence and escort capabilities, weapons technologies, bomb aiming devices and up-rated payloads combined to support the assumption that bombers of the near future would be able to decimate city and industrial centres and break the enemy nation's will to fight.

Air Defence. What added to a general confidence in the long-range bomber was a second factor — the relative ineffectiveness of air defence during most stages of the war. At the outset, air defences proved inadequate for the task of acquiring early warning, intercepting and bringing down an enemy bomber operating in the vastness of airspace. In Britain, for example, it was not until the 'Leeffe Robinson' raid on 2 September 1916 that air defence, by that stage with co-ordinated early warning, searchlight, gunnery and aircraft assets, got any measure of the night-raiding Zeppelins. The relative immunity of the Zeppelins for the first 18 months of the war was borne out by the statistic that during the coastal raids from June 1915 to April 1916, "...only one Zeppelin was brought down by gunfire and none by defending fighters." When the Gotha bomber raids commenced in mid 1917, air defences, unable to react to the much reduced warning times of their arrival, struggled to make contact with the enemy formations. Nor, in terms of rate of climb, ceiling and speed, could the interceptors match the performance of the bomber. The Gotha was virtually undisturbed in its strategic operation, revealing that air defences were "...utterly confused and powerless against the new weapon." To the end of the war, Britain's air defences mounted to thwart the Gotha and Gotha/Giant raids barely improved. The effort that went into air defence and the paucity of success is indicated as follows: During that twelvemonth (sic) period (from June 1917) there were 28 raids... the aggregate number of enemy aircraft employed on these occasions amounted to 369, making an average of 13 per raid. Eleven Home Defence squadrons were allotted to the London Air Defence Area, comprising some 200 machines in all, and for the most part Camels, a type well able to get on terms with the enemy... There were 294 anti-aircraft guns, 415 searchlights and 114 height-finders in the same area... For the purposes of air combat
an aggregate of 1568 Home Defence aircraft rose to meet the hostile machines, making an average of 56 per raid against the enemy's 13. It might have been expected that with all this outnumbering in the sky, and with all this preparation on the ground, the enemy's losses would have been severe, if not (a) deterrent. In actual fact they were very slight indeed. Anti-aircraft fire was instrumental in bringing 13 down, and a further eight were lost in combat... (representing) a loss of less than six per cent.

What generalisations could the relative failure of air defence yield? One was that the bomber will always get through. Patently, this was epigrammatic and could not be taken literally, due in the main to the factors of weather and mechanical failure that contributed a stouter resistance than provided by the active measures of air defence agencies. What World War I promised was that although the bomber may incur some losses, there is little that reactive air defence can do to prevent it arriving overhead and completing its bombing mission. A second and related lesson is the logical impact on air tasking priorities. Based on the experience of World War I, it seemed fair to assume that an air strategy for future conflict would focus on independent strategic strike. Some level of command of the air would be sought as a pre-condition to strategic strike, not because air defence would be a major concern, but to render the enemy incapable of inflicting reciprocal damage. Air support for the tactical objectives of army and navy, historically the first priority of air, would be subordinated to the independent role.

Impact of Strategic Bombing. World War I contributed to the assumption that independent offensive bombing would dominate the use of air power in future wars in a third way — by showing its potential for success. The effects were partially successful in terms of the material damage and casualties inflicted and in terms of the diversion of men and material that had to be diverted for the protection of the home front. However, the more significant lesson was the destabilising impact on morale and production that air raids on cities and industrial centres could produce. High altitude night bombing with its consequent inaccuracy (‘...resembling much more the action of a spray than the pin-pointing effect of a hypodermic syringe’) intensified the effect, contributing to demoralisation to a degree that accurate targeting of military or industrial assets would not have induced.
The mid-war raids on England, for example, have been described as ‘...quite devastating, reaching blitz proportions... (producing a) feeling of deep anxiety and uneasiness among the population... (and) prodigious psychological shock.’ Had air commanders been able to adhere to the Clausewitzian precept of concentration by sustaining full strength bombing missions, the effects would have been even more crippling.

Perhaps the most telling indication that strategic bombing could impact on the decision-making centre through the vulnerability of the citizenry was the forming of the Smuts Committee in July 1917, to make recommendations on air defence and air organisation. Granted, a review was justified in military terms. Aircraft production was poorly co-ordinated and inter-service rivalry was negating whatever effectiveness a more collegiate approach might have yielded. The division of aviation duties between the RFC and the RNAS was unequal and not entirely logical, and as a result, navy and army indulged in bitter competition for scarce resources. The summative view of the subsequent Smuts Reports was that the British air effort was disorganised and inefficient. More seriously, it was characterised by the wide dispersion of assets (at home and along a wide front) being squandered on short-term objectives and, as such, was not disposed to meet the new strategic task that was developing as the prime raison d’etre of air power. The establishing, therefore, of an independent organisation and an independent service to manage and execute the independent function of military aviation, as advocated by Smuts, was justified on the grounds of military common sense.

However, common sense in strictly military terms was not the Government’s principal consideration when it tasked Smuts with conducting his review. The principal consideration was one of political pragmatism, brought about by public clamour following the second Gotha raid on London. George Quester has presented the case that if aerial bombardments are to cause a civilian population to rebel against its Government (and to demand it sue for peace), then the ferocity of those attacks must exceed the population’s expectations. It was quite plain to the British Government that the sudden, unexpected and destructive Gotha raids were having a severe impact on the civilian psyche and required a demonstration of government initiative to avert the collapse of public confidence. That a public’s confidence could be shattered by being exposed to more hardship than it was expecting to bear, and that this rather than the direct defeat of the military could be the over-riding factor in the cessation of hostilities, was demonstrated by the eventual ‘defeat’ of Germany in 1918. Airmen at the end of the war could be excused for assuming that, based on the developments of World War I, air power had the potential to accomplish such a task far more expeditiously than the four years it took for the Royal Navy’s blockades between 1914 and 1918.

The broad factors that would enable such an outcome, most of which were reflected in Smuts’ reports, were the creation of a large strategic bombing force, the priority of conducting independent, offensive strike operations into Germany, and the centralising of command in an independent service. It was a valid generalisation by 1919 that future aerial warfare would be characterised accordingly.

**The Tactical Air Role**

The lessons of World War I for the application of air power were not confined to the home front and the enemy heartland. Generalisations relating to the tactical use of aircraft could also be drawn from the roles to which aircraft were committed, in four years of support at the land front and at sea.

In the early stages of the war, military aircraft designed as spotters had to be adapted, often unsuccessfully, for the myriad of uses for which they were trialed. A trend toward aircraft dedicated to one or a few related tasks provided advantages over an enemy still using a hybrid type; and provided a guideline for the consideration of future aircraft designs. Similarly, the later trend toward organising squadrons by role (eg. as for dedicated fighter squadrons) rather than to accommodate each role within a squadron, provided training and logistic advantages, indicating likely squadron structures of the future.

Role specialisation became viable only with the arrival of new technology on the front. While there is no scope in this article to trace the major aircraft technological developments, Wrigley’s four phases of aircraft development between 1914 and 1918, three of which apply exclusively to tactical use on the land front, broadly indicate the progressive development of aircraft and aircraft roles. Although technical developments in air to ground weapons and communications made the aeroplane a progressively more effective instrument of ground support, it was the technical developments affecting the contest for air superiority that had the most dramatic impact and provided the significant lessons.

An obvious lesson was that war accelerates technical progress and consequently, that obsolescence during war occurs rapidly. This implied that future pre-war measures of air power may count for little if a subsequent war becomes protracted. It also indicated that development may be far from uniform, and that
the breakthrough can suddenly overturn the air superiority status quo. The notable example was the combination of the mechanical interrupter gear (allowing guns to be fired through the airscrew) with the Fokker Eindecker monoplane, tipping aerial supremacy to the Germans from late 1915. The arrival of the SE-5 enabled the air supremacy pendulum to swing back toward the allies in 1917. Fluctuations in air superiority over the front would serve as a lesson on the nature of air superiority per se. Air superiority would be a temporary and a relative condition. In a long war, it would have to be fought for in multiple places and at multiple times and it would rarely be absolute. Patently, this would not be just a technological struggle. The war indicated that the factors of morale and tactical improvisation (such as developing escort and formation flying tactics to counter the Eindecker threat) could diminish the advantages conferred by superior technology. However, wars of the future could be assumed to be even more technological than this one, with air superiority ultimately being determined on the basis of technological mastery.

It was only when equipped with specialised fighter and attack squadrons and in the possession of technically capable aircraft that air commanders had the option of mounting a more aggressive campaign along the land front. Unlike their German counterparts, Allied commanders exercised this option in the mid stages of the war. The decision by the French and British to commit aircraft supporting land operations to a policy of 'constant offence' had consequences too significant for post-World War I military aviators to ignore. Constant offence, jointly conceived by Hugh Trenchard and his French counterpart, Du Peuty, was based on the premise that mere local air superiority over one's own lines constituted a negative tactical aim. In practice, constant offence involved the search for combat over enemy lines, regardless of location or odds. Du Peuty introduced the policy at Verdun during which French aircraft carried out a variety of tactically offensive roles over and behind enemy lines.

However, by the Battle of the Somme, constant offence was contributing to an increasing attrition rate among British aircrew. The RFC lost 26 per cent of its force during the first few days, and a total of 499 pilots and 782 aircraft by the close of the battle — totals greater than the RFC ceiling of 426 pilots and 410 planes at the start of the campaign. Trenchard blamed the poor quality of aircraft and pilot training when there were other contributing factors, such as the German decision to concentrate their fighting aircraft and the adopting of a more offensive approach by the newly formed German pursuit squadrons. Trenchard’s restatement of constant offence in his ‘Future Policy of the Air’ memorandum of September 1916 indicated a hardened resolve to engage his pilots and aircraft in a war of attrition that continued, with appalling losses, until the battle of Arras in 1917.

What could scarcely escape the attention of military aviation planners at the end of the war was that constant offence involved an unjustified misuse of scarce aviation resources. Although the numbers of aircrew casualties on the Western Front were low in relation to national manpower, they were unsustainably high in relation to the capacity to replace them. Such an expenditure would have been justifiable only if the dividends outweighed the costs or, as a final resort, if the outcome of the war itself depended on the tactic’s success. Palpably, neither condition was manifest for Britain in the mid stages of World War I. Given the context in which it was used, then, the unrelenting attrition approach to the aerial war, viewing a trained pilot as expendable as the readily replaceable foot soldier, or as expendable as his aircraft, was neither a necessity nor a success. It involved the commitment of ‘...the greater part of British air power to a theatre in which the scope for inflicting injury upon the Germans was extremely limited’ and it worked counter to any decisive impact that aviation might have had on the course of the war. Future strategists could assume that for air power to be used in offensive support operations, some level of air superiority must be obtained, but at the right time and place, and by the right means. The principal lesson of World War I aviation was that the time should be at the outset of hostilities, the place the enemy’s homeland, and the means the independent strategic bombers.

Conclusion

In retrospect, some of the generalisations arising from the experience of military aviation in World War I, defensible in 1919, have proven to be a little ragged at the edges but intact in substance. Yet that is not the point. The point of this article has been to show that, despite the tendency of many air power writers to overlook World War I, the war gave unequivocal signals on how aerial warfare might be managed in future conflict.

Perhaps to the deflation of apologists of land and maritime power, the generalisations that ought to be drawn from World War I are precisely those that were made by Douhet in his expressive document...
The Command of the Air, and to a degree by the more prosaic contributions by Trenchard and Wrigley. To some degree, the lessons of World War I suffer from the Douhet association. Douhet's thesis implied criticism for the futile methods with which the military hierarchy had conducted the previous war. It could not have been easy after the war to accept that a strategic victory for the decisive winning of the war, which had eluded the great military commanders for almost four years, should be seen so clearly by a single advocate. Perhaps it never will.

NOTES
2. "The point has recently been convincingly made that... almost every conceivable air strategy and tactic known today was employed between 1914 —1918," McCarthy, J. Air Power as History: Looking Backwards to Looking Forward. Paper presented to the Conference 'Conventional Air Power into the 21st Century; Smaller but Larger,' 25-27 March 1991. p.51.
6. Ibid., p.12.
8. The French were the least comfortable with the bombing of civilian populations: either because Paris was vulnerable to reprisal raids, or because without suitable aircraft, French bomber aviation remained in crisis throughout most of the war. In England, at the outset of war, David Henderson (Director General of Military Aeronautics at the War Office) reflected the prevailing moral high ground: 'No enemy would risk the odium such action (attacking civilian communities) would involve'. See Clark, R.W. The Role of the Bomber (Sidgwick & Jackson, London, 1977) p. 15. However, values changed quickly. Within a few months there was little objection to oft repeated calls to target 'open towns'. Some restraint was urged, however, to proposals in early 1915 to distribute a blight or incinerate Germany's grain crop. Balfour (First Lord, Admiralty) cautioned that it should be used only under extreme provocation. In Germany, the will to '...systematically (work) on the nerves of the English towns through an overwhelming air force' (Morrow, op.cit., p. 72.) was expressed as early as August 1914 and put into effect with the Zeppelin raids six months into the war, and the later raids by the Goth/Giant fleets. There were some initial constraints in the bombing of London; the Kaiser concerned for the safety of his royal cousins and the historical sites of the city. Gradually these constraints were eased.
11. Charlton, op. cit., p.43.
12. Charlton, op. cit., p.49.

BIBLIOGRAPHY
Australia — The Homefront

This year marks the 50th anniversary of the end of World War II and the theme for this commemorative year is 'Australia Remembers'. This is the third in a series which deals with Australia's involvement in the war.

National Security Act

The Australian Parliament passed the National Security Act giving Government Ministers wide powers to govern by regulation. With this Act, and with its powers under the Defence Act, the Government set about establishing control over trade. Regulations were gazetted to prevent Australians from sending capital overseas. Proceeds from exports were directed into the banking system and thus made subject to government control. Australians were later prevented from selling securities held abroad in order to obtain foreign currency. The control of exchange was completed by the introduction of regulations requiring importers to obtain permission before bringing in imports from non-Sterling areas.

Shortage of Skilled Labor

The shortage of skilled labour soon became acute. In 1939, Australia had fewer than 20,000 engineering and other skilled tradesmen and it was estimated that, by June 1942, industry and the Services would need 56,000. In an effort to limit the number of skilled workers enlisting in the Services, men in various age-groups whose trades were listed in the Schedule of Reserved Occupations were not allowed to join up unless they were to be employed in their trade in one of the Services. Skilled men were offered wages above the ruling rates if they would work in munition factories, and training was accelerated.

Defence Production

In December 1939, 7,600 were employed in munition factories; it was estimated that 2,200 more would be added by June 1940; a small increment considering that there were in Australia 1,750,000 wage and salary earners and many thousands unemployed. The munition factories were then chiefly making small-arms, heavy anti-aircraft guns, and ammunition. When war broke out, one destroyer, a sloop and two boom-defence vessels were being built for the navy; in November 1939 the building of four 650 ton corvettes was authorised, and these orders were distributed among four shipyards whereas hitherto naval shipbuilding had been concentrated at one. Soon the building of a second destroyer was approved. One aircraft factory was producing Wirraway single-engined aircraft and another was, by 1941, producing Beaufort bombers and later, the very successful Beaufighter; in October the War Cabinet authorised an order for 350 Tiger Moth aircraft, an elementary training machine and approved the manufacture of twin-row Wasp engines and Gipsy Moth engines in addition to the single-row Wasp engines already being made. One hundred Hudson bombers were on order from the American makers as were other aircraft from Britain. By June 1940, 75 Wirraways, 8 Moths and 76 single-row Wasp engines had been produced; in the following year 225 Wirraways, 453 Moths, 195 single-row Wasp engines and 319 Gipsy Moths.

Manpower Control

The Japanese advance southwards produced a threat so evident that the country was prepared to accept almost any government action intended to combat it. Measures put forward earlier but which were thought politically impracticable, including full-scale manpower regulation, restriction of non-essential industry and heavy taxation were introduced. The Manpower Directorate was created in January 1942 and adopted the principle of declaring protected undertakings in which employment movement was controlled, as was call-up to the forces from them. The Manpower Priorities Board insisted that the policy could not be successful unless based upon reliable and detailed statistics, and to acquire these the registration of all persons above the age of 16 was instituted, followed by the issue of identity cards which people had to carry. In February the Cabinet established the Allied
Works Council to carry out large constructional jobs. A Civil Constructional Corps to supply some of the labour needed by the Allied Works Council was approved in April; into it were pressed men over military age (men of 45 to 60). In May aliens were recruited by the Council, forming a Civil Aliens Corps. By June 1943 the CCC had 53,500 men, of whom, 16,600 had been conscripted. The Aliens Corps had 4,000.

**Civil Employment**

By July 1941, 666,000 women were in employment, 100,000 more than in 1939. An additional 24,000 were estimated to have left domestic service and found other work. It was planned to increase the number of women in the Services and the munitions factories from 13,000 to 52,000 in two years. The Manpower Priorities Board found that by February 1942 the armed forces employed 520,000 men and women, while civil employment was only 20,000 less than in July 1939. The resources which had produced the 500,000 were estimated at: 248,000 unemployed, 102,000 increase in the total working population, 150,000 persons not normally seeking employment. For 1942 it was estimated that 318,000 more persons would be needed (including 48,500 women and, for the Allied Works Council, 50,000 men). By June 1943 there were 190,000 women in direct war work (including the Services), and the total women in employment (again including the Services) had risen to 840,000. There had been a considerable drift from those jobs traditionally defined as women's work to men's work, leaving gaps in those essential services which were traditionally filled by women; and the rates for skilled women's work compared unfavourably with those new rates being paid unskilled women in factories.

**Australian Women’s Land Army**

The Australian Women’s Land Army was established in July 1942 under the Directorate of Manpower. The Land Army’s purpose was to supplement Australia’s supply of rural labour engaged in food production. Women aged between 18 and 50 who were not from rural families or already employed on the land were eligible to join. Land Army members were obliged to go where directed and to undertake any work they were allocated by their employers, who were also responsible for any travel costs. Award conditions, or minimum standards set by the Directorate applied. Permanent members of the Land Army were issued with uniforms, auxiliary members with distinguishing badges. The Land Army made a significant contribution to Australia’s rural labour supply. A peak of about 4,000 permanent and auxiliary members was reached in the 1943-44 harvest season.

**Rationing**

Rationing, mostly through coupon systems or the imposition of quotas on production levels, was introduced at various times during the war to restrict civilian consumption of essential items needed to support the war effort. Petrol was first rationed in October 1940. Private motorists were initially allowed enough petrol to drive about 4,000 miles a year, which was actually above average running figures for the time. By 1942 however, the standard issue allowed only 45-60 miles of running per month. Rationing of clothing and footwear began in June 1942 and food rationing followed. In 1944, the weekly ration scale for each adult was 2 oz of tea, 16 oz of sugar, 6 oz of butter, 2 and 1/4 pounds of meat. The coupon rationing system was generally well accepted by the Australian public, although the illegal practice of swapping coupons and exchanging goods was common. Some rationing continued until July 1950.

**Threat of Invasion Removed**

Darwin continued to suffer air raids during 1943, and it was not until June 1943 that the Prime Minister announced publicly that he considered that the threat of invasion had passed. Nevertheless there were obvious signs that things were better; in December 1942 civilians had learned that there could be a reduction in black-out provisions, and that the immobilisation of small craft no longer applied; in February 1943 some planters were allowed to return to their properties in Papua; in August 1943 restrictions on holidays was removed. For the civilian, as for the soldier, the summer of 1942-43 was the turning point. Formation of the Department of Post-War Reconstruction was announced at the end of 1942. However, a Bill giving the Commonwealth powers for five years after the end of the war covering reinstatement of ex-servicemen, employment and unem-
ployment, marketing, uniform company legislation, trusts, profiteering and prices, primary production, overseas exchange, air transport, railways, national works and health was rejected in a constitutional referendum on 19 August 1944.

Aborigines and Torres Strait Islanders

Approximately 840 Torres Strait Islanders served in the Army during the 1939-45 War. It is estimated that between 1,500 and 2,000 Aborigines formally enlisted in the services. Other Aborigines gave military service although not formally enlisted and perhaps as many as 2,000 to 3,000 supported the war effort as civilian labourers freeing enlisted servicemen to perform military duties. Unlike most Australians, the dependants of Aboriginal servicemen and labourers in northern Australia also found themselves living in the war zone and in close contact with day-to-day military operations.

War Time Prime Ministers

Robert Menzies, who had been Prime Minister at the outbreak of war, resigned in August 1941. He was replaced on 29 August 1941 by Country Party Leader Arthur Fadden whose budget was defeated in the House of Representatives. ALP Leader John Curtin was sworn in as Prime Minister in October 1941. His government was returned at elections on 21 August 1943 with majorities in both the House of Representatives and the Senate. Curtin, who was ill in late 1944, resumed his duties in 1945 but in June his health broke down and he died on 6 July. Deputy leader Frank Forde was sworn in as Prime Minister. The ALP caucus later elected Ben Chifley as Prime Minister and he took office on 13 July 1945.

Source: Department of Veterans’ Affairs.

Australian Women’s National Services motor cycle messengers.
BY THE SEAT OF THEIR PANTS
by Terry Gwynn-Jones, published by University of Queensland Press in paperback, no price given, 215 pages, cover in colour, photos in B & W.

Reviewed by Flt Lt (Retd) H.S. Brennan, RFD JP.

Terry Gwynn-Jones was born in England, he served with British, Canadian and Australian Air Forces as a fighter pilot before joining Department of Civil Aviation as an Examiner of Airmen. In 1988 he gave up flying to pursue a full time writing career. However, since 1973 he has had twelve books published plus numerous magazine articles.

This book traces, by means of different chapters, the development of the airplane in Australia, the lives and times of various airmen, not necessarily Service airmen, from the time that Harry Houdini, an American, made his first flight in a paddock near Melbourne on 18 March 1910, to be followed by several Australians who, by virtue of bad publicity at the time could not contest Houdini’s claim to be the first man to control powered flight for some distance in Australia.

Captain Robert Little, a flyer from the 1914-1918 War, and who was the highest decorated Australian pilot is given the recognition due to him, as are all the flyers both male and female who by their love of flying helped to put this country “on the map” as far as record breaking and flying under very hazardous conditions not always related to wartime are concerned. Apparently the author and his friend Denys Dalton, to whom the book is dedicated, set what was possibly the last record breaking flight in a piston engined aircraft in July 1975 before both retiring and enjoying pleasure flying only.

The book contains numerous photos, some of which cover the early commencement of QANTAS, and those early planes bring home the state of development of the airplane from the flying box kite type to modern enclosed high speed aircraft. To my mind a very interesting collection of aviation history.

THE ANZAC SQUADRON
by Norm Ashworth, published by Hesperian Press, WA.

Reviewed by WGC DR Mark Lax

The History of No 461 Squadron RAAF 1942-1945 is the sub-title to this book, which examines every aspect of No 461 Squadron’s activities during the relatively short period of its existence. Formed on ANZAC Day 1942 at the height of the Battle of the Atlantic, No 461 was one of the 17 Article XV Squadrons promised by the Australian Government to aid Britain’s defence. Crewed by Australian and Commonwealth airmen, for three years, the Squadron sought out and destroyed enemy submarines to help protect Britain’s sea lanes.

This is not the first publication about these bygone heroes, but I must say it is one of the most comprehensive. Divided into 12 chapters and an overview, Air Commodore Ashworth has interwoven personal stories from correspondence and interviews with historical records and diaries kept at the time. The result: a most entertaining and informative read.

As published, the book is in small paperback layout with 244 pages of text plus five appendices and a short index. Greatly adding to the story are five maps and 73 black and white photographs, many from private collections. Because the Squadron flew Sunderland flying boats, a chapter is devoted to the aircraft and crew duties and several flight manual diagrams are also included. The appendices cover nominal rolls, operational summaries and casualties. Also included are daily entries from the personal diary of Flight Sergeant Colin Gramp covering March to September 1944 - illustrative of the day-to-day life on the Unit.

The Squadron had its successes and failures. 64 decorations were awarded and 12 submarines sunk or damaged. This put them equal top score for the entire Coastal Command (a record incidentally shared with the other RAAF Squadron, No10 and two RAF units). On the down side, 11 aircraft were lost claiming 86 casualties, including the Commanding Officer,
Wing Commander Halliday lost in 1942. This book also tells their story.

The author, Air Commodore Norman Ashworth, is a retired RAAF officer, now President of the United Services Institute of Western Australia. He came to this publication with a strong maritime patrol background, which gives him some affinity with those about whom he has written. On retirement in 1988, amongst other pursuits, became involved with the Sunderland Squadron’s branch of the RAAF Association. It was in his capacity as Secretary no doubt, that spurred his interest in this historical study of No 461 Squadron at war. In this publication, the author has ensured that the Squadron lives up to its motto ‘they shall not pass unseen’. Recommended.

**EXPOSE, A history of Searchlights in World War Two**


Reviewed by Vic Jeffery, Defence Public Relations

One of the earliest new Army formations raised in anticipation of World War Two, the anti-aircraft searchlights of Australia, a small original volunteer force, became 34 companies of 10,000, and 1,500 Womens Army Service personnel.

First formed as units of the Royal Australian Engineers, responsibility passed to the Royal Australian Artillery in 1943. Fifteen of these companies were involved in direct combative action with the Japanese in New Guinea, Borneo, Dutch New Guinea, Darwin and in the Torres Strait, with the remainder playing a defensive role in the protection of the Australian mainland.

This is the first comprehensive account of the organisation, training and operational experience of Australia’s wartime anti-aircraft companies and batteries.

Described as a literary animation of the condensation of the War Diaries of Australia’s Anti-Aircraft Searchlights by retired officers Lieutenant Colonel John Robinson and Major Ron Adams, and added to and written by Noel Hill, this book fills a void in Australia’s World War Two military history.

My only disappointment with this informative work is that it does not take in the Coastal Artillery organisation. However, this does not detract from this well priced and illustrated book which is an interesting insight into the often overlooked and important searchlight batteries of World War Two.

**BLACK CATS**

by A.E. Minty, RAAF Museum, Point Cook.

RRP $15.00 or $25 for two copies.

Reviewed by Squadron Leader John Bennett, HQADF

Black Cats is another publication which goes towards filling the void in the Australian application of air power. The Catalina flying boat in RAAF World War II service, camouflaged black for night operations, is most probably best known for its patrolling and search and rescue roles. In fact, the Catalina was to provide Australia’s long-range strike force during the Pacific War. As this book states, 70 per cent of RAAF Catalina missions were offensive mining strikes as far afield as Singapore and China.

The story of these missions is told by the crews that flew them. “Bill” Minty has gathered his comrades from the Catalina units – Nos 11, 20, 42 and 43 Squadrons – to relate their tales of these 20-hour missions. As Air Commodore O’Loghlin mentions in his foreword dealing with the strategic significance of these operations, the Catalina was foremost in deep penetration, responsiveness and flexible target selection. Such mining operations not only caused considerable disruption to the Japanese, but also resulted in much inconvenient effort by forcing enemy countermeasures.

Bill Minty’s treatment of RAAF Catalina missions comes from a welcome operational perspective, by those who were there and are still in a position to tell us about it. The book makes an appropriate companion volume to another RAAF Catalina record, David Vincent’s Catalina Chronicle.
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