PART B
Collection of Air Power Papers, Essays, Articles and Book Reviews
Volume 3  Number 1  2017
The Journal of the Royal New Zealand Air Force, otherwise known as the RNZAF Journal, is an official Royal New Zealand Air Force publication, produced by the RNZAF Air Power Development Centre (APDC). The RNZAF Journal is the professional journal of the Royal New Zealand Air Force and consists of two parts. Part A contains academically credible articles on air power, with the objective of serving as an academic forum for the presentation and stimulation of critical thinking, debate and education on air power. Part B contains a broad collection of air power papers, essays, articles and book reviews intended to promote and enhance air-mindedness, encourage professional mastery and stimulate debate and discussion about air power at all levels.

The submission of papers, essays, articles and book reviews for either part is open to anyone but all submissions must be relevant to air power. Challenges to conventional thinking and accepted norms are encouraged, as are innovative recommendations or conclusions.

JOURNAL SUBMISSIONS

The APDC will formally call for papers, essays, articles and book reviews for both volumes of the RNZAF Journal during October of each year, to be submitted by the first week of the following February. However, articles may be submitted at any time and should be sent to: ohapdc@nzdf.mil.nz
Papers, essays and articles should not normally exceed 5000 words and shorter submissions are encouraged. Submissions should be in MS Word format using Chicago referencing with footnotes. The use of supporting charts and photographs are acceptable, but may be subject to copyright confirmation before being reproduced within the RNZAF Journal. Submissions must only contain unclassified material.

Reviews of air power related books, either contemporary or historical, should consist of approximately 300 to 500 words.

To obtain further information on journal submissions, contact the APDC at:

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» Royal Air Force Review to reprint ‘Soldiers are from Mars and Airmen are from Venus: Does air power do what it says on the tin?’ by Air Vice-Marshal (Rtd) Colley (RAF).

» The Otago Daily Times to reprint the winning entries from the 1921 Henry Wigram Essay competition.

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AIR POWER DEVELOPMENT CENTRE

The purpose of the Air Power Development Centre is to research, formulate and disseminate information on air power from a New Zealand perspective in order to promote awareness on the contribution of air power to the security of New Zealand.
CHIEF OF AIR FORCE  
FOREWORD

It is my pleasure to provide the foreword to the first issue of the resurrected Journal of the Royal New Zealand Air Force, which is intended to become a regular publication. 58 years since we last had such a journal is at least 57 years too long.

Air power is using air capabilities to influence the course of events. Air-mindedness, the understanding of how air power achieves influence, underpins air power. But while the Royal New Zealand Air Force (RNZAF) is the custodian of military air power for New Zealand, the practitioners, enablers and supporters of air power extend far beyond the boundary of this single service.

The Journal of the Royal New Zealand Air Force (or RNZAF Journal for short) is published to promote and enhance air-mindedness in the RNZAF, the wider New Zealand Defence Force and the New Zealand public. It aims to achieve this by presenting a range of air power-related papers and book reviews, covering diverse topics such as history, roles, strategy, technology and theory. The articles are educational and will encourage critical thinking with respect to the tenets and application of air power. The book reviews provide a glimpse of the value of reading the book itself.

This journal is for everyone, not just academics. You will see that the articles and book review have been written by a broad cross-section of people, most of who are, or were, serving members of the NZDF. Title, rank, position and formal qualifications are immaterial; air power understanding can, and should be, universal. I am grateful to all of the contributors who have taken up the challenge of researching and writing about air power and additionally, for some articles, its contribution to the security of New Zealand. In doing so, we are all able to learn.

I recommend all of the articles and book review to you, and trust that they will enhance your understanding of air power. Finally, I challenge you to consider contributing your own article or book review to the next edition of the journal; this journal should always be for you, by you.

T. DAVIES  
Air Vice-Marshal  
Chief of Air Force
## Contents

<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chief of Air Force Foreword</td>
<td>7</td>
</tr>
<tr>
<td>Introduction to the Journal of the Royal New Zealand Air Force</td>
<td>11</td>
</tr>
<tr>
<td>Editor’s Notes</td>
<td>13</td>
</tr>
<tr>
<td>Air Power – Doing Something in the Air</td>
<td>17</td>
</tr>
<tr>
<td>“The Use of Aircraft in the Defence of New Zealand”</td>
<td>27</td>
</tr>
<tr>
<td>“The Use of Aircraft in the Defence of New Zealand”</td>
<td>39</td>
</tr>
<tr>
<td>Report on the Air Aspect of the Defence Problems of New Zealand</td>
<td>51</td>
</tr>
<tr>
<td>To what degree can air power’s inputs to battle be considered strategic?</td>
<td>65</td>
</tr>
<tr>
<td>Strategic Air Power in the Nuclear Age</td>
<td>73</td>
</tr>
<tr>
<td>US and Soviet approaches to State Security and Aviation Technology</td>
<td>83</td>
</tr>
<tr>
<td>during the latter stages of the Cold War</td>
<td></td>
</tr>
<tr>
<td>Soldiers are from Mars and airmen are from Venus:</td>
<td>93</td>
</tr>
<tr>
<td>does air power do what it says on the tin?</td>
<td></td>
</tr>
<tr>
<td>Can New Zealand’s military meet the challenges of the South Pacific?</td>
<td>109</td>
</tr>
<tr>
<td>Book Review: <em>Air Warfare: History, Theory and Practice</em>, by Peter Gray</td>
<td>123</td>
</tr>
</tbody>
</table>
INTRODUCTION TO THE JOURNAL OF THE ROYAL NEW ZEALAND AIR FORCE

In 1959, the Officers’ School of the Royal New Zealand Air Force (RNZAF) compiled an assortment of topical articles and printed them within a single publication called ‘The Journal of the Officers’ School, Royal New Zealand Air Force’, or RNZAF Journal for short. The need for this was seen as simple; RNZAF officers required a product that would guide and assist in furthering professional development. The intent at the time was for the journal to be produced on an annual basis but only two issues were ever published before the concept went into hibernation for over 57 years.

Today, the need for on-going professional education is as important as it was back then, and not just for RNZAF officers. Air-mindedness is vital for all who employ or support any aspect of air capability. But while the amount of available literature concerning air power has increased significantly since 1959, there were no regular air power publications presented from a New Zealand military perspective. This need and this void were the prompts leading to the resurrection of the RNZAF Journal.

Concept of the Journal of the Royal New Zealand Air Force

The official title of the resurrected RNZAF Journal is ‘The Journal of the Royal New Zealand Air Force’, and it will continue in the spirit of the original journal by providing topical articles covering a range of air power related subjects. These will include, but are not limited to: RNZAF operations, air warfare, humanitarian assistance, technology, capabilities, training, strategy, theory and security. Articles will be sought and drawn primarily from NZDF personnel, academics and interested civilians. Reprints from companion journals and other relevant sources may be published from time to time.

The RNZAF Journal consists of two parts, both of which are intended to promote and enhance air-mindedness, encourage professional mastery and generate discussion about air power. Part A, Air Power Readings contains academically credible articles on air power, with the objective of serving as an academic forum for the presentation and stimulation of critical thinking, debate and education about air power.
This part is intended to be the RNZAF equivalent publication to academic air power journals produced by other military forces, such as the Royal Air Force Air Power Review, the Royal Canadian Air Force Journal and the United States Air Force’s Air and Space Power Journal. Part B, Collection of Air Power Papers, Essays, Articles and Book Reviews contains a broader collection of works which may not readily fall within the constraints associated with an academic journal. The intention of Part B is that it will be a forum for all with an investment or interest in air power and, similar to Part A, act as a stimulus for thought, debate and discussion whilst also educating.

Part A and Part B of the RNZAF Journal are stand-alone publications which will normally be published at the same time, though in 2017 only Part B will be produced.

RNZAF Journal Editorial Review Board

Prior to publishing any issue of the RNZAF Journal, the RNZAF journal editorial review board, comprising subject matter experts, review the essays, papers and articles for correctness and suitability.

The Board members for 2017 are:

Group Captain R.J.M Paddock,
Royal New Zealand Air Force

Doctor J. Moremon,
Centre for Defence and Security Studies, Massey University

Mr B.A. Oliver,
New Zealand Defence Force

Warrant Officer R.P Pleasants,
Royal New Zealand Air Force

Overall

The RNZAF Journal is designed to be a means for anyone, no matter who they are, to present and/or digest ideas, views and analysis of air power matters through researched and reasoned papers, essays and articles. Material published in the RNZAF Journal may challenge current thinking, policy and conventions; the opinions and conclusions are those of the author, not necessarily those of the New Zealand Defence Force or the Government of New Zealand.
Welcome to this, the first issue of the RNZAF Journal to be produced in nearly 58 years. But even though it shares the same name, we have no intention for this resurrected title to be a faithful continuation of the original concept. The reason is simple: the first RNZAF Journal was an officers-only publication which seemingly overlooked the fact that air power effects are created and delivered by the corporate body, not a single subset. Hopefully it was just a reflection of the times, and it is not a theme we support. Instead, this resurrected journal is targeted at everyone, no matter their level of involvement, investment or interest in air power.

This first issue is designed to tie in with the 80th anniversary of the RNZAF by presenting essays, articles and reports that together encompass the life-span of military aviation in New Zealand. Looking at past events is an important aspect of a journal such as this, even though many may question the relevance of this when we live and operate in very different times. But do we really? Are the threats we face, the roles and responsibilities we shoulder, the limitations we overcome and the changes we predict, all that different from those of the past? Is the use of air power today so very different to how it was previously used? While the answers will not directly affect the day-to-day work of most people, they may assist in understanding why the day-to-day work is what it is.

Ultimately though, this journal is about providing an interesting read. It is hoped there will be something within each issue that will grab your attention and give pause for thought. The editor of the original 1959 journal noted that within the first issue were articles containing contentious material but then justified the publication of these on the basis that mature men and women could discriminate and evaluate conflicting points of view. We intend to carry forward this spirit by promoting, within a constructive forum, lateral and critical thinking about all aspects of air power and the various influencing factors.

But to achieve a regular publication that is of interest, provides food for thought, is relevant to all and reflects a New Zealand perspective, contributor input is vital. To plagiarise the well-known World War One poster, We Want You! Air power effects are not created and delivered by aircrew alone: every RNZAF trade, role and duty has an important part to play, as do others within the wider NZDF and civilian population. If you are reading this, then you most probably have an involvement or interest in air power. As such, you will have views, experiences, knowledge and ideas about the subject and if something resonates with you, it will resonate with many others. Joe-room discussions can easily be the starting point for an article. Contact the APDC in the first instance if you are interested in contributing.

This issue of the Journal opens with a sweeping overview of the last 106 years of air power, providing over-arching context for the following papers. Cramming over a century of military aviation history into less than a dozen pages can only provide a taster rather than a main dish; the article does not pretend to be comprehensive.
and it does not go into detail. Instead, it provides a chronological outline of air power use in the past, mentions a few limitations encountered along the way and concludes with some thoughts about the future. Reading the article may leave many unanswered questions but rather than proving frustrating, it is hoped that these unanswered questions will pique interest in delving further into the subject yourself.

The next two papers reach back to the early days of military aviation in New Zealand. In 1921, Sir Henry Wigram offered prizes for the three best essays on the subject ‘The Use of Aircraft in the Defence of New Zealand’. Considered the father of New Zealand military aviation, Sir Henry had urged in 1909 for the formation of a flying corps as part of the nation’s defence forces and later, in 1917, was instrumental in establishing the Canterbury (NZ) Aviation Company, one of the country’s first flying schools. His motives for the essay competition were primarily to arouse interest in military aviation and gather practical suggestions from those who may have had relevant wartime experience. The winning and runner-up essays are reproduced in full in this issue and are interesting in their similarities, even though the writers hailed from very different backgrounds. While neither essay became a blueprint for New Zealand’s air defence, it is worth thinking about just how much of what was written still applies today. For instance, both essays argue that even though the possibility of an air attack against New Zealand is remote, it still needs to be detered or defended against by a standing fighter force. Technical capability has improved significantly since the essays were written and armed military aircraft are able to reach New Zealand from any point of the globe. Therefore, is the possibility of air attack any different now? Is the perceived need for a standing fighter force still valid?

In 1936, Sir Ralph Cochrane wrote a report which served as a basis for New Zealand to create an independent air force. This report is regarded as the founding document of the RNZAF (though the title RNZAF was first bestowed in 1934) and it is highly appropriate that it is reproduced in this 80th anniversary year. Considering the effect it had, the report is relatively brief and light in detail. With the benefit of hindsight, some of the author’s assumptions and reasonings may appear to be flawed and it is very clear that even though advocating an independent air force for the defence of New Zealand, it was still going to be subordinate to the requirements of the Empire. Bearing in mind the employment of the RNZAF during and after World War Two, were the conclusions and recommendations of the report, clearly influenced by the bomber-first doctrine which was in vogue at the time, appropriate? Keep in mind when reading this report that not only was the author a bomber pilot himself but the majority of it was written on the boat before he arrived in New Zealand.

The terms tactical and strategic are bandied about a lot within military aviation circles but are terms that are often used as labels. For example C130s are often called ‘tactical transport’ aircraft while attacking a power station is often called a ‘strategic strike’. But is putting aircraft types or airborne actions into specific boxes overly simplistic? This question is the basis of the next paper by Lieutenant Commander Dowling. He has used two aspects of the Asia-Pacific campaign during World War Two as examples for arguing that aircraft and actions commonly considered as tactical can actually have strategic effect. Is it better to only use these terms in the context of desired or resultant effect rather than as disingenuous labels?

Continuing the historic theme, ‘Strategic Air Power in the Nuclear Age’ by Flight Lieutenant Fenton is an article that was printed in the first issue of the RNZAF Journal. Even though the Cold War has officially ended, the world remains in the nuclear age. Nuclear weapons are being modernised by the superpowers and more state actors are gaining the technology to make and potentially use nuclear weapons. This article looks at what were the
key factors in the air war back in 1959 – thermonuclear firepower, manned supersonic flight and guided weapons systems. It concludes that in the midst of change one important inheritance from World War Two remains: the war winning potential of strategic air power. When looking at today’s air power technology, current area denial concepts and modern geo-political relations, how much has the situation actually changed since 1959? Has it, in the broadest sense, changed at all?

The Cold War was not just about nuclear weapons, it was also about politics, economics, security and technology. In a time when tensions between Russia and the West are increasing once more, it is interesting to reflect on the Cold War and its impact on technological developments in air power. Mr Peter Cook’s paper does not attempt an analysis of these developments, rather it provides a historical overview in order to illustrate how a heightened security environment influenced aviation technology. Could such a situation be occurring again? What technological developments in air power are quietly underway in the contemporary era not only by Russia and the West but also by other key players such as China?

The capabilities of air power are broad and are condensed into four roles: control of the air, intelligence and situational awareness, attack and air mobility. Members of air forces usually have an inherent understanding of the roles and sub-roles performed by their operational squadrons but this, understandably, does not necessarily apply to those in other services and the wider public. Air Vice-Marshall Colley in his article ‘Soldiers are from Mars and airmen are from Venus: Does air power do what it says on the tin?’, articulates what air power is and what it does. Originally printed in the RAF’s Air Power Review, his view was that airmen had failed to clearly express what air power can do in the joint campaign. While the article is from a Royal Air Force perspective and was written back in 2008, is the RNZAF any better at ensuring our service brethren (and ourselves for that matter) know what air power can bring to the table? Even though the RNZAF does not have the full gambit of capabilities discussed in the article, they are available and used in many combined operations which have a New Zealand presence.

New Zealand rightly prides itself on being a good global citizen and a caring nation. The military forces of this country have undertaken many security and humanitarian missions locally and further afield using available land, sea and air power to maximum effect. But are our forces being asked to do too much with too little, or is the balance about right? Wing Commander Clark in his research report points out that our local ‘back yard’, the South Pacific, is experiencing considerable change; change that may result in a need for greater New Zealand military presence within the area for both security and humanitarian reasons. The report questions whether New Zealand is able to meet this emerging need without re-examining defence investment and engaging the public more. This report was written four years ago - has the intervening period weakened or strengthened his argument?

Concluding this issue of the Journal Mr Simon O’Neil, a former Director of the RNZAF Air Power Development Centre, reviews Peter Gray’s publication ‘Air Warfare: History, Theory and Practice’. In the review, the book is described as a refreshing review of the first century (and a bit) of air power and is a work that should lead our professional study and discussion of air power. It is a book that, should your interest have been piqued by the opening article in this Journal, will be perfect for delving further into the subject.

P. STOCKLEY
Editor
Colonel Billy Mitchell USAAS\(^2\), an early air power theorist and advocate, described air power as;

‘...the ability to do something in the air’.

**INTRODUCTION**

The above somewhat vague, but inherently true, description of what air power ‘does’ was made in 1925 during a time when air power was still new and poorly understood. It was a power that challenged institutionalised convention and, even though demonstrating considerable value and potential during World War One, struggled for a long time afterward to be recognised as a legitimate and valued arm of the military. Indeed, shortly after the outspoken champion of air power Mitchell made the above statement he was court-martialled for severely criticising US War Department policy. He was not the first to be treated this way as only ten years previously, a like-minded advocate in Italy named Giulio Douhet had been court-martialled and jailed for both criticising the conduct of the war against Austria and advocating air power as a solution to break the stalemate that then existed. Even in the United Kingdom, the nation that created the first ever independent air force, Sir Hugh Trenchard\(^3\) had to fight tirelessly throughout the 1920s in order to retain the Royal Air Force (RAF) in the face of fierce opposition or apathy from all quarters. While it is unlikely, and unnecessary, that anyone will go to jail through advocating the cause of air power today, debate over the merits or otherwise of air power continue.

Today, air power is typically defined as the ability to project power from the air in order to influence behaviours or events.\(^4\) It is a power that has only been in use for 106 years, but has in that time evolved to now take central standing amongst all of the powers. It has developed from a novelty into an important component of warfare, though without ever being completely decisive. There have been many notable successes in the use of air power but it has also struggled to make a meaningful impact in a succession of minor conflicts, particularly during more recent times.

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1. This essay, and in particular, established factual historical aspects are largely based on the following two publications: Colin Gray, *Air Power for Strategic Effect* (Alabama: UAP, February 2012), and Martin Van Creveld, *The Age of Airpower* (New York: Public Affairs, 2011). They will not be referenced further except in cases where the individual thoughts and ideas of the authors are expressed.

2. The aviation arm of the US Army was referred to as the US Army Air Service until July 1926 when it thereafter became the US Army Air Corps.

3. Chief of the Air Staff, Royal Air Force.

4. Draft New Zealand air power doctrine defines air power as “using air capabilities to influence the course of events.”
The strategic significance of air power is now beyond question, and its strengths and limitations (speed, reach, height, limited payload, costs, fragility etc.) are generally well understood. It has seen many advances over the years and the increased adoption and reliance on non-human technology today, particularly in the case of unmanned aircraft, presents both significant advantages but also great challenges. To understand how air power can be used today and in the future, it is worthwhile having an understanding of how air power has been used since conception. The following is a very brief overview.

A BRIEF HISTORY

The Italian-Turkish war of 1911 in Libya saw many aviation firsts, including the first, albeit ad-hoc, offensive operations when Italian aircrew dropped grenades on encamped Turkish forces. The most valued contribution of air power during this conflict was in the role of observation, providing reconnaissance and artillery spotting for ground forces. It was in the same observation role that aircraft subsequently made their first useful contribution in World War One. The sheer scale of the battlefield, extending hundreds of kilometres, made it difficult to maintain awareness of the overall operational picture, and aircraft provided a useful tool to alleviate this. It did not take either side long to realise that the benefits of aerial reconnaissance were something that should be denied the enemy, resulting in the advent of scouts (fighter aircraft) which could both protect their own aircraft and also shoot down enemy observation aircraft. The concept of control of the air was born and air-to-air combat became commonplace.

The first strategic air attacks took place in 1915, when Zeppelins raided southern England’s urban areas which, even though causing relatively little damage (1414 deaths in total in the UK), created panic and required significant reallocation of resources in order to defend against them. The slow and unwieldy Zeppelins eventually proved to be vulnerable to the re-organised British defence as well as to the natural elements. In 1917, Gotha and Giant bomber aircraft took over the strategic bombing campaign and proved much more effective.

From 1916 specialised aircraft were developed for battlefield support of infantry, and the first battle of Cambrai in 1917 saw the British Royal Flying Corps (RFC) operating with tanks; by 1918 aircraft operating in concert with tanks and infantry had become standard. At the Battle of St Mihiel in September 1918, the American Expeditionary Force employed approximately 400 tanks and 1500 aircraft in support of over 600,000 US and Allied ground troops. The joint combined arms nature of the offensive together with the speed at which it was conducted was perhaps the forerunner of the later German Blitzkrieg style of warfare.

World War One also saw the emergence of the aircraft carrier with the British Royal Naval Air Service (RNAS), albeit in rudimentary form, which pointed the way to the future of naval warfare. The seeds had been sown for ship-borne air power to eventually take primacy over the might of the battleship.

The RAF was formed in 1918 and amalgamated the RFC and RNAS into the world’s first independent air force, recognising that air power should no longer be a subset of land or sea power. But even though air power had rapidly gained in prominence and both sides employed tens of thousands of aircraft during the war, aircraft did not in themselves prove decisive. Air power neither diminished the industrial capacity of the belligerents to wage war nor the will of the people to continue fighting; the evidence suggests that bombing cities may have actually strengthened morale and resolve. Arguably, the main lesson to emerge out of World War One was that control

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5 The first major independent American offensive of the First World War.
of the air was likely to become increasingly necessary as an enabler of effective military operations.

The majority of the inter-war period saw air arms committed to a policy of long-range strategic bombing, independent of the army and navy. This was despite limited and inconclusive evidence in support of such bombing during World War One. Instead, a desire to avoid a repeat of the attrition-type land warfare of 1914-18 and the conviction of men such as Trenchard, Mitchell and Douhet, who were convinced that air power lay with strategic bombing, drove doctrine to be largely constructed around this principle. Optimistic claims were made about what air power could achieve, which were seen by some as questioning the need for armies and navies. In a time when funds were short and rivalries were high, the RAF only narrowly survived persistent challenges from the senior services. In the United States (US), calls for an independent air force came to nothing as the army tightened its control. The RAF enjoyed a limited resurgence during this period whilst undertaking Imperial policing in places like Afghanistan, as it was cheaper in both monetary and personnel terms to use small numbers of aircraft to cover a large area, than it was to maintain standing ground forces across the region. Aerial policing relied on carrot-and-stick methods for success but ultimately, like all coercive strategies, it alienated as much as it engendered co-operation.

By the mid-1930s, fundamental issues with strategic bombing slowly became apparent. Evidence of the impact of bombing on the morale of the civilian population during World War One remained inconclusive; the performance of fighters gradually exceeded that of bombers; and in 1935 radar began to be developed into a practical early-warning detection system. Even though doctrine still centred on the bomber, Britain began preparing to defend its shores against the emerging threat of Nazi Germany, placing orders for the new high performance monoplane fighters that were then under development and creating an integrated air defence system which would prove a life-saver in 1940.6 The result was that the RAF’s medium bomber fleet was in poor shape at the outbreak of World War Two.

By 1939, Germany’s Luftwaffe was the most powerful air force in the world and had gained valuable combat experience during the Spanish Civil War, particularly in interdiction and close air support operations. They had also learned the necessity of air superiority. During the invasions of Poland and France in the early stages of World War Two, the Germans successfully applied joint combined arms principles established in 1918 into their ‘Blitzkrieg’ style of warfare. The Luftwaffe acted as a force multiplier for air-land warfare, and had validated tactics in Spain. It was recognised that local air superiority was vital for success and this they mostly achieved throughout May-June 1940.

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6 Van Creveld, The Age of Airpower, 84.
Following this, the German’s aim was for the Luftwaffe to pave the way for an invasion of England, contingent upon victory in and from the air. The subsequent battle, the very first campaign in warfare fought almost exclusively in the airborne environment, was known as the Battle of Britain.

The importance of quality intelligence was revealed during the battle, as at no time was the Luftwaffe fully aware of how integrated the defence of the UK was, how it actually worked and how vital certain elements of it were. For instance, they believed information from each radar station was only used locally by one or two squadrons in a disjointed manner. Instead, data from all radar stations was collated at Fighter Command HQ, filtered for ‘big picture’ understanding and then widely distributed to the various Group and Sector Headquarters for use in a coordinated response. Rather than concentrating effort on vital strategic elements, such as the radar stations and headquarters, the Luftwaffe only made token attacks against them, choosing instead to destroy RAF aircraft in the air, on the ground or in the factories producing them. This was a strategy that had previously worked for the Luftwaffe, but was inappropriate for the situation over Britain. Faulty intelligence meant that bombs were often dropped on inconsequential targets and the unaffected integrated defence system allowed the RAF to choose (to a limited but advantageous extent) when and where to fight. British factories were largely untouched and production of aircraft increased during the battle. The RAF, whose ultimate task was to remain in existence, carefully managed their resources and was able to replace losses in pilots and aircraft. In early September 1940 the Luftwaffe changed focus, concentrating attention on London in an effort to draw up RAF fighters in large numbers and deliver a mortal blow. On September 15, the Luftwaffe suffered so many losses that they were forced to admit that they had failed to achieve the level of air superiority necessary for an invasion to succeed. Two days later, the German plan to invade Britain was postponed indefinitely. The importance of the Battle of Britain cannot be overstated as by remaining in existence the RAF allowed Britain to stay in the war. This both ensured US support and provided a base for which resistance against German aggression could continue.

Air power played a vital role in the Mediterranean and North African theatres from 1941-43. The dramatic airborne invasion of Crete was enabled by air power, but also revealed the high cost of airborne landings in the face of a determined defence. In the desert war, air support was essential in the roles of fire support, interdiction, and protection of lines of communication. The subsequent Italian campaign proved challenging for air power, as despite air superiority it was unable to make a notable difference, due to the complex and difficult nature of the terrain combined with frequent bad weather. While effective, air power also proved it had inherent limitations.
Even though pre-war doctrine had been focussed on the bomber, neither the Allies nor Axis possessed sufficient resources for a sustained bombing campaign during the first three years of the war. The Allied *Casablanca Directive* of January 1943 changed that situation after Stalin demanded that a second front be opened to relieve pressure on Soviet forces in the east. As the Allies were not ready to launch a land-based front, it was decided that a continuous strategic bombing campaign, known as the Combined Bombing Offensive (CBO) was the next best way of achieving this end. The CBO would consist of round-the-clock bombing with RAF attacking by night and the US 8th Air Force by day. This was further refined with a subsequent directive,\(^7\) which stated that depletion of German fighter strength must be accomplished prior to Operation Overlord.\(^8\) The initial result of the CBO was unsustainable losses to the Americans and unescorted daylight missions ceased in October 1943, only resuming in February 1944 when long-range fighter escorts became available. While the effects of the CBO itself are still being debated, what it did achieve was the withdrawal of thousands of German heavy guns and hundreds of fighters from the Eastern Front in order to defend Germany. Once fighter escort was provided for US daylight raids, the war of attrition that followed between the opposing fighters depleted the Luftwaffe more than did the bombing.

On the Eastern Front, the scale of the campaign ensured that air power had an important role to play. During the German invasion of Russia in 1941, the Luftwaffe had imposed an apparently catastrophic defeat on the Soviet air forces (VVS) by destroying at least 7500 aircraft in the first three months. However, most of the aircraft were destroyed on the ground and their crews survived to fight again. Once momentum had been lost and the invasion stagnated, the sheer size of the Russian front meant that it was impossible for the available Luftwaffe resources to effectively cover it all. Units constantly moved to where they were most needed, were constantly exposed to combat and a war of attrition began. By mid-1943 advanced Soviet aircraft types were becoming available in large numbers and by late 1943 Russia dominated Germany in terms of strength. As previously mentioned, Germany was also forced to redeploy fighters and artillery back to their homeland in order to defend against the allied CBO. This combination of factors meant that Germany lost air superiority and eventually the greater mass of the Soviets took its toll on the German forces. The VVS were able to operate at times almost at will and played a significant part in the success of Soviet ground operations.

By June 1944, most of the Luftwaffe was engaged in defending the German homeland and as a result the D-Day landings were virtually unopposed from the air. The battlefield itself was mostly isolated by interdiction operations and airborne forces were delivered to protect the flanks. Air power prevented large scale reinforcement and any movement by German forces during daylight was fraught with risk. In the last phases of the war in Europe on both the Western and Eastern fronts, air power proved to be the key enabler for allied victory.

The war in the Asia-Pacific theatre was another attritional contest, this time for control of the approaches to the Japanese home islands. The attack on Pearl Harbour by the Japanese in December 1941 was a tactical success, demonstrating the significant value of aircraft carriers, but eventually proved to be an operational failure.

\(^7\) The *Pointblank Directive* of 14 June 1943.

\(^8\) The code name for the Allied invasion of continental Europe that came to be known as D-Day.
The US carrier fleet was untouched and able to gain the strategic advantage following the Battles of the Coral Sea and Midway in 1942. In both clashes, air power was used to fight naval battles. These battles, together with others over places such as Guadalcanal and Rabaul, cumulatively eroded the depth of Japan’s fighting power, mainly through the loss of experienced crews who were rarely, if ever, rested. On the Asian mainland, effectively a sub-theatre, air power contributed to the war of attrition, slowly eroding Japanese war-fighting capacity through a combination of air attack against enemy forces and efficient air re-supply of own land forces whenever required. Strategic bombing in the form of B-29 raids against Japan were commenced once suitable airfields within range became available. Initial high altitude raids were only of limited success, primarily because the allies were using similar tactics to those used in Europe. When Curtis Le May took over command of all strategic air operations against the Japanese home islands, he recognised that conditions over Japan were very different to those over Germany and immediately switched to low to medium altitude fire-bombing of Japanese cities at night.

The results were spectacular, burning out 67 Japanese cities. In concert with sea-mining operations and a submarine blockade, strategic bombing had already created the conditions for Japan’s eventual defeat before the nuclear bombs at Hiroshima and Nagasaki were used. While the Asia-Pacific war was inextricably a joint combined arms affair, ultimately it was air power that decided the outcome.

In contrast to World War One, air power enabled victory in World War Two. All of the roles of air power had been used extensively during the conflict but its most valuable contribution was probably the air support of armies through interdiction, which was a significant feature of most campaigns. Without air superiority though, this would not have been possible. While air power in itself did not decisively win the war, it proved to be the biggest single advantage of the allies. Winston Churchill had possibly recognised this back in 1940 when, in a memo to his Cabinet, he stated “The Navy can lose us the war, but only the Air Force can win it.”

Immediately post-war, nuclear weapons became just another munition in the arsenal. Only in the mid-50s was it realised that their greatest value lay in being a preventer of war, through deterrence rather than coercion. But even though they remained the cornerstone in the prevention of World War Three throughout the Cold War, the threat of major-power nuclear war did not prevent a plethora of little and proxy wars. The Korean and Vietnam wars entangled the US in conflicts they did not understand and were ill-equipped doctrinally to win. The Korean War was a limited war and the US and United Nations (UN) were always fearful of triggering a wider conflict. A concerted strategic bombing campaign was never allowed but tactical air power performed well and, despite the jet age, was used in much the same way as during World War Two. Despite the US being a nuclear power it did not deter North Korea, China or Russia from continuing the conflict and it was only
in 1953 when President Eisenhower made threats of a nuclear attack that China was finally coerced to the negotiating table.

US air power was ill-prepared for the Vietnam War. The wrong kind of war was waged from 1965-68 with the US geared toward big-unit engagement, something the North Vietnamese rarely did. A strategic bombing campaign was attempted but was severely hampered by political interference. The depth and sophistication of the North Vietnamese air defences came as a considerable shock to the US and once again the civilian population demonstrated resolve rather than submission when bombed. The strategic campaign failed. A reversion to counter-insurgency (COIN) principles saw matters improve and once adjusted to an irregular warfare mind-set, tactical air power did all that was asked of it. But there was no coherent strategy and it is arguable as to whether the war was ever winnable by the US. The bombing campaigns were ill-conceived and poorly directed. The North was never going to be coerced by brute force, which the US totally failed to grasp. The helicopter was one of the few successes to come out of the Vietnam War, coming of age as an air manoeuvre platform. Armies now regard rotary lift as an integral component of land power.

Air power enjoyed a renaissance in the 1990s, conceptually driven by two US Air Force officers and air power theorists, John Warden and John Boyd; Boyd for his OODA loop model (Observe, Orient, Decide, Act) which was extrapolated into the strategic world and Warden for his five centre of gravity rings for aerial bombardment. The Gulf War of 1991 saw a powerful coalition of nations pitted against the Iraqi forces of Saddam Hussein. The air-led war of manoeuvre never allowed the Iraqis to implement their strategy of attrition. Control of the air was gained in the first 24 hours and the subsequent 26-day air bombardment comprehensively destroyed or disabled Iraqi capability to resist. The Gulf War was decided by air power, but claims of a revolution in warfare were somewhat exaggerated and premature. Ground action had still been necessary to force capitulation.

Operation Deliberate Force involved NATO air power attempting to coerce Bosnian Serbs from violence towards Bosnia’s Muslims. The air campaign, together with other measures on the ground, made the Serbs realise that they were seriously outmatched militarily, and they sought political compromise. When NATO returned to the Balkans in 1999, again it was with a strategy of coercion in an effort to deter Serbian aggression in Kosovo.
The action was entirely carried out by air power over a period of 78 days with gradual escalation bringing increased pressure on Serbian President Slobodan Milosevic to cease his oppression of the Albanian Kosovars. This eventually told and Serbia was successfully coerced through air power alone, though the threat of NATO ground action and the apparent loss of Russian support also played a part.

Subsequent actions in the new millennium have seen mixed success. Afghanistan, Iraq, Lebanon, Gaza, Libya, Yemen and Syria all represent political and strategic failure to some degree and proved a challenging arena for air power. In all of these conflicts air power has played a supporting role to ground forces and co-operation with Special Forces in particular has been honed to a fine art. They have seen the widespread deployment of drones, principally for situational awareness purposes but also used in the strike role, which has at times proven controversial. Air power has not fared well when employed in the ‘war on terror’ and the art of COIN has had to be re-learnt. The ‘protection’ of rebel forces in Libya represents the most successful recent air action and ultimately negated the need to deploy ground troops, which the UN and NATO were keen to avoid. The most notable features of this particular conflict were that not one single sortie was flown by the Libyan Air Force to oppose coalition forces who had declared a no-fly zone, and that only precision guided munitions were used by the coalition throughout.

In summary, air power has played a full and active part in most conflicts over the last century, with mixed results. Offensive air power reached its peak during 1939-45, being able to consistently demonstrate its ability to destroy cities. But even so, the importance of holding territory with boots on the ground, and command of the sea did not diminish. Air power is a political tool and is extremely sensitive to misuse when employed by those who do not understand its limitations.

It has more or less come full circle in a tactical sense over the last hundred years. Initially used offensively to target one or a few individuals by throwing hand-held grenades over the side of the aircraft, 34 years later it was capable of laying waste an entire city with only one bomb. Somewhat ironically, the aim now is often back to targeting just one person or a few people within a specific building within a city, and cause as little damage as possible.

Today the major powers mostly base their capability around contingencies and not on fighting another similar power. Overwhelming numerical strength is not seen as particularly important and over the last 10 - 20 years most of the major air forces have decreased their fleets by around a third. The claim that aircraft are a lot more capable than they were and therefore we need less of them, does not stand up to close scrutiny. Despite increased capability, strike aircraft still are not comfortable in a COIN scenario or in ‘war amongst the people’. It requires robust intelligence for air power to be of any utility and there is so much information available to commanders now that it can, in many instances, complicate rather than clarify understanding of situations. Another factor is cost. Since 1970, every key new western military aircraft has suffered cost overruns. It is expensive to replace aircraft; the average age of the US military air fleet is 38 years (a few years ago the average age of the RNZAF fleet would have exceeded this by a considerable margin). China still maintains a large fleet of what the West would regard as obsolete aircraft, but quantity does have a quality of its own as larger fleet sizes also means far more redundancy should aircraft be lost for any reason.

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THE FUTURE

So what does the future hold for air power? There are perhaps four main drivers that will influence the future of air power, at least in the West. These are: technology; economics; a complex Command and Control (C2) environment; and the West’s own perspective, or at least perception, of air power and air warfare. Air power is not technology, it is merely technological. Technological advancement has become its own rationale in the belief that technology (such as unmanned autonomous aircraft) can give a universal qualitative advantage in military operations. This is not necessarily true, and by implication marginalises the human factor. All technology requires human input to ensure the required effect is correctly delivered and therefore at a fundamental level technology is people, served by policy, doctrine, strategy, operations, tactics, science, and logistics. In the foreseeable future Air Power is, and will remain, a human endeavour but the emerging capacity to fight war from a distance, removed both physically and emotionally from the field of battle, holds risk that the future military aviator will become a morally indifferent warrior-technician. Space is also playing an increasingly vital part of military operations in the Precision Navigation and Timing, and C2 functions. Any future risk associated with dependence on non-human technology and space is outweighed by the advantages they provide.

Throughout the western world there is increasing reluctance to sustain perceived costly defence establishments; the immediate economic aspects associated with the maintenance of security have taken precedence. Emphasis is now largely on contributing capability to coalition operations rather than maintaining capacity to ‘go it alone’ on all but limited contingencies. Paradoxically, the opposite more or less remains true throughout Asia, who continue to invest heavily in defence. A consequence of an uncertain strategic environment and constrained economic times is the need to do more with less, and Joint, Interagency, and Multinational operations across all domains are the most likely scenario. The value added by air will ensure that demands on it will generally always exceed the limited resources available.

There is a belief that Western air power currently cannot be effectively challenged. The demand (and expectation) now is for precision as an enabler of low casualties and the use of drones to avoid deploying ground forces, all in an environment of air dominance. Air power is the weapon of first choice by politicians due to low footprint, scalability and the potential for precise effects. No matter how popular or precise it is, air power has not yet progressed to the point where it can win wars alone. But without it, wars cannot be won.

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13 Technology is scientific knowledge, machinery and devices. Technological is ‘using technology’.
AIRCO DH.4 IN NEW ZEALAND SERVICE 1919 - 1929
THE USE OF AIRCRAFT IN THE DEFENCE OF NEW ZEALAND

1921 Wigram Essay Winner — Captain W. Ivory, NZ Army

In discussing a subject of this magnitude it is impossible, having regard to the space at our disposal, to investigate the details of small side issues. It is only possible to discuss general principles and the broad issues at stake.

Before we embark on the subject proper it is necessary to analyse the title. We may take it that we require a scheme outlying the tactics that should be adopted or a scheme in which we will consider the problem of putting this country into a state of serial preparedness. The following essay will be an attempt to combine these two points of view, since we must decide what work our air force will be called upon to perform before we determine its constitution.

We will divide the subject up into several main headings. These will not be rigid as overlapping will take place.

i. Consideration of the nature of attacks to which we will be subjected.

ii. The nature of the work which our aircraft will have to perform in order to meet these attacks.

iii. The organization of a force to perform this work.

We must remember that New Zealand is a small country, both as regards to size and population, and therefore possessed of a limited purse. Thus the scheme propounded, to be of any value, must be commensurate with our means. In the second place, it must be taken for granted that the ‘third arm’ will work in conjunction with the army and navy. It has been maintained by enthusiasts that in the future war will resolve itself into a battle in the air. We may dismiss this argument at once as the same theory has been put forward in the case of the cavalry, infantry, and in fact, every arm of the service.

THE AUTHOR

Captain Ivory was a professional soldier who served as an artillery officer during World War One. While having no direct involvement in military aviation, he believed that it was essential to keep abreast of developments in “such an important arm of defence”.

Captain W. Ivory, NZ Army
The whole secret of success lies in the successful cooperation of all arms. There is no doubt that aircraft will play a large part in the future battle, and it behoves this country to be prepared for all eventualities.

CONSIDERATION OF THE NATURE OF ATTACKS TO WHICH WE WILL BE SUBJECTED

This question involves a brief consideration of the strategical and tactical position of this country. We are situated at a great distance – 1300 miles from the nearest land masses. This expanse of water is a formidable barrier to aerial attack, and the danger is also enhanced by the stormy nature of the region in which we are placed. For many years to come we can ignore the question of attack by any unit of the British Empire. This divides our subject into two main headings:

(a) Attacks by European Powers.
(b) Attacks by Pacific Powers.

The nature of attack upon us then falls into three divisions:

(a) Attacks in force.
(b) Raiding attacks.
(c) Attacks from the air.

In the event of another European war, a nation, or combination of nations, may attack Great Britain and thus place our colonies in the position which the German possessions found themselves at the commencement of the late war. In this case the foreign navies have to traverse approximately the same distance as our own and both will have equally long and vulnerable lines of communication. In this connection let us consider the probability of an attack in strength.

We may regard this type of attack as improbable. It would be made with the object of capturing and holding this country. A strong army of at least three divisions would be needed. This would necessitate the presence of a strong naval force to guard transports. Even though a combination of nations possessed a navy outnumbering our own, the lack of cohesion invariably found in in such a case would impair their efficiency. This menace of our fleet to their bases and lines of communication would be so great that they could not afford to detach first line ships and cruisers for operations in foreign waters.

This state of affairs would exist until the enemy obtained absolute command of the sea. This would mean the destruction of the British fleet and the consequent downfall of the Empire.

We are much more likely to be called upon to defeat a raiding attack. This would be carried out by fast cruisers, destroyers and submarines.
This attack would be accompanied by small aircraft carried on ships. The objects of the raid would be the destruction of ports and shipping and the prevention of help being sent to the Motherland.

When we consider a war in the Pacific we are faced with a different problem. The nations with which we have to reckon are Japan, allied perhaps with China, and the United States of America. Both these nations possess strong fleets and bases much nearer to us than their own. On the outbreak of war they would immediately attack British colonies in these waters. By doing so they would deprive our navy of a base and thus make its task much more difficult by forcing her to maintain long lines of communication. Though we cannot defeat this type of attack, it is our duty to delay it and generally hold off the enemy until help arrives.

Should this attack fail we would then be subject to raiding attacks, both naval and aerial. In this case we would have the assistance of the imperial forces.

We now come to the case of aerial attack. As we have pointed out before, the geographical position of New Zealand renders the attack of this form by aircraft flown by land bases extremely unlikely for many years to come. It will always be a hazardous proceeding and it will be many years before heavier than air machines will be able to undertake 2600-mile flights. They have to carry petrol, also a large supply of bombs to make the risk to the machine worth undertaking. We are, however, liable to an attack by the Zeppelin or similar types. During the war a Zeppelin made a successful flight from Germany to East Africa and back again. We have methods, very effective methods, which can deal with this form of attack. Germany did a great deal of damage to London during the war by this form of attack, yet so good were our defensive measures, that the Zeppelin was abandoned in favour of the large bombing machine.

Summing up our conclusions we arrive at the following:

(a) An attack in force accompanied by large numbers of aircraft flown from battle ships, large cruisers and seaplane carriers.

(b) Raiding attacks in which we will be subject to attack from a small number of small fast machines flown from small ships.

(c) Attacks by lighter than air machines and probable attacks by larger long-distance bombing machines.

THE NATURE OF THE WORK WHICH OUR AIRCRAFT WILL HAVE TO PERFORM

The report of the American Aviation Commission states that, “Any future war will inevitably open with great aerial activity in advance of contact either on land or sea, and the victory cannot but incline to the belligerent, able at first to achieve, and later to maintain, the supremacy of the air.”
In view of the lessons taught by the late war this statement cannot be contested. We can see our duty clear. We must provide aircraft which will be able to fight and destroy any air force that an enemy can bring to us.

The force we may expect to meet will vary with the nature of the attack. With the attack in force, in addition to the aeroplanes flown from ships, we will have to deal with well organised squadrons from aeroplane or seaplane carriers. This will be a strong force and will be formidable.

As has been pointed out above, the object of this force will be to capture New Zealand. It would endeavour to secure an uninterrupted landing on unfrequented parts of the coast and would then take our four large towns in rear. This policy would, at a stroke, give the enemy command of our railheads and ports. Their aircraft would endeavour to drive off our reconnaissance machines and would reconnoitre the country in advance. The enemy once landed, would then attack on land, and the naval operations would give place to a land war.

Thus we have to deal with warfare under the two headings:

i. Naval warfare.

ii. Land warfare.

In the first case we will have to deal with vessels above and below the surface, and aided by aircraft. As the naval strength in these areas is weak we must call on our air forces to assist them in attacking ships.

The first great duty that naturally falls to the lot of this arm is reconnaissance. It is particularly suited for this duty owing to its speed. It can cover wide stretches of space in a short time, and, owing to the height at which it works, has unrivalled breadth of vision.

In addition, reports can be wirelessly to headquarters at once.

The problems of New Zealand at the present day are comparable with that existing in England at the time of Nelson. We must use our aircraft in the same manner as Nelson used his frigates. We must, at the first hint of war, throw our planes far afield to scout for the enemy. They would be equipped with wireless, and on coming into contact with the opposing forces would call out the fighting squadrons to contest the supremacy of the air. Our reconnaissance machines would, of course, be armed, and it would be their duty to endeavour to break up the formation of the enemy squadrons and generally delay them until the main fighting force arrived.

This patrol can very successfully be carried out over a large area. A good instance of coastal patrol is furnished in the work of Major Gran, of the Norwegian service. During the late war he single-handedly patrolled the Norwegian territorial waters and warned off trespassing belligerent warships. Our patrol would be much further afield, but, against this, we would be in the position to employ more machines.

We now come to our fighting squadrons. These machines would be powerful, fast, easily manoeuvred, and well armed. Their role would be that of the battleship of the air. They would come up and reinforce the reconnaissance squadrons and endeavour to destroy the enemy aircraft. This action would destroy the eyes of the fleet, and would give us at least temporary supremacy of the air.

Our naval force would be incapable of dealing with this attack, so the task of dealing with them would fall largely on the shoulders, or, rather, wings, of our air squadrons.
We have during the war numerous instances of the attack of naval vessels by aircraft. This method of warfare cannot be said to have proved a conspicuous successes. However, we must remember that during the early stages of the conflict our air service was in its infancy and that in the latter periods there were very few instances, excepting submarines, of enemy vessels venturing out of harbour for any extensive cruising, consequently our aircraft had few opportunities of developing and perfecting this particular branch of service. If we take the instance of submarines, we find that the percentage of successful attacks to attacks made steadily increase, thus indicating that our pilots became more and more efficient. In the latter years also the science of bombing was brought nearer perfection. The bombing of a ship should be easier than the bombing of a stationary object. When an aeroplane is coming up behind a ship, and on the same course, the relative speed of the ship and aeroplane is much less than on land, and the probability of hitting would be correspondingly greater.

There is ample evidence that the naval authorities are fully alive to the situation and are armouring their ships on the decks to deal with attacks from the air. This deck armour, even in the case of the heaviest ships, will necessarily be light, and will be penetrated by the modern armour-piercing bomb, especially if the latter is released from considerable height.

During the late war we can see to what extent even a few planes can cope with a naval force. On April 23, 1915, a reconnaissance patrol, having reported a number of enemy destroyers off Blackenberge and Zeebrugge, five miles from the coast, these were attacked and one destroyer was put out of action, and the others compelled to abandon their enterprise.

On April 25, 1916, Commander Douglas Oliver took part in a bombing attack over the German fleet with indecisive results. This shows the other side of the question.

We can take it as certain that this department of aerial work will develop rapidly and will be studied greatly in the future. The cruiser can keep the enemy’s cruisers and raiders away from transports; but if a force loses its command of the air, no anti-aircraft guns will protect them from bombing attacks.

As the ships approached land they would be continually worried and subjected to incessant bombing. The machines would work in divisions, and would return for fresh pilots, bombs, and petrol in these formations. An action of this type would destroy much material and, more important still, impair the morale of the enemy. The pilots would be resolute men, and would have to take great risks in the defence of their home and fireside. It is at sea that our best chance of success would lie; once let the enemy land and he would immediately find cover, both natural and artificial. Casualties would be less easily inflicted, and their location in a country of this nature would be extremely difficult.

Now let us consider the duties in the event of a raid. As indicated above, this would consist of small fast cruisers, destroyers and perhaps submarines, the latter being met on the way by the surface craft. The role of our aircraft would be much the same as before. Our scouts and reconnaissance machines would locate the enemy, and the heavy fighting machines would come up to gain aerial supremacy. The navy could then co-operate very effectively, and in the ensuing battle the aircraft would help to locate the submarines and would generally assist the surface craft.

We must now assume that an enemy has landed and is attempting to capture the ports and railheads. The war would at once settle down to trench fighting. All the main towns would be protected in this manner.
The role of aircraft would then be identical with the part played in France; we would find them bombing back areas, spotting for the artillery, photographing the enemy’s operations, and doing the hundred and one things they did in France. As the enemy landed they would be bombing the beaches and hold up his advance as much as possible. As an example of what can be done in this line we can take one of many instances. During the German advance in 1918 Captain Moorhouse encountered 40,000 men in the neighbourhood of Courtrai railway station. He bombed them, held them up and thoroughly broke up their advance.

THE ORGANISATION OF AN AIR FORCE IN NEW ZEALAND

In the foregoing pages we have endeavoured to indicate briefly and simply the types of attack to which we will be subjected, and have indicated the duties the machine will be expected to undertake. We now come to the chief and more important aspect of our subject – our organisation and constitution.

We will first of all deal with our scouts or reconnaissance machines. These will be on duty far from the coast and must, therefore, be seaplanes. They will encounter heavy weather and must have great endurance, besides being mobile enough to attack and manoeuvre against enemy aircraft. The work will be extremely hazardous, but it was successfully carried out during the late war round the coasts of England. We must therefore provide a seaplane with the characteristics above. In addition to these we would have the small, fast, non-rigid airship which proved of such inestimable value during the war. Their speed of course, cannot compare with that of the airplane, but, being lighter than air, they have great endurance, and the work of flying them is not as arduous as flying an aeroplane. They would cruise much longer, and could carry a large supply of bombs. They would have to be protected by aeroplanes as they would be helpless against a fast scout.

Nearer to the shore we would have the inshore patrol; it would watch for and deal with the fast light craft which may get past our outer ring, either unobserved or not. These machines could be either sea or aeroplanes, and would be small, fast machines, able to carry light bombs; but fighters and easily manoeuvred.

We now come to the powerful fighting aeroplane, which will be our main force for obtaining and maintaining supremacy of the air. They must be the very best machines available. They are expensive, but the money will be well spent.

We will then have our reconnaissance, bombing and photographic machines. They will be protected by our fighting squadrons, and so will not be expected to bear the brunt of the enemy’s attack.
The next consideration is New Zealand’s requirements, and the organisation necessary to fulfil them. As we pointed out at the beginning, New Zealand is the only small country possessed of moderate means. Air Marshal Sir H. M. Trenchard, in a recent article made the following statement: “No nation can afford to keep its fighting force, whether they be raised on a voluntary or compulsory basis, at such a strength in peace time as to be able to deal (without expansion) with war on any considerable scale. To a greater or lesser degree all his fighting services of today must be organised on the cadre principle, and must have behind them the necessary reserves of trained men and material, with plans for speedy mobilisation worked out in every detail.”

This short quotation is a summation of the whole position as far as New Zealand is concerned, and our line of argument cannot do better than to discuss this theory in detail.

The army vote in New Zealand at present is £500,000 per annum, and we must regard this amount as an indication of what we may expect when the people of this country are brought to realise that a properly organised and equipped air force is as vital to our national existence in the future as is the army. Thus we see that we must start with a small force and then expand and develop hand in hand with the country. We must not legislate for a large and unwieldy force for which we cannot pay, and cannot man. Our plan must be commensurate with our means.

In dealing with our organisation we will first discuss material, and then pass on to the manning and the general details.

It will be noticed that in considering the roles that our air force will have to play we have confined ourselves to a few types of machine. This was done purposely.

We are only legislating for a small force, and efficiency would suffer if we did not standardise our machines as far as possible.

We will now deal with the types of machine.

(a) **Non-rigid airships** - These are expensive items, but very necessary. Only one need be obtained at first, and then later as we expanded another, one being based at Wellington and one at Lyttleton.

(b) **Seaplanes** - As a nucleus we would have six machines, and would station two at each of the following ports: Auckland, Christchurch and Wellington. The south island station for seaplanes would of course be Lyttleton.

(c) **Scouting or Reconnaissance Machine** - These again would be six in number, and distributed as in the case of seaplanes.

(d) **Fighting Machines** - Of a similar number and similarly distributed as above.

(e) **Bombing Machines** - Again as above.

(f) **Observation, Photographic and Similar Types** - These for a start would not be obtained. Training could be carried out on commercial machines or on some types already mentioned, temporarily converted for the purpose.

We now have the following distribution of aircraft in the various centres:

**Auckland:** six aeroplanes and two seaplanes.

**Wellington:** one dirigible, and six aeroplanes, and two seaplanes.

**Christchurch:** one dirigible, and six aeroplanes, and two seaplanes.

A total of two dirigibles and 24 sea and aeroplanes.
We now have to consider our aerodromes. There would be one in each centre, fully equipped with hangars and small workshops. They would be well inland - for instance in Wellington in the neighbourhood of Heretaunga and Trentham. They would thus be safe from gunfire from the sea. A chain of emergency landing grounds would have to be prepared throughout the Dominion. The seaplane sheds of course would have to be on the harbours, but would be placed as far from the open ocean as possible.

In the first few years the flying school at Kohinimarama and the Christchurch Company would provide for engine and other heavy repairs. Later on workshops would be brought into being at Trentham.

Later still, two observation balloons should be obtained to work with the 60-pounder and 6in Howitzer 26cwt batteries stationed in the North and South Islands. This development, however, need not be thought of for several years to come.

In addition the nuclei of supply depots and aircraft parks will be obtained, and provision made for expansion. Transport would be obtained by commandeering lorries from private firms.

In dealing with organisation it is impossible to divide it up into water-tight compartments - overlapping must take place. The brief resume given above is an indication of our needs and the standard on which we base our requirements in the matter of personnel.

Headquarters - This small organisation would constitute part of the Air Board. It would consist of one lieutenant-colonel, who would command the whole force, assisted by two staff officers, one administrative and the other technical. The commandant would hold office for four years, and should be an Imperial officer. By doing so we would be following the lead of the navy and of the army in pre-war days. Probably neither the navy nor the army is in such a state of flux, or will be for many years to come. When war broke out the R.F.C. was in its infancy; there were no former precedents to go by, and now it is our duty to consolidate and profit by the lessons of the war. This is going on, and will be going on for many years in Great Britain, and it is only by obtaining our commandants from this source that we will be able to keep pace with modern developments.

At each station we would have a major or captain in charge, with three officers to assist him, one being a seaplane specialist. These officers would fly the machines, act as instructors, and do general routine work.

At Trentham would be situated the supply depot, with headquarters and a central school. This would necessitate three more officers being carried - one for the former and two for the latter.

The rank and file would be a skeleton squadron, and would be organised as follows:

- **Master mechanic**, 1, at G.H.Q.
- **Chief mechanics**, 4-1 at G.H.Q and 1 at each station.
- **Sergeant mechanics**, 7-2 at G.H.Q. and 2 at each station.
- **Air mechanics**, 36-6 at G.H.Q. and 10 at each station.
- **Privates**, 8-2 at G.H.Q. and 1 at each station.
- **Clerks**, 5-2 at G.H.Q. and 1 at each station.

We would thus have an establishment of 18 officers and 61 men.

The Territorial force would be organised on the same principles as the army is today. We should organise on the basis of three or four squadrons for New Zealand, one wing of each squadron at each station.
It may be argued that it would be better to station one type of machine at each centre, but against this we have the consideration of training. Organised as suggested, the trainers would have the advantage of working with other types of machine, and would thus learn the principles of co-operation.

This Territorial Force would be organised on home establishments, and would be administered by the regular officers of the centres in the same way as the artillery are administered at present.

The General Staff at the War Office give it as their opinion that no country will be able to undertake a war of any magnitude for at least six years. We can therefore work up gradually, but we must start at once.

In the commencement the officers would be taken from those who served in the R.A.F. at Home; then as civilian flying becomes more and more popular, the pilots could be enrolled and trained in the duties of a military pilot. They would put in so many drills, so many day parades, and so many days in camp, either at the aerodrome or G.H.Q. school, per annum. It would be part of the duties of the officers at the stations to instruct these men and to bring their commands to a state of efficiency.

The mechanics, fitters, etc, would be drawn from the various motor firms for the present, and later on from the personnel of the aviation companies. Other tradesmen will be drawn from their particular trades.

At the present time the Government are subsidising various aviation companies. In return these should agree to take a certain number of various tradesmen and give them a year or more in their shops. In this manner a reserve of skilled tradesmen will be built up. A man who has served his time as a motor mechanic or motor fitter should, with a year or two's training, become a competent motor mechanic and fitter.

It would be impossible to provide aircraft up to full establishment for this personnel, but the Government should insist that the aviation companies import machines that would easily and quickly be converted to war purposes. This would not be a hardship to the companies as they are already using machines that have done service in the war.

As a set off to the expenditure of upkeep our air force could carry mails. The pilots would then not only obtain a thorough knowledge of flying conditions in the country, but also would become thoroughly conversant with the topography of the regions over which they might have to fight.

Wireless stations would be provided, and the existing stations could also be used. The wireless personnel would be drawn from these, and also from the Post and Telegraph Department. They would be trained in working with aircraft and field wireless work.

Practice in observing fire would be obtained at field artillery practice camps and at the annual gun practice from the forts. Valuable work could also be done by means of an apparatus firing puffs and puffs.

A G.H.Q. school would be held at Trentham on the same lines as the army school at present installed there. It would be manned by the headquarters staff and the two officers shown above. The personnel of both regular and territorial units would attend for courses in the various technical and routine matters with which they have to deal. As the officers are trained they would be posted to the reserve, and fresh officers taken on. The wastage in a war will be high, and thus we will have ample men to replace casualties and to provide expansion in time of war.
The entrance to the regular forces will be by cadetship, tenable at the R.A.F. College in England. On completion of the course they would be attached to Imperial units to gain the latest experience and a knowledge of regimental duties. Provision must also be made to send home officers fairly frequently. It is only by these means that we can keep our force efficient; it is small, but a small efficient force will triumph over a much larger force badly organised and poorly equipped.

We have given only an outline of a policy of aerial defence for New Zealand to adopt. As we pointed out before, we cannot afford a large force to protect ourselves against any aggression. We cannot protect ourselves against all-comers, and must always look to the Mother Country for aid and help. However, we enjoy all the sweets of self-government and self-determination, and it is only fitting that we should shoulder our fair share of our responsibilities.

It has already been proved in various theatres of war that the New Zealander is a fine potential airman. Our little force must be up-to-date and mounted on the finest machines obtainable. Efficiency cannot be stressed too often.

Given good mechanics, good training, and good organisation, there is no reason why New Zealand should not be supreme in her “Territorial Atmosphere.” Everything is in our favour, our “aerial insularity”, our closeness to our bases, and the calibre of our men.

The programme outlines will cost money - perhaps £150,000 per annum; but it will be money well spent. An air force is as vital to our national existence as an army and navy, and our surest protection is preparedness. An enemy will hesitate to attack a country that is prepared for war, and a few thousand pounds spent now will save millions in the future, and, more important still much life and property in this fair land of ours.
The American Aviation Commission

“Any future war will inevitably open with great aerial activity in advance of contact either on land or sea, and the victory cannot but incline to the belligerent, able at first to achieve, and later to maintain, the supremacy of the air.”
The question of aerial defence of New Zealand revolves itself into an examination of the following points:

i. The possibility of an aerial attack on this country and the extent of the menace such an attack represents.

ii. The probable nature and method of such an attack.

iii. The form of defence best suited to provide an adequate safeguard against such an attack.

iv. The most economical and practical method of securing and maintaining such form of defence.

But it will be impracticable to proceed to an examination of the above points without some slight digression on the present state of aviation as a whole, and of its possibilities in the future.

The mind of the average layman in New Zealand is still very hazy on the subject of aeroplanes; one man believing them capable of the impossible, another being frankly incredulous as to their being of any practical use whatsoever. But the best antidote for the former state of mind, and the best cure for the latter, is to examine the progress of aviation - not so much from its inception - but during its abnormal growth through the war.

The early pioneers of aviation persevered through extraordinary difficulties and very real danger, because of their belief in its future possibilities, and posterity and the present generation will always be in their debt; but without the war, aviation would - in all probability - be still in its infancy, the hobby of a few individuals and an object of scepticism to the man in the street. The war demonstrated not only the powers of aviation, but how all-important such powers were; and it would be hard to estimate how much the ultimate success of the Allies was due to their aerial supremacy.

The Author

When World War One broke out, Captain Bell immediately joined up, serving as a cavalryman in a British regiment. He subsequently transferred to the aviation corps where he served as a pilot. After the war, Captain Bell returned home to New Zealand to take up farming.
Therefore, if we are to unravel the aerial problems of the present day, we can best do so by means of conclusions drawn from the study of progress of aviation in war time.

The aeroplanes which accompanied the original B.E.F. [British Expeditionary Force – ed] to Mons were of a very elementary type, unarmored and not particularly suited for any purpose. Nevertheless, the work which they were able to accomplish proved beyond all doubt the paramount importance of aircraft in the war; and from that time the rapid development of aviation on both sides began.

New types of machines were quickly produced one after the other, fresh work was continually found for them, and the different types began to specialise each in the different class of work for which its construction rendered it most suitable. Aerial armament developed apace, rifles, then light machine guns being carried, and finally the discovery of wave power by Constantinesco was utilised to synchronise fixed Vickers gun so as to fire through the spaces between the propeller blades. Bombs from aeroplanes became effective weapons, and the invention of bomb sights to allow for wind, altitude, and speed of machine rendered these more accurate in their results. The rapid development was not confined to the aircraft and their armament alone, but to many other things, which contributed to their efficiency - wireless telegraphy and telephony, aerial cameras, and numerous other devices, all of which played their part in increasing the powers of aviation as a whole.

No one could examine the development of wartime aviation without becoming convinced that aerial supremacy depends in as great a degree on the skill and resources of the designers of aircraft as on that of the pilots. Ceteris paribus [all other things being equal – ed], the Britisher was a superior pilot to the German; but in spite of this superiority the command of the air swayed from one side to the other with the advent of some new and better type of machine, until yet again a new and better type had been produced to counter it. The advent of the British Scout, type SE5, robbed the Germans of the almost undisputed - if temporary, supremacy they had gained in the early part of 1917 by means of the improved Fokker biplane; whilst to look at the old FE2b nowadays, it is almost ludicrous to recollect that it was once described in newspaper reports as “one of our modern battleplanes”, and that, with the now also obsolete Sopwith two-seater, it was directly responsible in securing our almost total command of the air during the battle of the Somme. The only machine designed as early as 1917, which was - at the end of the war - still admittedly the very best for its purpose, was the Bristol Fighter. This type has to its credit the downing of more
hostile machines than any other British aeroplane, and in addition is admirably suitable for bombing, photography, reconnaissance and co-operation with attacking infantry. It is fortunate the Government of New Zealand is in possession of machines of this type, and it will be shown later how very well suited they would be to play their particular part in the aerial defence of this country.

Looking at aerial development from the point of view of the enemy, we see that its progress enabled the Germans to produce the Gotha type of bombing machine. This type was capable of compassing the long distance journey across the Channel from the German bases to London and the Midland industrial centres of England; it was capable of carrying nearly a ton weight of bombs and comfortably climbing with such a load to 18,000 ft. Its advent demonstrated the fact, which applies particularly to the case of New Zealand, that insularity coupled with naval supremacy no longer renders a country immune from direct and serious attack. The character of the aerial menace on England was totally changed. Hitherto air raids had been merely of a spasmodic nature - probably undertaken far more with a view to weakening the moral in England than with the idea of encompassing any great material damage, of which latter they were, in fact, largely incapable. The advent, however, of properly organised raids by Gothas in comparatively large numbers soon proved itself a menace, the extent of which was capable of producing very material results unless kept in check by an adequate defence.

The actual extent of the damage caused by them in their initial raids was very properly not disclosed; but that it was sufficient to give the authorities serious cause to think is shown by the fact that Fifty-six Squadron, a squadron of SE5s was withdrawn from the western front to an aerodrome in Kent, to provide an immediate defence against such raids. Fifty-six Squadron was probably the most efficient of all the fighting squadrons in France, comprising amongst its personnel some of the most famous pilots, and it could hardly have been spared from the western front had not the need for an immediate defence against the Gotha raids been a very real one.

From that time - i.e., in the autumn of 1917 - the aerial defence of England was organised and developed seriously; adequate machines were provided and squadrons of fighting scouts - the pilots of which were trained for both day and night fighting - were established, not only around the metropolis itself, but on the coastal aerodromes, to guard, what experience had shown to be, the main aerial routes of the invaders. Besides these scouts there was established a chain of anti-aircraft batteries and searchlights, the whole defence being coordinated to work in conjunction.

It will later be necessary to examine more closely the main characteristics of the scout machines thus employed, and the special training which the pilots of them had to undergo, as squadrons of these scouts must be the essential keynote of any aerial defence established in New Zealand.
This provision of a suitably organised and equipped aerial defence had the desired effect of holding the Gotha raids in check. The triumph of this organisation of scout machines cooperating with ground defences came on the night raid of Whit Monday, 1918, when seven Gothas were either brought down in flames or forced to effect a landing. From that time what had been a very real and serious danger became a controllable, though ever-existing, menace.

It would be possible, if space permitted, to extract many more lessons from war-time experience on the question of aerial defence; but the foregoing can be drawn, what the author considers to be, the essential conclusions, viz:

i. That the powers of present day aviation, due to the rapid progress given it by the impetus of war, can no longer be neglected; nor can its hostile possibilities be ignored.

ii. That no army is complete without its complement of aerial squadrons.

iii. That the danger which an aerial attack constitutes is a very real one, and that such an attack is capable of inflicting very great damage.

iv. That there is sufficient proof that such an attack can be effectively guarded against by the organisation of an adequate defence.

v. That the efficiency of such defence depends, not only upon a supply of competent pilots, but on the employment - according to pre-arranged and coordinated plans - of aeroplanes of modern type, and constructed each for the special part it has got to play.

Some slight outline has been given above of the possibilities of aviation - in particular those relating to its offensive and defensive powers - as exemplified by its already accomplished performances. It is now possible to proceed to examine how vulnerable or immune New Zealand is from aerial attack, and what likelihood there is of such attack being undertaken. Because on this question must obviously turn the necessity or otherwise of providing a suitable defence.

It is not within the province of this article to go into conjectures as to whether the Great War has, as some people say, been the end of all war, or whether we must always be in a state of preparedness against future hostilities. Obviously, if it is certain there will be no more war, we need maintain no defence. The fact, however, that the Government of this country is still prepared to face the expenditure which the upkeep of a territorial defence force entails, shows that they at least do not eliminate the possibility of future hostilities. They provide this as a form of insurance, just as a man knows it to be sound policy to pay an annual premium on his house, although the likelihood of the latter being destroyed by fire may be remote. But if this upkeep of a territorial defence force is necessary, because of the possibility - however remote - of an invasion of New Zealand, in as
great or greater degree the upkeep of an air force is also necessary. This is partly because aeroplanes have become so integral a part of the modern army that it is only the truth to say that no land force can do without them; and partly because it is also necessary to provide defence against attack which may be purely of an aerial nature.

An attack of air can be delivered with suddenness and surprise, and so great would be the advantage accruing to the attacking force thereby, that in all probability the formal declaration of war would be dispensed with, and the first intimation that hostilities were commenced would be an attack in force by aeroplanes.

The nature of this country, isolated as it is by miles of sea, renders it safe from an aerial attack developed from land bases; but it is liable to attack by aeroplanes carried by ships to within striking distance of its coasts. There was a big development in experiments of this nature during the war; aeroplane and seaplane-carrying ships are now an integral part of the fleet; and by steaming such ships at full speed into the wind, it is a comparatively simple matter to take off from and alight on their decks. This is the form of aerial attack therefore which must be considered. Assuming that any country had hostile designs on New Zealand, a fleet of such ships could be convoyed to within striking distance of our coasts, and an attack delivered by air - the first intimation of such an attack being the approach of the hostile aircraft followed by the explosion of bombs in our midst.

In order to see how and where such an attack would be developed it will be best to examine the question from the enemy’s point of view - which method is the key to most strategical problems in war.

They could hardly contemplate landing an attacking land force by air at some undefended point on the coast line - as it would be impossible by such method to land a force of any adequate size; their initial attack therefore would be in the form of a bombing raid, and such could only be of effective value if delivered against one of the four large towns. Any one of these would form an excellent target and could be easily reached by day or night. It requires no stretch of imagination to picture the damage a fleet of aeroplanes, each carrying a ton weight of bombs would do - more especially as such bombs would not be only high explosive, but - in all probability - incendiary, and gas as well, and would be followed by a hail of machine gun bullets.

Subsequently under cover of an aerial and naval bombardment the enemy might effect a landing at some point on the coast, and establish a base from which further raids might be made. In this case aeroplanes would have to play their role in conjunction with the Territorial defence force.

It will be seen from the foregoing that it would not be necessary to establish a chain of aerial defence to cover the whole coastline; such an undertaking would in any case be impossible owing to the expenditure it would entail; but the provision of a defence of the four main towns would cover the strategic points at which the enemy would first strike. Added to this the extreme mobility of an aerial force means that it could be speedily summoned to any other point of attack. Such mobility would be very greatly facilitated by the establishment beforehand of dumps of petrol and ammunition and the surveying of the country for suitable and pre-arranged landing grounds.

It is probable that the enemy would choose to make his initial attack under cover of darkness, and thus ensure the maximum surprise on which the success of such an attack would so largely depend. The probable hour would be shortly before dawn in order that the raiding aeroplanes might return to their parent ships in daylight.
The foregoing represents a forecast of the nature of a hostile attack by air and the probable method of its development. It is now necessary to examine the best form of defence against such an attack. This defence should be:

(a) **Defensive.** This will be by means of scout machines in communication with the ground by wireless telephony or ground signals, and - in the case of a night attack - in cooperation with searchlights. These machines will attack the hostile raising aeroplanes.

(b) **Offensive.** This will be by means of bombing machines. It is for this purpose that the Bristol Fighters and DH4s now in possession of the Government will be invaluable. These machines will immediately climb to an altitude at which it will be possible to locate the parent ships, whence the raiding aeroplanes have started; and on these ships they will deliver an attack by bomb and aerial torpedo; as regards this latter weapon the British Air Ministry is at present carrying out extensive experiments. These bombing machines, while encumbered with bombs on their outward journey to the parent ships, will not seek combat with the enemy raiding aeroplanes, but leave these to be dealt with by the scout machines mentioned in (a). They must concentrate on their mission of bombing the parent ships. This mission accomplished, however, and their manoeuvre-ability unimpeded by a load of bombs, they are then in a position to intercept and give battle to the raiding aeroplanes as these return to their parent ships. It is especially in this second mission that the Bristol Fighter, the author believes, will vindicate the opinion expressed earlier as to its merits. A certain number of these bombing machines will be equipped with wireless telegraphy or telephony, and they will by these means immediately give information to headquarters as to the number and disposition of the enemy ships. One at least of them will be equipped with a camera, that photographs may be obtained as to the damage inflicted by their bombs, and also to provide information as to the character and class of the hostile ships. A pilot would need considerable naval training in order to supply a reliable report as to this latter; it is therefore preferable that the tasks should be allotted to the camera, whose information must be of necessity be accurate and trustworthy. As regards the scout machines mentioned in (a) for attacking the raiding aeroplanes the type of machine in use at the end of the war for this purpose was the Sopwith Camel, with a 110 h.p. Le Rhone air cooled rotary engine. This machine - although towards the end of the war it was becoming superseded by a later type, the Sopwith Snipe, for day fighting - was still very efficient for that purpose, and as a night fighting machine it had a splendid record. Mention to its performances on home defence has been made previously; but its best record in night
fighting was made in France. In May 1918, it was recognised that the German night bombing squadrons were doing serious damage, and it was decided to send out a squadron of scouts solely for operation at night against these. One-hundred and fifty-one squadron was therefore made up and equipped with Sopwith Camels for this purpose. Their record was a marvellous one. Between May 1918 and the armistice they bought down 33 German night bombers, and their own casualties in these fights were nil. There can be no doubt therefore, that this type of machine is especially suited to combat the heavy and somewhat clumsy bombing machine.

In as much as it is the author’s purpose to advocate the obtaining and employment of the Sopwith Camel, to form the nucleus around which an aerial defence of New Zealand may be built, it is necessary here to go into some little detail as to the reasons which render this machine so suitable:

i. **Speed** – It is capable of flying level at 110m.p.h.

ii. **Climb** – It is capable of attaining the height of 10,000ft in 11 minutes.

iii. **Manoeuvrability** – The fact that its lower planes alone are set at a dihedral angle, renders it one of the lightest of all machines on its controls; it can therefore be very easily swung into the most favourable position to open fire on an enemy machine, and also quickly disengage from a position where it finds itself to be at a disadvantage.

iv. **Armament** – This consists of two fixed Vickers guns firing through the propeller, and synchronised with an Aldis telescopic sight. The pilot therefore aims the machine in order to bring these guns to bear on the target – and this has been found to be the most satisfactory method.

v. **Ability** – to leave the ground very quickly from the time of starting the engine. This is of immense advantage where machines are called upon to meet a sudden and unexpected attack. This ability is due to its rotary engine, which requires practically no warming up, and the machine could be in the air within two minutes of starting the engine. The advantage thus possessed is readily seen, when it is pointed out that – in the case of machines with water-cooled stationary engines – to open the engine fully out and take the air before the water temperature has risen to 60deg, and the oil been allowed to circulate thoroughly, is only to court disaster from engine failure. A machine with such an engine could not be in the air in under eight minutes by which time the Sopwith Camel would be six or seven thousand feet up on its climb to meet the raiders.

vi. **Lightness** – Although the Sopwith Camel has a small wing span and thus diminished head resistance, it is able, owing to its lightness, to maintain flight at a low air speed, and therefore to land slowly. It also has very little momentum, and therefore a short run after touching the ground. Both the above results are of immense advantage for night flying, of which landing constitutes one of the chief difficulties.

vii. **Cheapness** – The Sopwith Camel is a machine able to be produced cheaply and maintained cheaply. The author fully realises that curtailment of expenditure must be one of the chief considerations in the construction of an aerial defence scheme for New Zealand at the present time. The Imperial Government must be in possession of very great quantities of this type of machine and its spare parts. When hostilities
ceased there were a large number of squadrons equipped with them, and also a large number of machines in reserve. Since then they have been largely superseded in the R.A.F. by the improved type – the Sopwith Snipe. It should therefore be easy to arrange with the British Air Ministry for the purchase of sufficient Sopwith Camels at a very greatly reduced price. Also – when dismantled for transport they occupy a small space. Freight charges on them therefore would be comparatively low.

Their fuel consumption works out at about 13 m.p.g. petrol and 13 m.p.g. oil. All spare parts are small and cheap, and their tyres considerably smaller than those of most machines.

Modern improvements in design have led to better machines than the Sopwith Camel, but the latter is still admirably suited for its purpose, and it is the author’s contention that, being easy to obtain, and also inexpensive, it will meet the requirements of our Government, which must be so largely governed at the present time by the question of economy. The foregoing shows that an adequate aerial defence of this country depends on the maintenance of two classes of aeroplanes:

(a) scouts;
(b) bombers.

Suitable equipment must also be provided, and this will consist of:

i. Bombs and aerial torpedoes.

ii. Wireless apparatus, both Telegraphic and Telephonic. It is absolutely essential that the scouts should be equipped with wireless telephones. Those pilots who have flown on Home Defence know that the chief difficulty, especially at night, consists in locating the hostile aircraft. Whereas a telephone message such as “H.A. approaching S.E. over Kaiapoi” greatly reduces the area to be searched by our scouts.

iii. Cameras, as shown above.

iv. Suitable ammunition. To arm the machines solely with ball ammunition greatly prejudices their chance of success. The machine gun belts should be filled as follows: One round Pomeroy (explosive), one round armour-piercing, one round Tracer (which also acts as an incendiary), one round ordinary ball, which is merely to draw out the fouling collected in the barrel by the Pomeroy. Too great importance cannot be given to the provision of suitable ammunition. An ordinary round of ball may only bore a hole through a strut or longeron, whereas a round of Pomeroy will shatter same and probably cause the machine to crumple up. The value of Tracer, both by day and more especially by night, for correcting one’s aim is obvious.

Above has been examined the method of defence and the types of machines and equipment essential for its provision. It is now necessary to examine the organisation required for its foundation and maintenance – in particular the training of its personnel, and to see how far such maintenance and training can be co-ordinated with the progress of commercial aviation in this country, as by this method a great deal of redundant expense may be eliminated.

The secret of aerial progress lies in the devising of an economical scheme of co-operation between Government and private enterprise. Aerial progress in this country, if developed solely by private enterprise, suffers from a tremendous handicap. New Zealand – lying as it does at the actual antipodes to Europe – was too far away to see closely the progress of aviation during the war.
In consequence there exists here, as to its capabilities and utility, a very large amount of the original scepticism and doubt, which have been now almost entirely overcome in England, where the powers of aeroplanes have been so constantly demonstrated before the eyes of the general public. In New Zealand too great stress is laid on the occurrence of a single accident, and too little on the numbers of successful flights carried out. The average investor, therefore, is not prepared to risk his capital in what he considers to be some wildcat aviation scheme. This prevents the proper expansion of aerial enterprise in this country.

Once, however, Government assistance has enabled commercial aviation to get a proper start popular prejudice against this latter will soon be dispelled, and it will then expand so rapidly and new channels be so constantly found for its powers that the need for Government assistance will quickly become non-existent. It is no idle boast to say that, given thus its proper chance, the aeroplane will become as essential a part of the business life of this country as the motor car is to-day.

Apart from the handicap of popular doubt as to the utility of aviation, private enterprise, acting alone, suffers from being a very extravagant and wasteful method. Aerodromes, and the surveying and mapping out of aerial routes, should be for the general use of all aviation, and their upkeep a national charge.

But in nothing will greater waste occur than by leaving the training of personnel - both pilots and mechanics - solely to private enterprise. The tendency is as present towards the growth of numerous small aviation schools, whereas there should be at most one school for each island - better still, one central school for the whole of New Zealand. Christchurch, with its expanse of safe flying country afforded by the Canterbury Plains, would be the most suitable place for the pupil learning to fly.

Besides this, a pilot, trained solely for commercial employment, will have many essentials left out of the curriculum, which are indispensable in that of a service pilot, if he is to be available for aerial defence. Whereas all instruction necessary for commercial purposes will be covered by a course of military aviation. This will be seen by an examination of the ground this latter form of instruction will cover:

The initial teaching of the pupil will take place on the ground and consist of:

i. Lectures on the theory and principles of flight.

ii. Instruction as to aeroplane construction, engines and rigging, and practical experience in these: this could be accomplished by the pupil working with the machines in overhauling engines and machines.

iii. A thorough course in machine-guns and bombs.

iv. Instruction in wireless telegraphy and telephony, and in the use of the camera.

v. Instruction in adjusting a compass, map-reading and steering a compass course; and in many minor matters which there is no space to detail here.

The pupil would then pass on to learn actually how to fly a machine - machines of the Avro type with dual control being used for this purpose. Having passed certain tests on the above machines - among which would be night flying, he would then pass on to the service type of aeroplane; and would on these undergo a course of aerial fighting, bombing, artillery co-operation, and photography. When all tests had been passed satisfactorily and sufficient experience gained, the pupil would then be certified as a pilot both for military and commercial purposes.
Admission to the aviation school would be contingent on the intending pupil undertaking that – having graduated – he will present himself for a fortnight’s defence refresher course annually; and also that – in the event of emergency – he will immediately report for duty at the aviation headquarters of his district.

The cost of maintaining the aviation school would be born in part by the Government, in part by fees payable by the pupils, and in part by commercial aviation companies in proportion to the number of pilots required by them.

Some such system would also have to be devised for the training of mechanics – but these would not require so extensive a course; and there are any amount of motor mechanics and cabinetmakers in this country who – with a little specialised instruction – would make competent aeroplane fitters and riggers respectively.

The annual refresher course for pilots and mechanics would synchronise with the annual Territorial camps in their district, and would take the form of operations in conjunction with these land forces. This practice of co-operation between aerial and land forces is as essential for the defence of this country as is the purely aerial defence.

Some slight mention has been made previously as to the part played by anti-aircraft batteries and searchlights acting as a complement to the scout machines in defence against hostile aircraft. In the case of a night attack searchlights are almost indispensable to the scout machines. A small permanent force would be required for these; as it is extraordinary how ineffectual anti-aircraft guns and searchlights can be unless manned by a highly trained personnel in constant practice.

The proper working of a searchlight depends entirely on the skill and experience of its operator, and no pilot, who had crossed the lines by night, could fail to be struck by the enormous disparity there was in the working of two German searchlights, one being quick in picking up the aeroplane and difficult to elude when once caught in its beam; another either failing to pick up on the aeroplane at all, or promptly losing it when once picked up.

The provision of a small force of anti-aircraft guns and searchlights could be made by substituting these for some of the present coastal batteries. These latter in present times must be of somewhat doubtful value, and their guns would be probably very greatly outranged by modern naval armament.

The aim of all the above scheme is to provide an adequate aerial defence of New Zealand with a minimum of expenditure; that is, by the Government so subsidising and assisting commercial aviation and co-operating with it in bearing the cost of instruction of personnel that the country will be assured of a sufficient supply of fully-trained defence pilots without having to maintain a large permanent air force. In fact, the only permanent force that would be required would be the staff at the aviation school and a small headquarters staff at each of the four centres.

Such defence aeroplanes as are suitable for commercial purpose could be loaned to various companies.

So assisted, commercial aviation will thrive and grow until it becomes an integral part of our national industry. And as commercial aviation develops and expands, so will the construction and design of aircraft develop and expand to meet the needs of commerce.
Naturally the development of the aeroplane in war time ran on war lines. The fighting pilot demanded greater and yet greater speed and climb, and, to obtain these qualities in the aeroplane, he was prepared to sacrifice in it a certain amount of stability and the ability to land at a low airspeed. Commercial aviation, however, will not require to make such a fetish of speed and climb, and aeroplanes will therefore be designed so that the angle of incidence of their main planes can be varied by the pilot during flight. This will give them greater lifting powers and the ability to land more slowly; and thus they will be much easier to fly.

It is only the man with no knowledge of aviation who can remain sceptical. To those of us who have already been pilots, or to those who have studied its progress through the war, the future of aviation is certain.

Its progress will not be hastened by endeavours to make the aeroplane attempt the impossible. But by studying its past accomplishments and continually utilising modern invention and enterprise to advance it step by step - it will be assured a “tail down” landing in the commercial life of New Zealand.
VICKERS WELLINGTON AND AIRCREW OF NO. 75 (NZ) SQUADRON, 1941
THE DEFENCE PROBLEMS

1. This report deals only with the air aspect of the defence problems of New Zealand and does not attempt to offer a comprehensive survey of the defence situation or of defence requirements. At the same time, it has been found necessary to outline the general nature of the defence problems in order that the responsibilities which it will later be suggested might devolve upon the Air Force can be judged in relation to the whole.

A review of the situation suggests that the defence problems in which New Zealand is most directly interested can conveniently be summarised under three headings.

The defence of New Zealand itself, and in this must be included the defence of the outlying islands and mandated territories for which responsibility has been assumed; the defence of overseas communications, including the channels of trade which contribute so vitally to the prosperity of the country; and, finally, the security of the United Kingdom, the central partner in the British system. It would appear that failure in the arrangements for meeting any one of these three sets of problems must inevitably have serious consequences on life in New Zealand, and it is therefore desirable to consider the nature of the problems and to examine the manner in which a New Zealand Air Force might be able to assist in their solution should His Majesty’s Government in New Zealand so desire.

THE AUTHOR

ACM Sir Ralph Cochrane joined the Royal Navy prior to World War One and subsequently piloted airships during the conflict. He transferred to the RAF in 1920 and in 1936 was asked to review and recommend a way forward for New Zealand’s air force. Appointed as the first Chief of Air Staff for the RNZAF, he remained in New Zealand to implement his recommendations before returning to Britain. During World War Two he commanded three separate bomber groups and was in command of the ‘Dambusters’ raid. Retiring as an Air Chief Marshal in 1952, Sir Ralph became a highly successful businessman.
THE DEFENCE OF NEW ZEALAND

2. The problem of the defence of New Zealand was examined by the Committee of Imperial Defence at the request of the New Zealand Government in 1931, and the report published as Paper C.I.D. 358-C. This report emphasised that the security of New Zealand primarily depends on the concentration of such Imperial forces as will ensure effective control in the South Pacific, and that invasion will never be a likely contingency so long as an adequately defended base is maintained at Singapore, and the main British Fleet operates therefrom.

No subsequent developments have invalidated these general conclusions, whilst the rapid strengthening of the defences of Singapore and the decision of the United Kingdom Government to press forward with its programme of rearmament promises an increasing measure of security. Until these preparations are completed there is an undoubted element of risk, but no local forces which it would be practicable to provide during this interim period would materially reduce the danger. It is therefore concluded that New Zealand is only exposed to the threat of invasion if the main Imperial forces do not arrive in time or suffer a major defeat; and that the strengthening of these forces which is now energetically in hand is the best safeguard against these dangers.

3. Although the threat of invasion may be discounted, New Zealand may nevertheless be subjected to raids by cruisers, armed merchantmen, or submarines; and by aircraft carried in these vessels; whilst the possibility of the raider operating from one of the Pacific Islands, many of which are either uninhabited or without means of communication, must be borne in mind. Such activities might be undertaken as much with the object of tying down forces in defensive operations as for the destruction likely to be achieved; for experience suggests that even a single raider cannot be ignored, and that it may require a considerable force to hunt it down.

It is impossible to ensure absolute security against raids of this nature, but the damage which they cause cannot seriously affect the course of the main operations. Defence against this form of attack will be provided by the general naval dispositions, by air forces within range, and by the local forces and defences. This paper deals only with the operations of the air forces, and in a later section the manner in which they might be employed is considered in detail. For the present it will be sufficient to note that their ability to search a suspected area and to strike at any hostile vessels located within range will constitute a further deterrent to attack, and provide a valuable addition to the defences.

DEFENCE OF COMMUNICATIONS

4. This is a twofold problem involving not only the defence of the shipping carrying cargoes to and from New Zealand, but also the defence of the communications required by the main Imperial forces operating in the Southern Pacific. These forces, on which the security of New Zealand ultimately depends, require defended bases from which to operate and secure lines of communication, especially with the United Kingdom. The contribution of £1,000,000 towards the construction of the Singapore Naval Base emphasised its importance to New Zealand, whilst the allocation of thirty-seven squadrons of the Royal Air Force, with a strength of 415 aircraft, to assist in the protection of overseas bases and communications suggests the magnitude of the problem involved in their defence, of which Air Force commitments form only a part. Circumstances can be conceived in which it might become desirable to concentrate a larger proportion of Royal Air Force resources in the United Kingdom. Should such an occasion arise, the ability to send a unit to Singapore or elsewhere at short notice, should the New Zealand situation permit, would be an important contribution to local and general defence.
5. The defence of shipping in New Zealand waters is also of great importance, and it is clear that there is scope for the useful employment of aircraft in conjunction with such naval forces as may be available in these waters.

During 1935, the last year for which statistics are available, the value of imports and exports was little short of £(N.Z.)83,000,000, whilst the cargo handled at the ports exceeded 6,500,000 tons.

SECURITY OF THE UNITED KINGDOM

6. The growth of European air forces during the past few years has faced the Empire with a disturbing problem. The extreme vulnerability of the United Kingdom to air attack is recognised and urgent steps are being taken to increase the Home Defence Air Force from 53 to 129 squadrons. Nevertheless, with the uncertainties of air warfare the available R.A.F. resources might prove inadequate to meet the situation, and assistance from outside the United Kingdom might become an imperative need. Such forces might take the form either of complete air units or of trained personnel, but since a crisis may occur within a few weeks of the outbreak of war it is clear that the necessary preparations and the training of any potential air assistance must be completed in peace.

SUGGESTED DUTIES OF THE AIR FORCE

7. From the foregoing brief review it would appear that such air forces as New Zealand may be able to provide could usefully assist in any of the following tasks:

i. The defence of New Zealand territory, including outlying islands and mandated territory, against sporadic raids.

ii. The protection of New Zealand trade.

iii. The defence of the bases and lines of communication necessary for the operation of the main British forces in the Far East.

iv. The possible provision of air assistance for the defence of the United Kingdom and its communications.

The provision of forces to co-operate with military formations is considered later in this paper.

THE NATURE AND STRENGTH OF THE FORCES WHICH MIGHT BE PROVIDED

8. It is appreciated that the strength of the Air Force must be governed by the resources which can be made available for its development and subsequent maintenance; and the need for strict economy has been kept in mind when preparing this report. At the same time an Air Force is a complicated technical organisation making use of expensive equipment and calling for the services of skilled personnel. It is not cheap to maintain, nor can the necessary facilities be economically provided on a very small scale. The most effective manner in which economy can be ensured is the provision of a Force capable of undertaking a wide range of air duties, and suited to the varying needs of local and Imperial defence.

Owing to improvements in design, aircraft are now being built with greatly increased range and striking power, whilst the development of civil and military air routes and the establishment of bases with repair facilities at suitable points along these routes have provided the means for greater mobility. The extension of the civil route from Singapore to New Zealand is already in hand, and the time would appear ripe for a similar extension of the military route. This would enable air squadrons to be moved east or west in accordance with the situation, and would greatly reduce the time necessary for assistance to reach New Zealand in an emergency.
The effectiveness with which squadrons can operate on arrival must depend, however, on the necessary facilities being available, including meteorological and wireless services, a repair organisation, and stocks of fuel and bombs. These would form an essential part of the organisation of any New Zealand Air Force.

An extension of the military route to the Pacific Islands will also be required. Examination of the map attached to the report suggests that it will be necessary to ask the United Kingdom Government to co-operate in providing facilities at suitable points throughout the area.

9. It is now possible to consider in more detail the type of aircraft which would best meet the general requirements outlined above. The more important characteristics are summarised below:

i. The aircraft should have sufficient range for a flight from New Zealand to the Pacific Islands, or to Singapore, stopping only on British territory. The longest stretch is from Darwin to Singapore, 1,700 miles, and the aircraft should therefore have a range which will ensure an adequate margin of safety in a voyage of this length.

ii. The aircraft must carry sufficient military load to cripple if not destroy any raider encountered. Aircraft will not normally work in groups of less than six, and, although possibly spread out on reconnaissance, they will be within supporting range of each other. Taking into account the high-explosive content of the modern bomb, a bomb load of 2 tons per aircraft should meet this requirement. This load would have to be reduced proportionately should very long-range reconnaissance be required, or whilst on passage to outlying bases.

iii. In local defence operations the aircraft will normally work over the sea, and some of them may be temporarily based in the Pacific Islands. This raises the question of whether they should be land planes or flying-boats. In the conditions normal to New Zealand waters a flying-boat attempting to alight in the open sea will run grave risk of breaking up, and it is unlikely that it would be able to take off again. The merits of the two types of aircraft must therefore be considered from the point of view of the relative ease of finding aerodromes or sheltered anchorages, and not from that of their safety when on passage over the sea. In both cases this must be obtained by the provision of a sufficient reserve of engine-power to ensure that the aircraft can remain in the air should a proportion of the engines fail.

Provided that aerodromes can be prepared without extravagant cost, land-planes possess many advantages. They are more efficient, easier to maintain, and less in first cost and upkeep. Sufficient aerodromes are now available or in course of construction in New Zealand, and from such information as is available it would appear that aerodromes can be prepared at any rate in the larger Pacific Islands.

It is therefore concluded that the aircraft should be land-planes and not flying-boats. They should be equipped with the latest aids to navigation, such as automatic pilots and wireless position finders.

iv. Finally, there is the question of size. It is desirable on account of cost to limit this, but, apart from the points already mentioned, it is essential that the aircraft should be large enough to carry a small maintenance crew and sufficient spares to enable them to operate away from their main base during the period necessary for additional personnel and equipment to arrive by sea.

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1 The map referred to is not attached, as it is missing from the original report.
10. Before reaching a final conclusion on the type of aircraft required there are two further questions to be considered – namely, the local defence of the main centres in New Zealand against air attack and the provision of suitable aircraft for co-operation with the New Zealand military forces.

As regards air attack, fighter aircraft, even if available in considerable numbers, could do little to counter an air raid, since in New Zealand most of the important centres are on or near the coast, and it would be impossible to ensure sufficient warning of the approach of hostile aeroplanes to enable the defending aircraft to concentrate at the right time and height. Nor owing to their short endurance could they pursue the raiders out to sea.

In view of the unlikelihood of air attack, except on the smallest scale, it is considered that the problem can best be met by the provision of aircraft capable of locating and attacking the vessel from which the hostile aircraft are working. This again points to the need of an aircraft capable of overseas flight and carrying a heavy bomb load. Local protection of important points must be provided by such anti-aircraft weapons as are available.

11. For army co-operation duties, aircraft should be smaller and more manoeuvrable than the type considered in the preceding paragraphs. They must be capable of operating from small landing grounds, and suitable for message-picking-up and other duties necessitating manoeuvrs close to the ground. If a permanent squadron is to be maintained in peace special equipment must be provided at considerable cost, and be replaced from time to time as it grows obsolete. It would appear, however, that the provision of aircraft is but one aspect of the larger problem of equipping the New Zealand military forces on mobilisation, and, subject to any remarks by the military authorities, it is recommended that the principles adopted in respect of the provision of military equipment should also be applied to aircraft for co-operation with the military forces. Even if it should prove impossible to maintain the full equipment in peace, a considerable amount of useful training can nevertheless be undertaken, and arrangements can be concerted for the provision of a suitable squadron should it be required.

There remains the question of the possible use of aircraft for co-operation with coast defence artillery. At ports such as Singapore, which are defended against a heavy scale of attack, and where the guns can fire at ranges beyond effective observation from the shore, it is customary to provide aircraft to spot the fall of shot.

In New Zealand, however, the lesser range of the guns and the neighbouring high ground, which provides a view over the whole area to be defended, renders this form of air co-operation of considerably less importance. It is therefore considered that it will be uneconomical to allot any of the first-line aircraft for these duties.

12. To sum up: The defence requirements appear to call for a long-range multi-engine aircraft; and these requirements can be met by the type known as the medium bomber which is now being put into production for the Royal Air Force. This is estimated to carry 2 tons of bombs, 1,000 miles cruising at 200 miles per hour, whilst with a lesser bomb load and slightly slower speed the distance can be increased to 2,000 miles. Taking into account the area over which operations may extend, it is recommended that the Royal New Zealand Air Force should consist of not less than two squadrons having a total first-line strength of twenty-four aircraft, and with adequate base facilities and reserves.

It would be desirable for these two squadrons to be stationed on the same aerodrome in order to economise in base equipment and to simplify control, and the most suitable location would be Auckland.
A preliminary investigation of Hobsonville suggests that it will prove barely large enough for one squadron, and it will therefore be necessary to examine other alternative sites, bearing in mind strategical requirements, meteorological and other conditions affecting flying, and finally cost. Such an investigation must take time, and the question of the final location of the two squadrons, should they be approved, is therefore left open for further consideration.

13. A force of the size recommended would represent a considerable striking-power and a notable addition to the means of reconnaissance in New Zealand waters. It would form an organisation of sufficient strength to provide a valuable contribution to local and Imperial defence, and would ensure a nucleus from which to expand or on to which reinforcements from outside could be grafted. Some notes on the operations and training of this force are included as an appendix to this report.

SUGGESTED ORGANISATION

14. It is now possible to examine the elements which it is suggested might make up the Air Force organisation. The conclusions reached in the foregoing paragraphs point to the organisation of the two squadrons on a permanent basis. By this means alone will it prove possible to reach the standard of efficiency and readiness for action which is essential. This standard of readiness must be in no degree less than it is customary to look for in the ships of the Royal Navy, and it is suggested that the provision of personnel and equipment should be approached from this standpoint.

15. Yet a territorial organisation is of great value to any Air Force. It helps to identify the service with the civilian population, and taps some of the best material in the country which would not otherwise be available.

It forms a valuable reserve behind any regular units, and provides a means of expanding the service in war. An air unit must, however, be provided with equipment which can be flown and personnel to maintain it; but equipment is expensive and can only be justified if it can be constantly employed. This is impossible in a territorial unit, and it is consequently recommended that for the present at any rate any territorial effort should be devoted to building up the general reserve of flying personnel and mechanics referred to in the next paragraph. At a later date the provision of equipment may become easier, and it may prove possible to form territorial squadrons which could be trained in peace to a stage which would fit them with little extra training to take their place as complete units in the defence organisation in war.

16. In paper 358-C the Committee of Imperial Defence drew attention to the value of a reserve of pilots in Imperial defence. They stated that fresh pilots “arriving at a time when the personnel at home might be expected to be feeling the strain acutely would have the most far-reaching effect”.

In a war involving air fighting casualties to flying personnel are heavy, and in the last war amounted to 50 percent per month in squadrons engaged on the Western Front. Although every effort is now being made to build up reserves in the United Kingdom, the major part of the available resources must for some time continue to be devoted to increasing the first-line strength of the Air Force. Yet without reserves this strength cannot be increased or even maintained during the months necessary to train personnel entered after the outbreak of war. It is for this reason that a potential reserve of trained personnel is of such value.
There is no obvious figure to propose for the size of a possible New Zealand Reserve, but it is suggested that for a start it might be calculated on the numbers of the flying personnel necessary to maintain two medium bomber and one army co-operation squadrons under conditions of a major war. Should it subsequently prove possible to increase the size of the reserve, by adding other categories, the contribution would be correspondingly more valuable. Calculated on the basis of the number of months necessary to complete the training of personnel entered after the outbreak of war, and assuming a casualty rate in the squadrons of 50 per cent per month, the requirement would be:

- Pilots ....................... 250
- Wireless Telegraph Operators .... 125
- Air Gunners .................... 125

The organisation necessary to train these numbers and to maintain their efficiency in peace is considered in a subsequent section; but it may be noted that a school will in any event be required to train crews for the Royal New Zealand Air Force Squadrons, and that once set up it can be employed to train the reserves. Reserves of maintenance personnel are also required, but the casualty rate may be expected to be much lower and the problem is not so acute as in the case of flying personnel. Nevertheless, the point must be borne in mind when considering the final organisation of the Air Force.

17. The last element to be considered is civil aviation: This is recognised throughout the world as a potential source of military strength, and it is therefore necessary to decide what part it should play in New Zealand defence. No argument is needed to show that by its growth, aerodromes, wireless and meteorological services, and repair facilities are multiplied; and that it creates a general knowledge and experience of aviation which is a valuable adjunct to an Air Force.

It is also true that the chief function of both civil and military aircraft is to carry a load, and that an efficient passenger-carrier can lift a considerable weight of bombs. From this fact comes the suggestion that civil aircraft should be specially designed so that they may be readily convertible for military purposes; and this policy has a number of advocates, especially on the Continent of Europe.

The United Kingdom view, which has been confirmed by experience, is that any such system is uneconomic, both from the commercial and military points of view. Any restriction on the freedom of the operator to ask for and for the designer to produce, the most satisfactory aircraft for the particular end in view will tend to perpetuate an uneconomic type, which, while requiring a subsidy, is still far from suitable for air operations.

The policy of the United Kingdom has therefore been directed to encouraging the production at the earliest moment of a type of aircraft which can be operated without a subsidy. When this position is generally reached the development of civil aviation will receive an impetus which will result in an accretion to the air strength of a country far greater than could be expected from subsidising types which are at best an unsatisfactory compromise between the conflicting requirements of civil and military use.

There are, however, a number of ways apart from air-line operations in which civil aviation can afford direct assistance; notably by means of the aero club organisation. A well-directed subsidy can be made to produce valuable results, and it is recommended that encouragement should continue to be given to the movement, although modification of some part of the terms of the subsidy will probably be found desirable to ensure the production of the type of pilot best suited to service requirements.
ENTRY AND TRAINING OF PERSONNEL

18. Air force equipment is becoming increasingly complicated, and requires for its operation and maintenance personnel with a high level of intelligence and a sound education and training. The selection of personnel should therefore be on a wide basis from the best material available in the country. The details of any proposals for attracting the type required, and for selecting and training those needed for the permanent corps of officers and airmen and for the reserve must await a fuller investigation, which might also consider the proposals for attracting candidates for the Royal Air Force which have recently been put forward by the Air Ministry. In the meantime, the general lines of the organisation for training flying personnel both for regular units and for the reserve can be stated. The organisation must aim at producing individuals who are ready to take their places in squadrons on active service, and who are therefore trained in navigation, armament, signals, formation flying, and all other subjects which are required by a crew undertaking operations. In order to simplify the training organization it has been found convenient in the Royal Air Force to entrust the preliminary training of pilots to civil schools, and it is recommended that some analogous arrangement should be introduced in New Zealand, making use as far as possible of the existing aero clubs. This will enable the service training establishment to concentrate on the advanced training of pupils in service subjects. It is particularly desired to emphasise that by itself ability to fly is far from sufficient, and that under modern conditions it is only a preliminary to the more complicated task of training for war.

For efficiency and to reduce the overhead charges, it is suggested that the flying training school should be based on courses of not less than twenty-six pilot pupils; and since two courses can be held a year, the annual output, allowing for those failing to qualify, should be some fifty pilots.

A proportionate number of wireless telegraph operators and air gunners should also be trained. A school of the size recommended, if established, would take from five to six years to complete the training of the personnel for the first-line squadrons and the reserve. Thereafter the school would be fully employed giving annual refresher courses and making good wastage. Should this proposal be accepted, it is suggested that the Wigram Aerodrome should be developed as the Royal New Zealand Air Force School.

The enlistment and training of non-commissioned officers and aircraftsmen is equally important, but the manner in which recruits are to be obtained and the method of training to be adopted must be left for decision after a full investigation of the problem. It is probable, however, that it will take at least two years to train the personnel for the two medium bomber squadrons to a standard which will enable them to undertake all the maintenance work.

PROVISION OF EQUIPMENT

19. The provision of Air Force equipment calls for considerable initial expenditure, and adequate allowance must thereafter be made for replacements due to accidents and obsolescence. Any means by which this cost can be reduced therefore deserves attention. During recent years equipment which has passed out of first-line use in the Royal Air Force has on occasions been made available for Dominion forces at reduced prices, and this source has proved of great value. No such assistance can, however, be looked for at the present time, so far as the permanent squadrons are concerned, for two reasons. Firstly, the expansion of the Royal Air Force is absorbing all available aircraft, those which are no longer in squadrons being utilised for training; and, secondly, aircraft suited to New Zealand defence conditions have only recently been designed, and are not likely to be replaced in first-line units for a number of years.
If it is decided that the New Zealand Air Force shall be allotted the role suggested in this report it will be necessary in the first instance to buy new equipment for the permanent squadrons.

**HIGHER ORGANISATION**

20. Should the proposed programme be approved, the manner in which the Air Force is to be commanded and its activities co-ordinated with those of the other defence services, and the Government Departments concerned in defence, will require consideration.

The interest which successive General Officers Commanding and their staffs have taken in the Air Force and the assistance which they have rendered to it has been invaluable. Many of the facilities provided, such as the initial training of recruits, have been of the utmost importance, and it is most desirable that arrangements such as these should continue. But the organisation and control of a modern Air Force requires considerable specialised knowledge and a staff conversant with all aspects of air operations. This staff must naturally work in co-operation with the naval and military staffs on all combined problems, but there are many subjects in which only the Air Service will be concerned. It is therefore recommended that control of the Air Force should be vested in an Air Board with powers analogous to those of the Naval Board.

Whether this Board should also control civil aviation is a matter which only indirectly affects defence questions, and on which it is not therefore proposed to offer any recommendation.

The co-ordination of defence policy should, it is suggested, be undertaken by the Minister of Defence, advised, in such measure as he may desire, by the Committees of the Organisation for National Security, which would co-ordinate the views and requirements of the three services. It is clear that on the operational side a high degree of co-operation will be necessary between the Air Board and the Naval Board.

**COST OF PROPOSALS**

21. Detailed costs can only be prepared after a review of the special conditions and costs in New Zealand. The following figures show the cost in sterling of similar units in the United Kingdom, and will give some indication of the order of expenditure involved:

<table>
<thead>
<tr>
<th>Capital Cost</th>
<th>£(stg.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>i. A station in permanent construction for two medium bomber squadrons</td>
<td>420,000</td>
</tr>
<tr>
<td>ii. Aircraft and equipment for two medium bomber squadrons with 25 per cent reserve of aircraft</td>
<td>454,000</td>
</tr>
<tr>
<td>iii. Provision of bombs and bomb storage</td>
<td>120,000</td>
</tr>
<tr>
<td>iv. Additions to Wigram to accommodate the Royal New Zealand Air Force School and to provide additional training aircraft</td>
<td>120,000</td>
</tr>
<tr>
<td>v. Provision of landing-grounds in the Pacific Islands and the development of wireless telegraphic communications (token estimate)</td>
<td>10,000</td>
</tr>
</tbody>
</table>

Total: £1,124,000
The value of aerodromes and buildings already provided can be deducted from this total, but, with the higher costs in New Zealand, it would be unwise without fuller investigation to assess the capital cost at less than £1,100,000. This expenditure would be spread over a period of three to four years in accordance with the programme suggested below:

Annual Cost
(Final figure on completion of capital expenditure.) £(stg.).

Two medium bomber squadrons (includes full provision for obsolescence and renewal of equipment) ....................... 280,000
Royal New Zealand Air Force School (training flying and ground personnel) .................. 110,000
Cost of preliminary training at aero clubs ....................... 15,000
Cost of Air Board - Communications system and miscellaneous expenditure ................... 30,000

Total: £435,000

Note 1.- A scheme by which fifteen pilots per year would be offered commissions in the Royal Air Force has been suggested by the Air Ministry, who would be prepared to pay £1,500 per pilot. Should this scheme prove acceptable it would amount to a grant of £22,500 annually towards the cost of the R.N.Z.A.F. School.

Note 2.- Owing to the higher rates of pay in New Zealand this figure may have to be increased, although the extent cannot be estimated until a full investigation has been undertaken.

SUGGESTED PROGRAMME

22. Apart from financial considerations, the rate at which the suggested programme could be undertaken must be governed by the time required to train the personnel and provide properly equipped stations with the necessary repair facilities. Both these tasks will require at least two years. Furthermore, aircraft to equip the squadrons are unlikely to be available until the initial orders which have already been placed by the Royal Air Force have been met.

Should the proposed programme be authorised it is therefore recommended that it should be undertaken according to the following time-table:

1936-37: Concentration of all aircraft and personnel at Christchurch with a view to an immediate start being made in training the personnel required for the Air Force and the Air Force Reserve. Any extra accommodation to be put up as rapidly as possible, and the necessary additional training aircraft obtained.

1936-37 to 1938-39: Construction of accommodation, repair facilities, and bomb storage for two medium bomber squadrons.

1938-39: Purchase of equipment and reserves for two squadrons of medium bomber aircraft.

SUMMARY OF CONCLUSIONS

23. A review of the defence situation suggest that New Zealand has an interest in three defence problems – namely, the defence of New Zealand territory itself; the defence of communications, both those necessary in war for the maintenance of the main Imperial forces in the Far East and those required for New Zealand trade; and finally the defence of the United Kingdom. An analysis shows that a New Zealand Air Force could
usefully contribute towards the solution of these three problems, and proposals have accordingly been drawn up with a view to providing a force capable, when operating in conjunction with Naval and Military forces, of undertaking its appropriate share in the defence of these local and Imperial interests.

24. It is recommended for the consideration of His Majesty's Government in New Zealand that:

i. The Royal New Zealand Air Force shall be constituted as a separate service controlled by an Air Board under the direction of the Minister of Defence:

ii. It shall consist initially of two permanent squadrons equipped with medium bomber aircraft with a total first-line strength of twenty-four, and the necessary repair facilities and reserve of aircraft:

iii. A reserve of personnel shall be instituted, which might at present be based on the numbers required to maintain two medium bomber and one army co-operation squadrons in the conditions of a major war. These personnel to be trained to a standard which will enable them to take their places in squadrons on active service. The question of the formation of territorial squadrons to await consideration on a future occasion:

iv. Civil air transport shall continue to be encouraged with the object of enabling it to take its place in the transport system of the country, and thus provide a valuable backing to the regular force. The aero-club movement shall also be supported, but the basis of the subsidy may require modification so that the results conform more closely to defence requirements:

v. The Government of the United Kingdom be invited to co-operate in developing facilities to enable aircraft to operate in the area of the Pacific Islands.

It is further recommended that the provision of the forces referred to above, and the facilities necessary for their operation, shall be spread over a period of three years.

25. The cost of the proposals (if executed in the United Kingdom) would be of the order of:

<table>
<thead>
<tr>
<th>Capital (£(Sterling))</th>
<th>1,100,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual, rising to £(Sterling) on completion of programme</td>
<td>435,000</td>
</tr>
</tbody>
</table>

Figures based on New Zealand conditions could only be submitted after decisions had been obtained on a number of points affecting the organisation of the Air Force and the conditions of service of the personnel, and it has therefore been considered unwise to attempt any closer approximation of the cost. In view of the small amounts which it has been found possible to devote to the Air Force in past years, a fairly high capital expenditure appears inevitable. It is particularly desired to emphasise that full value can only be obtained from Air Force Squadrons if they are provided with adequate numbers of trained personnel, and the spares and equipment necessary to maintain a technical force at a high level of efficiency.

26. In concluding this report it is desired, once again, to emphasise that it deals only with the air aspects of the problems discussed, and will therefore require consideration in relation to a number of factors on which a competent opinion must be sought elsewhere. Many points of organisation and administration remain to be considered, but, whilst their nature has been indicated in the body of the report, detailed investigation has been
withheld until decisions have been taken on the major questions of policy. Should it be found possible to build up a force of the size suggested, it will lead to a welcome strengthening of the defence position in the Southern Pacific, and the establishment of a reserve of air personnel of great value in Imperial defence.

APPENDIX

NOTES ON THE OPERATION AND TRAINING OF THE ROYAL NEW ZEALAND AIR FORCE SQUADRONS

1. The role which might be allotted to the Royal New Zealand Air Force Squadrons, and the training which they must receive to fit them for their duties, must be considered in the light of possible operations. Map No.1 shows the areas for which New Zealand has assumed responsibility. On it have been drawn circles representing the distances traveled in each hour by an aircraft flying at 170 knots (200 miles per hour) from an aerodrome in the Auckland Area. It will be seen that in three hours it can traverse the coasts of New Zealand as far south as Timaru, that the seven-hour circle touches the Australian coast and passes through the Fiji Islands, and the ten-hour circle through Rarotonga and the Cook Islands. To the westward the direct air route to Singapore is shown, the distances being marked in terms of hours flying. On this basis Singapore is only twenty-seven flying-hours from New Zealand. An allowance would have to be made for stops to refuel and incidental delays, but it should be practicable with proper ground organisation for air reinforcements to traverse the Singapore route in either direction in thirty-six hours.

2. Weather conditions will naturally influence any form or air operations, either by reducing the visibility, or, in the case of high winds, by increasing the difficulties of navigation.

These difficulties can, however, be largely overcome by the use of suitable instruments, especially wireless direction apparatus. As an example, the trans-Pacific China Service of Pan-American Airways makes use of two small islands which would be invisible a few miles off, but to which the aircraft are guided by wireless signals. Suitable instruments would form an essential part of the equipment of any aircraft which might be provided for operations in New Zealand waters, but constant practice in their use will be necessary. Given these instruments, aircraft should not be adversely affected by weather conditions to any greater extent than ships.

3. It was suggested in the body of the report that any attack on New Zealand, or on shipping in New Zealand waters, should be in the nature of a raid, although the possibility of hostile ships using one of the Islands as a temporary base was also considered. It is, therefore, necessary to examine the exact manner in which the aircraft should be employed. Bearing in mind the size of the area in which attack may take place, the probable lack of information, and the number of aircraft available, it is clear that any form of standing patrol or permanent reconnaissance is out of the question, nor is it necessary, provided that the speed of the defending forces
is great enough to ensure intercepting a raider before it can escape. There will naturally be exceptions to this rule, when for example, an important convoy has to sail, and it is necessary to ensure that no enemy forces are within steaming distance of the area through which it will pass. But in general the role of the Air Force should be that of a striking force which combines within itself sufficient powers of reconnaissance to enable it to locate its target.

As an example, a ship 400 miles west of Auckland might report that she was being attacked. A flight of aircraft standing by should be able to leave the ground within twenty minutes and reach the scene of attack within three hours. Except in conditions of very bad visibility, or after nightfall, the aircraft should be able to locate and attack the raider. The interception of raids made on the coasts would be proportionately easier owing to the restriction placed by the land on the subsequent movements of the raider.

4. It is, therefore, concluded that the aircraft should not normally be tied down to any form of standing patrol, but should be maintained in a state of readiness to carry out any necessary reconnaissance or to attack any vessel which may be reported within their range. Even although success cannot always be achieved, aircraft must increase the hazards run by a raider, and act as an additional deterrent to operations in New Zealand waters.

5. It is clear from the foregoing review that, apart from general Air Force duties, pilots will require training not only in reconnaissance work at considerable distance from land, but also in attacking moving targets.

A cruiser is a small target from the air, but experience shows that a satisfactory percentage of hits can be obtained given adequate facilities for training and constant practice.

The Royal New Zealand Air Force Squadrons should, therefore, be organised so that they may be ready for instant action and trained more especially for operations over the sea. The necessary standard can only be reached by personnel who can devote the entire time that they are serving to intensive training in the employment of the equipment with which they are provided.

Based on Cochrane’s Report and Recommendations
The New Zealand Government ordered 30 Vickers Wellington Bombers for the defence of New Zealand. Crews were in Britain training on the new type when World War Two broke out and the bombers were diverted for use by Britain. In April 1940, these bombers and personnel formed the nucleus of the newly formed No. 75 (NZ) Squadron.
Strategic air power as a concept typically conjures up pre-conceived images of heavy bombers such as Lancasters and B-17s pounding away at cities during World War Two (WW2), and B-52s dropping incredible amounts of ordnance on the jungles of South East Asia or the deserts of Iraq. But strategic bombing is only one example of strategic air power. Tactical and transport aircraft can have as great, if not greater, strategic effect than the lumbering fleets of heavy bombers. A single squadron of fighter aircraft that are unopposed in a particular theatre, for example, can exert a disproportionate strategic effect. This begs questions about how air power gives commanders choice, how it opens up otherwise closed courses of action and how these enabling choices lead to air power having a strategic effect? This paper attempts to answer questions of this sort, with reference to a historical case-study from WW2.

Since World War One (WW1), air power has become an ever-present feature of battlefields across sea and land, but its impacts are not just limited to the frontline of soldiers and sailors. By using the Allied WW2 Campaign against Japan and more specifically, the use of carrier-based aircraft in the Pacific and tactical air transport in Burma, it is possible to demonstrate how air power’s inputs can have far-reaching and strategic impact. From what was, in one analyst’s opinion, “the most joint of all campaigns”,1 it is possible to use the Pacific Campaign to highlight the strategic effect air power had as an enabler, using its versatility, adaptability, and flexibility. The unique geography of the theatre and air power’s ability, enhanced by sea basing, to range deep into the battlespace striking at strategic as well as tactical objectives, meant that eventually the Allies developed the perfect, aviation-led, strategy to defeat Japan. Even in mainland Burma and China, Allied air power, particularly in the form of tactical airlift, had huge strategic effect.

THE AUTHOR

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To what degree can air power’s inputs to battle be considered strategic?

Its potential allowed commanders, such as Slim of the Commonwealth 14th Army, freedom of manoeuvre and the ability to think differently when planning battles both defensively and offensively. Air power gave commanders strategic choice, a degree of choice which stemmed from operational and tactical flexibility. This choice, combined with numerical and qualitative superiority in personnel and equipment, gave the Allies the decisive strategic advantage over their opponents. Toward the end of the conflict strategic bombing became an important factor, but without the fast carriers and the tireless work of land-based tactical air power, the commencement of a strategic bombing campaign against Japan would have been scarcely possible.

The inputs of air power, not necessarily integrated into the battlespace during its early years, have now become intertwined into the very fabric of warfare. Today, any input from land, sea or air should have a strategic effect when applied as part of a carefully managed, integrated, joint campaign. The ‘trick’ is to understand how each input or capability can be used and when to use them.

The Allied Campaign in the Far East in WW2 is a perfect example of strategic integration across an entire battlespace.

In the Southeast Asia theatre, a semi-traditional continental campaign was taking place against the Japanese by the combined forces of China and the Commonwealth 14th Army in India and Burma. This theatre found battles scattered across a huge, geographically difficult and diverse area. By 1944 the Allies had fully recognised the vital necessity of tactical air transport and there are two key instances, amongst many, where the value of having the tactical flexibility offered by air transport had a decisive strategic effect.

Operation U-Go, the final Japanese offensive from Burma into India, in April 1944, surprised the Commonwealth forces and resulted in them being surrounded in sizeable pockets around the large hill town of Imphal and the considerably smaller one of Kohima. Both towns guarded the vital main supply routes into India and their loss would, in the opinion of Rooney, “have undoubtedly altered the course of the war in Asia.”

It was air transport of both troops and supplies which ultimately ensured the survival of both towns, with the pattern for this new form of warfare coming from the hard Allied defeats of 1942 and the retreat from Burma.

Slim, the commander of the 14th Army, realised that one way to defeat the Japanese was for land formations to defend areas, supplied by aircraft. In the opinion of Lyman, Slim’s efforts to inculcate his troops with a sense of ‘airmindedness’ was incredibly successful. In a similar way that maritime tactical air power gave the US Navy operational freedom in the Pacific, so too did air transport in the Burma theatre of operations. Slim and his army developed air resupply to such an extent

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that his ground troops, “regarded it as no more unusual than resupply by any other means.”

Hand in hand with local air superiority and increased effectiveness in close air support techniques, tactical air transport became the lynchpin around which Slim would fight his battles, both defensively and offensively.

The 1943 battles around the Arakan peninsular allowed Slim the opportunity to validate his air resupply ideas for defensively orientated units. In Arakan, his troops were resupplied, reinforced and evacuated throughout the arduous battle and this success of tactical air power gave Slim the confidence to develop future plans based on air transport. Critical to this success was his insistence on Air-Land integration, believing that, “all successful operations in modern warfare were air-land operations.”

The Japanese Burma offensive of 1944 caught Slim off balance, with his troops deployed in an attacking posture across the front and unprepared for defensive operations. The vital node of Imphal, the jumping off point for his planned offensive, but now defensive bulwark, was quickly surrounded. However, the confidence gained in the Arakan campaign meant that Slim and his staff were aware of the advantages air power gave them, subsequently flying in two divisions to Imphal to bolster its defences whilst maintaining the whole pocket with provisions and ammunition throughout the siege. Imphal was held and the Japanese offensive failed. It is clear that the tactical level inputs of air transport had a huge strategic success in defending India. With increasing confidence, those tactical inputs were developed into the plan for the Allied invasion of Burma in late 1944.

While the tactical transport fleet gave Slim the means by which to sustain his forces, it should not be overlooked that the freedom to use such aircraft, in large numbers and relatively close to the frontline, was only possible because of air superiority won by the Allied air forces. As Slim himself noted, “without the victory of the air forces there could have been no victory for the army.” Offensive operations across Burma necessitated the resupplying of an army across vast distances. The country had very poor interior lines of communication and in the opinion of Lyman, the physical restraint of operating across Burma was only overcome by the decisive advantage the Allies held in air re-supply and the experience gained by operations in Arakan, Imphal and Kohima, such that by 1945, “the air supply organisation of 14th Army had become a model of its kind.”

This tactical-level air power efficacy was only able to have a strategic effect because Slim and his team truly believed in its use. Looking back over the Burma campaign, Slim later noted that he and his staff were, “proved right in our reliance on the air forces.” Because of the operational-level freedom and therefore strategic choice that tactical air power delivered to the Allies, it is not too far a step to assert that without it the victories in India and Burma would not have been attained.

The overall Allied Campaign against Japan, from December 1941 to August 1945, was perhaps unique in its size and scope. It encompassed huge variations in geography, from the archipelagic nature of the Southern and Central Pacific, to the impassable and treacherous terrain of mainland Burma, Malaysia and Southern China. Much of the land was within reach of influence by the sea and vice versa.

4 Lyman, The Generals: From Defeat to Victory, Leadership in Asia 1941-45, 129.
6 Lyman, The Generals: From Defeat to Victory, Leadership in Asia 1941-45, 155.
7 Lyman, The Generals: From Defeat to Victory, Leadership in Asia 1941-45, 129.
8 Lyman, The Generals: From Defeat to Victory, Leadership in Asia 1941-45, 270.
10 Lyman, The Generals: From Defeat to Victory, Leadership in Asia 1941-45, 323.
11 Slim, From Defeat to Victory, 361.
To what degree can air power’s inputs to battle be considered strategic?

Logistics posed a huge challenge to every commander, be they in charge of a carrier battle group, an island fortress or an army spread across the jungle of Southeast Asia. O’Brien has coined the term “super battlefield”, and this goes some way to illustrating the sheer magnitude of the theatre and the challenges presented to commanders.

By explaining the geography of the battlespace it is possible to start to appreciate that air power and sea power provided the best, in fact only, means of conquering such a huge area of the globe. Ranged against the industrial might of the Allies, Japan was vulnerable to being drawn into a war of attrition. Indeed, it has been postulated that it was inevitable Japan would lose. In Gray's opinion, Japan, chose to fight the wrong war. Japan essentially became enslaved by the geography of its empire and overly stretched as it could not simultaneously protect its lines of communications, resupply its forces in the field and launch offensives. Once Japan’s combination of geographical vulnerability, mixed with a weak industrial base dependent on resource inputs, and limited fielded forces became apparent to the Allies, it was clear that air power would be decisive in stretching, straining and finally defeating Japan. The key was getting air power into the fight and initially the only way to do so was via the aircraft carriers of the US Navy.

Muller contends that the air war in the Pacific was split into three consecutive phases. Initially, there was the Japanese offensive spearhead by maritime air power, which was followed by the Allied defensive/offensive phase, during which Japanese advances were blunted and the island hopping campaign initiated. Finally, there was the surrounding of Japan by air and sea forces and direct attacks on the homeland. In each of these phases air power, primarily at the tactical level, had inputs that impacted at a strategic level. The best known strategic consequence of tactical air power in this theatre was the Japanese strike on Pearl Harbor in 1941. Arguably, there cannot be a bigger strategic consequence than starting a war. Nevertheless it should be noted that the Japanese missed a significant military strategic prize, by failing to catch and sink the US Navy’s aircraft carriers. As Budiansky opines, the failure to destroy US carrier aviation would have enormous ramifications, as US maritime air power became the cornerstone on which the Allies began to build up the Pacific fight-back.

Before the Allies could undertake offensive action against Japan there came, in 1942, three moments where tactical air power struck blows that resounded strategically; two of which were carrier-based and the third land-based. The first two were the aircraft carrier clashes at Coral Sea in May 1942, and Midway in June 1942. These clashes had some similarities, with Japanese carriers screening invasion convoys and US carriers very much on the defensive in both cases.

The Coral Sea battle resulted in the loss of one Japanese light aircraft carrier and damage to one of their fleet carriers, but most importantly the battle stopped the Japanese invasion of Port Moresby. This strategic victory was important because, “had Coral Sea turned out differently it is difficult to see how the US Navy could have won at Midway.” Tactical air power at Coral Sea fought a naval battle where, for the first time, the opposing ships never sighted each other, and the strategic victory for the US, despite the loss of a fleet carrier of their own, was vital for the survival of the US war effort in the Pacific. The comment by Muller above, about the link between the battle of the Coral Sea and the battle of Midway, needs to be viewed in the context of US victory at the latter.

At Midway, another naval battle prosecuted by tactical air power, the Japanese lost four fleet carriers and the

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16 Muller quoted in Olsen, *A History of Air Warfare*, 64.
balance in the Pacific war changed in an hour. O’Brien considers Midway to have been the only truly decisive battle in WW2\(^ {17} \) and Overy concurs, calling Midway, “the most significant naval engagement of the war”.\(^ {18} \) The loss of the majority of Japanese aircraft carriers within two months afforded the US vastly increased tactical and operational freedom within the Pacific theatre. Victory was achieved in the main by single-engine aircraft operating in recognised air power roles such as offensive and defensive counter-air, anti-shipping strike and reconnaissance. Strategic freedom, won by tactical air power inputs at Midway, threw Japan onto the defensive and allowed the US to advance their Pacific strategy one step further.\(^ {19} \) The next step took the US into an area where it would be the turn of land-based tactical air power to demonstrate its ability to impact strategic thought.

Operation Watchtower, the US invasion of the island of Guadalcanal, located at the southern most extremity of the Solomon Islands group, in August of 1942 signified the first step in taking the fight to Japan.\(^ {20} \) A precarious foothold on the island was achieved and maintained by the US Marine Corps, supported not by maritime air power but instead the fighters and dive bombers based on the island. The island was difficult for both sides to support logistically and with the ever-present threat of US land-based aircraft from Guadalcanal, the Japanese navy was forced into making logistical runs either at night or in daylight, accepting the inevitable losses. Between August and November 1942, US aircraft on Henderson Field (as the US airstrip was known), never amounted to much more than a combined total of about sixty airframes split between fighters and dive bombers. These few aircraft however, were enough to have a significant operational effect.

The centre of gravity on Guadalcanal was clearly the airfield, from which the US could not only conduct maritime reconnaissance and strike missions but also essential close air support missions that marine and army units required to keep the Japanese army at bay.\(^ {21} \) The Japanese military eventually conceded defeat at Guadalcanal in February 1943, by which time they had lost not only valuable military equipment, including two battleships and a full division of soldiers but, most importantly of all, significant losses in merchant shipping. Japanese industry was ill-suited to a prolonged war of attrition and Guadalcanal was a battle that proved as much. Lt General Miyazaki, Chief of Staff for the Japanese Southern Pacific Army, commented, “The biggest problem was the loss of shipping, with these losses our forces became stranded”.\(^ {22} \) The vast majority of these shipping losses were inflicted by tactical land-based air power and such was the effectiveness of this strategy of air power-led attrition that, in the opinion of O’Brien, the losses sustained at Guadalcanal began a chain of events which minimised effectiveness of the Japanese to

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To what degree can air power's inputs to battle be considered strategic?

counter future US thrusts. Muller takes this view one step further, claiming that the victory at Guadalcanal was the final event of a troika that began with the battle of the Coral Sea. It seems that both Muller and O’Brien are correct. Whatever the magnitude of each of the three tumultuous Pacific battles fought in 1942, it was tactical air power, in surprisingly small numbers, that had the decisive say in each engagement. The air power inputs were tactical but individually and cumulatively they had a strategic effect.

The strategic effects that the Pacific theatre tactical air power delivered, by early 1943, were twofold. Firstly, the position of the aircraft carrier as the decisive naval unit vice the battleship was comprehensively reinforced. In the opinion of Budiansky, “within a year of the outbreak of the Pacific war, the fast carrier force had consolidated its ascendancy over naval warfare.” This change manifested itself in the US by the ordering of ten new fleet carriers and the cancelling of six new battleships.

Secondly, and hand in hand with the first effect, was the realisation by the US that the projected fast carrier fleets offered the ideal weapon to defeat Japan. Command of the sea was made possible by command of the air and command of the sea resulted in operational freedom for allied forces around the Pacific Ocean. This operational freedom allowed, in the opinion of Gray, the Allies to strike at the Japanese centre of gravity, her maritime communications and approaches. The Japanese concept of an island-based defensive perimeter was vulnerable to the operational freedom of manoeuvre and combat power that maritime-based tactical air power gave the US. As a result, by late-1943 Japan was consigned to defeat. Both Muller and O’Brien believe that the transformation of the US Navy to, “a completely air orientated naval force,” by the end of 1943 was the, “greatest American triumph in the air war.” Tactical air power inputs resulted in a paradigm shift not only for naval strategy but also for the US, as they codified the strategy with which to defeat Japan in the Pacific.

Tactical-level air power inputs had a strategic effect on the conduct and outcome of the Allied joint campaign against Japan in WW2. In the case of maritime tactical air power of the US Navy in the Pacific, this managed to halt Japanese advances across the ocean whilst inflicting debilitating losses. It also changed the face of naval warfare forever. These achievements are made all the more remarkable when the relatively modest number of aircraft involved is taken into account, truly reflecting the strategic value of tactical air power. Echoing the sentiments of Muller, Budiansky believes that the three key engagements of Coral Sea, Midway and Guadalcanal represented, “a revolution in doctrine, that command of the sea was impossible without total command of the air.”

23 O’Brien, How the War Was Won, 386.
24 Muller quoted in Olsen, A History of Air Warfare, 66.
25 Budiansky, Air Power, 272.
26 Budiansky, Air Power, 272.
28 Muller quoted in Olsen, A History of Air Warfare, 70.
29 O’Brien, How the War Was Won, 376.
30 Budiansky, Air Power, 274.
To what degree can air power’s inputs to battle be considered strategic?

Operational-level geographic freedom of American tactical maritime air power meant that the US could strangle the strategically important Japanese lines of communications to her island fortresses and resource bases. This denial of Japanese freedom of manoeuvre was decisive and was created by tactical air power. In Burma, the Allied armies depended on the operational flexibility and freedom that tactical air transport gave them. Slim understood the contribution of air power to victory only too well noting, “The shares of the soldier and the airman were so intermingled that it was a joint victory.”

Tactical air power inputs had effects that were strategic in the joint campaign against Japan, to such an extent that although it did not win the war on its own, in Overy’s opinion, “air power proved to be the single greatest advantage enjoyed by the allies.”

The case-study examined in this paper has helped provide answers to the questions raised about how tactical air power can have strategic effects in the joint environment. As the views of both commanders at the time and historical commentators illustrate, these effects apply equally to air-sea integration as air-land integration.

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31 O’Brien, How the War Was Won, 480-481.
32 Slim, From Defeat to Victory, 361.
33 Overy, Why The Allies Won, 322-323.

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INTRODUCTION

“Ghastly dew from the nation’s airy navies battling in the central blue.”

Tennyson

Many authorities consider that the originator of air strategy was General Smuts in 1917. Inspired by the German air attacks on London he produced the historic memorandum of August, 1917. This document formed the basis of the creation of the Royal Air Force, and reads:

“As far as can at present be foreseen there is absolutely no limit to the scale of its (air) future independent war use. And the day may not be far off when aerial operations with their devastation of enemy lands and destruction of industrial and populous areas on a vast scale may become the principle operations of war, to which the older forms of military and naval operations may become secondary and subordinate.”

Although this concept originated in the First World War, the emergence of air power as an independent means of defeating the enemy did not take place until the later stages of World War Two.

Although bombers were used in support of land and sea operations their outstanding contribution to victory was, however, the sustained offensive against the enemy homeland. To quote the United States Strategic Bombing Survey, “The air offensive did not attain major significance until the Spring of 1944. Of the tonnage dropped on Germany, 72% was after 1st July 1944. After the air war against Germany was launched on its full scale the effect was immediate.”

Today, we again face the threat of war but this time a war unlike any we have ever fought. For the development of nuclear weapons has altered the whole concept of war as we know it. It has forced on us a reshaping of armed forces, the discarding of many weapons, and the development of new techniques. Yet in the midst of change, one important inheritance from World War Two remains: the war-winning potential of strategic air power.

SCIENCE AND WAR

One of the most significant contributions to victory in World War Two was the incursion of scientists into military affairs. In addition to research and the development of weapons, they were able to make a substantial contribution outside their immediate field of experience. By the end of the war they were engaged not only in producing and developing new techniques and training the Services in their use, but in the analysis of operations, the development of new tactics, and even the planning of campaigns.
The major powers have recognised that the integration of the scientist and soldier is essential, not only in war but in peace. From this recognition has evolved a highly developed, technically efficient, and permanent machinery of defence science in these countries. This defence science has been responsible for some remarkable post-war developments in propulsion, aerodynamics and radar, which have greatly improved the weapons available for both offence and defence. From these developments have evolved the supersonic aircraft and the guided weapons systems which, together with thermonuclear firepower, are key factors in the future employment of air power in war.

**POST WAR DEVELOPMENTS OF WEAPONS**

It is now perhaps pertinent to consider briefly these key factors in the air war – thermonuclear firepower, manned supersonic flight, and guided weapon systems.

**Thermonuclear firepower**

The history of warfare shows that the development of firepower has never remained static for very long. Man has always gone on to conceive and develop something more and more devastating. In World War Two we progressed from the 500lb aerial bomb to the “Grand Slam” with its ten tons of high explosive. Then, in the final phase of war two of the still experimental atomic bombs were used. Both of these had an explosive force equivalent to 20,000 tons of high explosive, or 2,000 “Grand Slams”.

At the time, the jump from conventional explosive was so great it appeared likely that the ultimate in fire power had been reached. However, post-war developments have produced not only more powerful atomic bombs, but the thermonuclear bomb which has put firepower almost beyond human conception. One such bomb may be over a million times more powerful than the “Grand Slam”, and in addition can contaminate hundreds of square miles of territory with radioactive fallout.

No doubt bigger and more destructive weapons could be designed but they would appear to be unnecessary. The thermonuclear weapon has, for the first time in history, achieved a firepower the effect of which is decisive on the issues of war and peace. “*We have in fact reached the practical, ultimate instrument of mutual destruction. We have at last arrived at the point when war – in the sense of total world war as we have known it in our generation – has abolished itself as a practical instrument of policy*.”

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Manned supersonic flight

It is perhaps too commonly assumed that the advent of the inter-continental ballistic missile means the end of the manned bomber. This is not by any means certain, for although the electronic brain can do marvels, in some ways it cannot equal the human intelligence. It appears unlikely that the missile will be able to take evasive action, whereas the bomber can do so and can thereby retain tactical flexibility. Until the threat ceases to be the manned bomber and becomes the long-range controlled missile, it is around the bomber that our air strategy must be planned.

Years ago in the Schneider Cup days, older men shook wise heads and said that with speeds like two hundred miles an hour we would soon be faced with the limit of human endurance. Today, men have already flown at around two thousand miles an hour and in addition, have withstood artificially produced stresses representative of flying speeds many times higher. This infers that the human “body” will not be a limiting factor, and that the real problem will be to protect the metal alloys of the aircraft against the effects of speed and heat. Whether men’s minds can react quickly enough to fight at these terrific speeds is yet to be proved. Already the trend is to eliminate the human element, firstly by placing the pilot more and more “on instruments”, and secondly by providing immediate answers to complex flight problems by the use of electronic computers. In effect, the tendency is to turn the aircraft into a type of guided missile.

Under future operational conditions the physical strain on bomber crews may be critical. Crews cannot risk failure of pressurisation through enemy action and must wear individual pressure suits, which can cause considerable exhaustion when worn for long periods. Nevertheless, the difficulties of manned military flight can and will be surmounted, and it is a fallacy to suppose that push-button warfare is just around the corner.

Guided weapon systems

The post-war development of guided weapons was initially defensive in character, being designed to meet the increasing difficulty of intercepting the nuclear weapon-carrying jet bomber. The improving performance of defensive missiles has partly restored the balance of power, which had swung slowly but surely in favour of offense. Later developments however, have catered for offense and the guided bomb, to be released at a safe distance from the target, is rapidly becoming standard equipment for the strategic bomber. In addition, some success has been achieved with the development of the long-range surface operated guided weapon. These missiles employed over both intermediate and long range will undoubtedly supplement the manned bomber, and may ultimately supersede it.

Power, control and guidance

Power is supplied by jet or rocket engines or a combination of both. Control is exercised by electro-mechanical servo systems which stabilise the flight and produce any lateral accelerations necessary to make the missile respond to guidance information. Guidance techniques may be based on electro-magnetic or gravitational principles, and range from a simple radio link to elaborate self-contained intelligence systems.

“There is no reason to believe that within the period with which we now need to be concerned we shall be able to dispense with men of the highest quality to design, develop and operate military aircraft.”

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2 Slessor, The Great Deterrent
Classification

All guided weapon systems fall into one of the following categories:

Air weapons:
- **Air to air (AAGW):** Used for fighter offensive and bomber defensive armament.
- **Air to surface (ASGW):** Used for guided bombs, anti-ship and other surface target weapons.

Surface weapons:
- **Surface to air (SAGW):** Used for anti-aircraft weapons for land and ship defences.
- **Surface to surface (SSGW):** Used for long-range bombardment and short-range tactical weapons.

OFFENCE AND DEFENCE

Although there are periods when either offence or defence is clearly superior, eventually a balance is always achieved. However, the combination of the nuclear weapon with supersonic and eventually ballistic flight has achieved a disparity in favour of offence. This disparity can be expected to increase rather than decrease during the next decade. There are two key factors which highlight the increasing disadvantages of defensive systems. The first factor is the explosive power of the nuclear weapon. It is of such tremendous power that there is no longer the need to build up and maintain attacks against a target system which can now be annihilated in one concerted effort. The other big factor lies in the ever increasing speed of flight. The time available for setting the defensive system in motion is continually becoming smaller. Of course the offense also has less time to attack, but against immobile targets this is of less importance.

If the discrepancy between the offensive and defensive techniques is not too great, a measure of military stability may be established. The danger here is that one side, believing it has achieved a temporary advantage, may embark on war before the advantage disappears. Also, under conditions of tension there is always the temptation to strike first. However, when the discrepancy between the offence and defence is very large, the main cause of instability is removed. If both sides are convinced that they cannot avoid immediate and overwhelming retaliation, there is no longer any advantage to be gained from seizing the initiative. The greater the disparity, the greater the stability.

To support the contention that the offensive can not be stopped, one could quote Marshal of the Royal Air Force, Sir John Slessor, "I would not be so foolish as to deny that some scientific means of defence may become technically possible, even conceivably against the long-range ballistic rocket with the atomic warhead. I do not believe it will ever be economically practicable. I am not saying that the bomber offensive of the future will get away with it without casualties. What I do say is Baldwin's dictum 'The bomber will always get through' would remain long enough for atomic and thermonuclear air power to become decisive."

If the offensive can not be stopped, the logic of retaliation becomes inescapable! For perhaps the first time in history we have in the nuclear weapon the basis for military stability.

STRATEGICAL CONSIDERATIONS

The national aim in war is to impose our policy on the enemy, or conversely to prevent the enemy imposing his will upon us. In striving for the attainment of the national aim the full war potential of the nation must be effectively organised and utilised in the service of the State, in keeping with the national strategy. However, before strategy at the national and various Service levels can be formulated, the priorities of Allied strategy must be determined for the various types of war. These are global war, limited or local war, and cold war.
With the continual possibility of cold war developing into local war, and the latter into global war, the problem of reconciling the appropriate strategies is always present. Despite these considerations some priorities must be established, although they may change periodically.

Since the Western powers, and in particular the British Commonwealth, are unlikely to choose war as an instrument of policy it must be accepted that, at the start of a war, the enemy will have the initiative and we will automatically be on the strategic defensive. For our national and collective survival we must wrest the initiative from the enemy. To achieve this requires not only an offensive policy but one which can be implemented at once. The implications of future wars are such that it is no longer a matter of months, or even weeks, it is a question of hours which may determine our survival.

Faced with such considerations our first strategic priority must be to prevent total war. Because of its nature, air power provides the key to such deterrence and, as the instrument best equipped for the purpose, the strategic air force must play the leading role in our offensive policy. The logic of retaliation is the key to future strategy and it is around the strategic air force, the nuclear weapon and the “total war” concept, that we must plan our future strategy.

Thermonuclear weapons will probably not be used in these wars but the bomber will still have its part to play, even perhaps with atomic weapons of limited power, depending on the tactical and strategical advantages involved. However, to contain these wars we must at all times keep our ‘big stick’ of deterrence plainly showing in the background.

It is now generally realised that there is little chance of anyone winning another world war, and it is inconceivable that anyone would take it on as an act of policy. Our potential enemies know that they could not survive thermonuclear war and we must leave them in no doubt whatever that if our vital interests were mortally threatened we would not hesitate to use the bomb, even use it first if necessary.

AIR INTELLIGENCE

“Not only are we uncertain as to the strength of the enemy but rumour increases his numbers.”

Clausewitz

““The local and cold war roles of the air force, where nuclear weapons may not be applicable, will still remain much the same as before, with the establishing of air superiority, support for land and sea forces, air transport, and attacking enemy bases and communications as some of the tasks. Against this sort of local aggression the air force can be an indispensably valuable partner, but it cannot in itself be decisive.”

3 E.J. Kingston–McCloughry, Global Strategy (London: Cape, 1957)
In military libraries there is a wide range of books on planning, logistics, strategy and tactics, but it would be difficult to find a guide on the training of a modern intelligence officer. It is equally noticeable that in books on World War Two written by acknowledged military authorities, the space devoted to military intelligence is negligible. These and many similar facts reveal inadequate status that intelligence has been accorded in defence systems.

In fact, the history of military intelligence is highlighted by a succession of inadequacies up to and including World War Two, and many examples can be found in post-war reports and surveys such as the United States Strategic Bombing Survey, which states: “If a comparable lack of intelligence should exist at the start of a future national emergency it might prove disastrous.”

With the threat of nuclear warfare ever present we must have detailed and accurate air and military intelligence about our potential enemies. Air intelligence, which has less than twenty years of tradition and experience, can be brought to the required high degree of efficiency only by the use of elite personnel. Professor R. V. Jones, a leading British authority in this field, says, “In an age in which scientific and technical intelligence dominates the general problem of military intelligence, first-rate researchers and scientists must be found and encouraged to do intelligence work. This may well be a matter of life and death one day.”

Strategic air warfare can neither be soundly planned nor efficiently extended without a continuous flow of detailed intelligence. There must be a competent and active air intelligence organisation within the air force working closely with a similar national organisation that not only deals with broad questions but collects, evaluates and disseminates a continuous stream of intelligence data.

As the main job of air intelligence is to anticipate operational needs it must have its plans, priorities, tactics and special equipment requirements such as listening sets and search aircraft. Priorities must be carefully chosen and one of the top priorities must be enemy radar which is the key to the strategic air situation. As our survival may depend on the ability to penetrate and to destroy vital enemy targets, our survival therefore may be determined by the quality and quantity of our air intelligence.

STRATEGIC AIR POWER

“It is to the universality of potential destruction that we may look with hope and even confidence.”

Sir Winston Churchill

The United States Air Defence Command has estimated that fifty thermonuclear bombs would be enough to paralyse that country. Possibly a dozen would knock the United Kingdom out of a war. With such a tremendous weapon, nothing less than complete interception and annihilation of the attacking force is acceptable for successful air defence. Some experts consider that no more than 25% of the attacking force can be destroyed, while others feel that further development of ground to air and air to air guided missiles will lift this figure considerably. However, it is generally agreed that complete destruction of the attacking force is unlikely to be attained. If the offensive is accepted to be unstoppable, the logic of retaliation becomes inescapable! These words illustrate perhaps better than anything else that the survival of our nation, possibly of our civilisation, depends on the strength of our deterrent forces.
“The aim of a future bomber offensive is still, as in the past, to destroy the enemy’s capacity or will to wage war. The time factor is overriding and the offensive must aim to achieve this in the minimum time. At the same time, the sustained capability, in peacetime, of fulfilling the wartime aim will constitute the major deterrent force to global war.”

This official definition shows that whatever changes are envisaged in the conduct of war, the basic aim of strategic airpower remains unaltered. Strategical changes will be mainly those forced on us by weapon development and political considerations.

Future Strategy

In order to wrest the initiative from the enemy, our future strategy will demand an immediate and powerful offensive to obtain air superiority. There will be no time for a prolonged battle and a decision must be forced quickly.

It is recognised that one of the most difficult and critical problems, and one which must be studied and prepared in peacetime, is the selection of target systems. The two broad categories of target systems are as follows:

War winning targets: Those targets, the destruction of which leads directly or indirectly to the enemy’s defeat.

Security targets: Those targets, the destruction of which will lessen the enemy’s assault against ourselves, and thus improve our ability to strike at war winning targets.

“Determining this balance between hitting the enemy harder than he can stand and securing our bases from which we strike is one of the most difficult strategic decisions.”

This was indeed the case in World War Two but could perhaps not carry the same weight in a nuclear war, or at least not in the initial stages. The vulnerability of the defensive systems and the primary requirement for air superiority would indicate an immediate strategic air offensive against security targets. This would be carried out to the heart of the enemy’s territory, to his peripheral air bases and to his launching sites. Attacks would be aimed primarily to destroy aircraft both in the air and on the ground, airfields and guided missile launching sites. One we had destroyed the enemy’s capacity to attack our main bases our strategic offensive could then switch to war-winning targets. Provided we had the ability to implement this second phase it is not improbable that the enemy would surrender rather than face the destruction that would follow.

To implement this strategy would require:

(a) A powerful strategic air force in being, equipped with the most modern aircraft and equipment available, and highly trained.

(b) A stockpile of nuclear and thermonuclear weapons.

(c) Strategically placed air bases, widely dispersed and preferably encircling the enemy for the purpose of opening a number of air “fronts”.

(d) Instant readiness for war.

(e) Maximum protection of our strategic air bases from all types of enemy attack.

(f) A highly efficient air intelligence capable of enabling us to pre-select target systems.

Granted the possession of all these requirements, we would be in a position to achieve our primary objective of air superiority, to which all else must be subordinated.
METHODS AND TECHNIQUES
With the swift attainment of air superiority as the foundation stone of our air strategy, and granted the material requirements, it now remains to consider some possible methods and techniques which may be employed in the implementation of that strategy.

Target Systems
Decisions on the selection of target systems and targets must be made before the outbreak of war. Accurate, detailed and up-to-date information must be available not only for the selection of targets but for a continuous revision of this selection. With the initial aim of air superiority in mind target information dealing with the potential enemy’s strategic bomber bases, missile launching sites, air defence systems as well as the available number of aircraft and missiles, including reserves, would be of vital importance. Anticipating a possible breakdown of our command system under nuclear war conditions it would be necessary to decentralise authority to dispersed bases and to allot pre-selected targets which could be attacked without delay.

Bombing Techniques
As the attack must be pressed home regardless of weather conditions or time of day or night, bombing would be almost invariably based on radar. Conventional maps would be replaced by highly detailed route and target radar maps. Aircrews could be allotted pre-selected individual targets thus enabling them to direct their training and techniques towards ensuring the complete destruction of that target.

Bombers will probably use the guided bomb as a means of avoiding enemy defence systems. Current developments indicate that the bomb, either rocket or jet propelled, is likely to have a speed of 1,000 miles an hour and a range of up to 100 miles. Air to air missiles may also be carried as defensive armament.

Radio Counter Measures
Radio counter measures will be of even greater importance than in World War Two. A Radio Counter-Measure component of the strategic air force must be developed to assist our manned bombers and prevent enemy interference with unmanned bombers or long-range ground to ground missiles. Attacking aircraft could carry a mass of RCM equipment intended to trigger missile warheads prematurely or to mislead their guidance systems, in an effort to neutralise air defence systems.

CONCLUSION
In viewing the employment of strategic air power we have considered briefly some of the background material which could affect the shaping of our strategy. This material included the parts played by the scientist, the thermonuclear bomb, the manned bomber and guided weapon systems. Also considered were certain aspects of offence and defence, some general strategical factors and that extremely important subject, air intelligence. From this background material it has been possible to establish the primary importance of strategic airpower, and broadly, to formulate some of the requirements, possible strategy, and likely techniques for its employment in a future war. It is contended that we can prevent total war by our threat, and our ability, to use the full force of thermonuclear warfare. Used as the “big stick” this threat may even prevent local war, but at least it should succeed in isolating and containing such wars. The strongest arm to wield the stick is undoubtedly strategic airpower.
Epilogue

The aeronautical seer who peers into the future will, no doubt, make as many mistakes as have the prophets and experts of the past. From 1912, when German officers declared that aircraft belonged more fittingly to a circus display than to serious military planning, until the present day, the prophets have been wrong many times. There were those in Britain who opposed the development of the helicopter, the American staff officers who resisted the development of strategic bombing in the 1930s. Those who in 1940 passionately advocated the dive bomber as the future key to army support later had to admit the superiority of the bomb — or rocket — carrying fighter. Some went on record regarding the invulnerability of the battleship to air attack, and at the beginning of World War Two few believed that fighters would be able to escort bombers from Britain to Berlin and back.

In theory, air power may be nearer to the push–button stage and therefore more predictable. There is, however, one major reason why air power may be more unpredictable than ever in the future. It is the fact that electronic equipment will have more and more influence on air affairs. The effectiveness of radio and radar depends initially on the quality of design and production, but subsequently depends on two unknown factors which are just as vital. First is the general standard of servicing and operating the equipment, and secondly there is the unknown factor of how skilful and effective the radio counter–measures of the enemy will be. Only time will provide the answer.

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INTRODUCTION

Throughout history, conflict and warfare have had a profound impact on the advancement of technology,\(^1\) from the use of longbows and catapults during the middle ages, to the development of aircraft and tanks during the First World War. Conversely, advances in technology have also had an effect on approaches by states as to how they deal with conflict; for example the development of nuclear weapons in the 1940s and the proliferation of such weapons dictated much of the global approach to conflict resolution for the subsequent 50 years.\(^2\) This has been no more apparent than during the Cold War, where the two global superpowers of the time, the United States of America (USA) and the Union of Soviet Socialist Republics (USSR / Soviet Union), were investing billions of dollars to improve national and state security. Simultaneously, advances in military aviation technology progressed at a rapid rate.\(^3\)

Under the leaderships of Ronald Reagan in the US, and Mikhail Gorbachev in the Soviet Union, the 1980s saw the Cold War enter its final stages,\(^4\) eventually leading to its end in 1991 with the dissolution of the USSR.\(^5\) Because of each leader’s approach to the conflict, this period saw significant global change and upheaval, be that political, economic, social or technological. Due to the bipolar nature of global security, international relations, and economics during this period, advances in air power and aviation technology were effectively focussed along the ideological viewpoints of each of the two superpowers, and closely aligned with their approaches to state security.

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\(^3\) J. Williams, *A History of Army Aviation: From Its Beginnings to the War on Terror* (New York, iUniverse, 2005).


US AND SOVIET COLD WAR POLICIES

January 1981 saw the election of Republican Ronald Reagan as US President, who would stay in the position for the following eight years. Although he would eventually be replaced by George Bush before the end of the Cold War, Reagan’s period as president was instrumental in bringing the conflict to a resolution. Reagan’s policy toward the Soviet Union was a move away from the previous policy of détente between the two superpowers, which had existed for the prior 10 years, and more toward an escalation of the conflict. After the Soviet invasion of Afghanistan in 1980, Reagan denounced the Soviet Union, stating in an address to the UK Parliament in 1982 that “the forward march of freedom and democracy will leave Marxism–Leninism on the ash heap of history”, believing a buildup of armed forces and military technology to be the most effective method of seeing the collapse of communism. It was deemed that technology could be used to make nuclear war unfeasible; the announcement in 1983 of the Strategic Defence Initiative (SDI), a system of ground and space based weapons, proposed to protect the United States and its interests from attack by nuclear missiles fired from within the Soviet Union. Although much of the talk of SDI was bravado and propaganda (the programme itself was theoretically unattainable), if implemented, this defensive strategy would have allowed a pre-emptive strike on Soviet positions with little threat of retaliation.

The Soviet Cold War policy during this period was somewhat different. The rule of Leonid Brezhnev came to an end due to his death in 1982. Brezhnev had ruled the Soviet Union since 1964 and put in place a system of principles known as the Brezhnev Doctrine, which was used to ensure the security of communist nations and effectively meant that any country that was a member of the Warsaw Pact could never leave or in any way depose the ruling communist party. The principles of this doctrine led to even closer Warsaw Pact inter-state cooperation, and were so broad that it was even used to justify the invasion of Afghanistan in 1980. After Brezhnev’s death, the Soviet Union went through a major transition period under the leadership of Yuri Andropov and Konstantin Chernenko, which very much resembled the period under Brezhnev with huge military spending impacting large parts of the economy. This interregnum period led to the eventual rise to power of Mikhail Gorbachev, whose policies of reform and diplomacy would be a major factor in bringing the Cold War to a close. Gorbachev served as General Secretary of the Communist Party of the Soviet Union, from 1985 until 1991 when the party was dissolved, and his primary goal as head of state was to revitalise the Soviet economy after the period of decline under Brezhnev’s tenure and the interregnum period. As a result, he called for rapid technological modernisation and increased productivity, as well as attempting to reform the Soviet bureaucracy to be more efficient.

While most of his emphasis was on domestic policies of openness and restructuring (with respect to foreign

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6 Matlock, Reagan and Gorbachev: How the Cold War Ended.
10 Colloquially known as ‘Star Wars’.
engagements during this time), Gorbachev sought to improve relations with the West by establishing close links with several Western leaders, including Reagan, to try and reduce Cold War tensions. According to his own memoirs, after the Geneva Summit of November 1985, although no resolutions were reached regarding international relations between the two superpowers, Gorbachev and Reagan had struck up a personal friendship and decided to hold further meetings in the hope of de-escalating tensions. In 1986, Gorbachev made a series of announcements, many in agreement with Reagan after further talks, including a proposal for the elimination of intermediate-range nuclear weapons in Europe, a strategy for eliminating all nuclear weapons within 10 years, and a process of withdrawing troops from Afghanistan. Nonetheless, many scholars, such as Matlock, criticized Gorbachev for taking too long to actually withdraw Soviet troops from Afghanistan, claiming that he still held on to a number of the old Soviet policies.

Although Gorbachev and Reagan did become close over this period, there were still some trust issues between them. Gorbachev was very much concerned by Reagan’s build-up of military forces and the development of SDI, feeling that Reagan was not as sincere in these agreements as he was. This meant that many of the policies and initiatives outlined during this period did not take immediate effect and others, such as the elimination of nuclear weapons, never actually occurred. Because of this shared distrust, each party was still investing huge sums of money into developing their respective militaries and advances in technology, particularly aviation technology.

and air power, progressed almost exponentially. During this period, two major aviation technological advances began to appear; stealth technology and thrust vectoring. 

STEALTH TECHNOLOGY / LOW OBSERVABLE AIRCRAFT

One of the major aviation advances of this time was in stealth, or low observable technology. This is a military discipline that covers a range of techniques to make vehicles such as aircraft, missiles or ships virtually invisible to standard detection methods such as radar or infrared sensors. Stealth aircraft use these technologies to reduce reflection of radar waves and visible light, as well as reducing heat signature, in order to avoid detection by enemy detectors. Development of stealth technology began in 1958, when the US attempted to prevent radar tracking by the Soviet Union of its U-2 spy planes. Although this experiment proved unsuccessful, later on during the 1960s and 1970s, air battle losses during the Vietnam War and the Israeli Yom Kippur War led the US Defence Advanced Research Projects Agency (DARPA) in 1974 to create a study into developing low observable aircraft. Designers turned to using particular

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14 Gorbachev, *Memoirs*.
16 Gorbachev, *Memoirs*.
shapes that tended to re-direct radar waves, as well as using newly developed radar-absorbent material, to reduce detection.\textsuperscript{25}

The first true operational stealth aircraft was the Lockheed F-117 Nighthawk, which first flew in 1983. Universally known as the “Stealth Fighter”, it was borne out of the DARPA study and developed by Skunk Works, Lockheed’s ultra-secret advanced projects office.\textsuperscript{26} One of Skunk Work’s lead scientists was Denys Overholser, who developed some of the world’s first calculations involving the optimal orientation of flat surfaces for optical scattering - essential for developing stealthy aircraft.\textsuperscript{27} These calculations were the basis for Skunk Works to build the first stealth prototype, the ‘Have Blue’, the precursor to the Nighthawk.

During the late 1970s, ‘Have Blue’ went through a number of top-secret test flights to determine the effectiveness of its design against traditional detection techniques (radar, infrared etc.). Despite a number of setbacks, including crashes and pilot injuries, ‘Have Blue’ achieved all of its test objectives, particularly with regard to low observability, and the program ended in 1979 as a great success. This led DARPA and USAF to initiate production of the F-117, a stealthy strategic attack aircraft.\textsuperscript{28}

Due to the unusual flat surface design of the F-117 it is highly un-aerodynamic, so as a result it cannot fly at supersonic speeds and is comparatively non-manoeuvrable. It is also aerodynamically unstable and requires a sophisticated fly-by-wire control system to keep it in the air. As such, its use in traditional air combat roles is limited and its primary role is one of strategic bombing.\textsuperscript{29} This enabled United States Air Force (USAF) strategists to effectively plan surgical strikes on some of the world’s most heavily defended targets without the risk of being discovered and shot down.\textsuperscript{30} This fit with the US Cold War policy at the time of being in a position to launch a pre-emptive strike against fundamental and heavily protected targets within the Soviet Union. This policy had also allowed funding to be redirected into the programme in order to get a prototype turned into a production aircraft in just four years.\textsuperscript{31}

\begin{itemize}
\item \textsuperscript{25} B. Rich & L. Janos, \textit{Skunk Works}. (Boston: Little Brown, 1994).
\item \textsuperscript{26} Rich & Janos, \textit{Skunk Works}.
\item \textsuperscript{27} Rich & Janos, \textit{Skunk Works}.
\item \textsuperscript{28} Even though the F-117 was commonly referred to as the ‘Stealth Fighter’, it was a purely attack aircraft and had no air-to-air fighter capability.
\item \textsuperscript{29} While the F-117 has retired from operational use, the US Congress requires the F-117 fleet to be stored in such a condition which will allow a future recall to active service.
\item \textsuperscript{30} Crickmore, \textit{Lockheed F-117 Nighthawk Stealth Fighter}.
\item \textsuperscript{31} Rich & Janos, \textit{Skunk Works}.
\end{itemize}
Due to the extreme secrecy surrounding the use of stealth technology by the US, the Soviet Union did not gain access to it and was never able to develop or produce a stealth aircraft during the Cold War. The first truly Russian stealthy aircraft would not appear until the early 21st century.\textsuperscript{32}

\textbf{THRUST VECTORIZATION / SUPER-MANOEUVRABILITY}

Another major technical advance in aviation technology during this period was the development of thrust vectoring. Thrust vectoring is a technology that allows the alteration of the direction of thrust from an engine away from the centreline, and transfers some of the force to another axis.\textsuperscript{33} The most famous use of thrust vectoring was in the Pegasus engine, which creates the Vertical / Short Take-Off and Landing (V/STOL) characteristics of the Harrier Jump Jet, whereby the thrust is directed vertically from horizontally to allow the aircraft to hover.\textsuperscript{34} Although the original Hawker Siddeley Harrier was developed during the early 1960s, and its first flight was in 1967, many within the US military did not believe that the technology would be worthwhile in combat operations, and so held back US involvement in the programme. The Harriers’ first combat operations were during the Falklands War between the United Kingdom (UK) and Argentina over the administration of the Falkland Islands in 1982, and the advantages of thrust vectoring were seen around the world. The Harrier proved formidable against faster Argentine aircraft in combat operations\textsuperscript{35} and Admiral Sir Henry Leach, First Sea Lord of the UK, said at the time of the conflict: “Without the Sea Harrier there would have been no Task Force. Operating from carriers proved the concept of V/STOL air operations in independent amphibious operations”.\textsuperscript{36} The two superpowers began to take notice.

The Harrier was originally manufactured for the Royal Navy and RAF by Hawker Siddeley, an aerospace company based in the UK. Once the US Marine Corps had begun to recognise the potential of thrust vectoring as used in the Harrier, McDonnell Douglas and British Aerospace began to develop a second-generation Harrier for the Marines\textsuperscript{37}, which entered service in 1985.

\begin{figure}[h]
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\caption{Sea Harrier Operations Falklands War}
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\textsuperscript{33} Ashley, \textit{Thrust Vectoring: A New Angle to Air Superiority}.
\textsuperscript{34} P. March, \textit{The Harrier Story}. (Stroud: History Press, 2007).
\textsuperscript{36} March, \textit{The Harrier Story}, 52.
\textsuperscript{37} L. Norden, \textit{Harrier II, Validating V/STOL}. (Annapolis: Naval Institute Press, 2006) and March, \textit{The Harrier Story}. 
The development was initially intended to be a joint venture with Hawker Siddeley, the original designers, however financial and political reasons forced British Aerospace to take over. The improvements to the new version of the Harrier incorporated a new composite wing and advanced aerodynamics to enhance the lifting capabilities, but did not include any work on the Pegasus engine. Therefore, no further development of thrust vectoring was required. As well as the ability to purchase the technology from the British, the US focus at the time was on stealth, which, during the 1980s was mutually exclusive from thrust vectoring due to the inherent aerodynamic instability of stealth aircraft. As a result, there was little necessity for the Americans to further this technology. Due to enmity between the UK and the USSR at the time, the Soviet Union was unable to acquire any form of thrust vectoring technology and had to develop their own.

Soviet development of thrust vectoring engine nozzles led to the development of an aviation advancement known as ‘super-maneouvrbility’, first introduced in Sukhoi Su-27 and Mikoyan MiG29 fighter aircraft of the 1980s. Super-maneouvrbility is the ability of aircraft to perform manoeuvres that would not be possible by aerodynamics alone, by modifying the geometry of the exhaust nozzle to alter the angle and direction of an engine’s thrust to a direction other than directly to the rear. Unlike the Harrier, however, it did not limit aircraft to purely V/STOL capabilities. Soviet emphasis during this period was on developing close-range, slow-speed, super-maneouvrbable aircraft as it was believed that super-maneouvrbility was essential in classical air combat / dogfight situations, which are normally conducted at high speed. If the first shot of an engagement misses its target the combat will become protracted and both aircraft speeds will be reduced and neither aircraft may be in a position to fire off a second shot. Super-maneouvrbility allows an aircraft to turn within very tight circles in only a few seconds and fire off another shot. This reflects the Soviet approach to security during this period, as their concern and fear was with the American build-up of military hardware and their potential to launch a pre-emptive strike. The belief was that they could use highly maneouvrbable aircraft to fend off any US attack, should it ever occur.

38  Rich & Janos, Skunk Works.


41  Super-maneouvrbility enables the aircraft to continue travelling in one direction while the nose can be positioned in a totally different direction. For instance, some super-maneouvrbable aircraft can rotate about its own axis (perform a head-over-heels loop) while continually travelling in a straight line upwards. This ability allows the pilot to keep the nose of the aircraft pointed towards an adversary (for the purpose of weapons engagement), without any delay in turning ability incurred through needing to overcome overall mass momentum.
FUTURE PROGRAMMES

Although much of the focus of the US, in terms of aviation technology during this period, was on the further development of stealth aircraft for use in pre-emptive strikes against the USSR, the emerging threat of Soviet super-manoeuvrable aircraft such as the Su-27, led to the US developing the Advanced Tactical Fighter (ATF) programme, a next-generation air superiority fighter that would combine the technologies of stealth, super-manoeuvrability and supercruise.\(^{42}\) Supercruise is the sustained, efficient supersonic flight of an aircraft without the use of afterburners, the primary method of reaching supersonic speeds in military aircraft, giving the aircraft greater endurance at supersonic speeds. According to Pike, the ATF project ended in August 1991, reportedly costing $US 86.6 billion.\(^{43}\) Although no aircraft went into production during this period as a result of the programme, it does indicate the effect the Cold War had on the development of new technologies in aviation and the kinds of money being spent at the time trying to improve state security.

In response to the ATF programme, in the late 1980s, the Soviet Union put forward a project to develop a next-generation fighter aircraft intended to enter service in the 1990s, which would eventually replace the MiG-29 and Su-27 in frontline military aviation service. This was known as the Perspektivny Aviatsionny Kompleks Frontovoy Aviatsii (PAK FA) programme\(^ {44}\), and like the ATF looked to develop a fighter aircraft that would incorporate supercruise, super-manoeuvrability and stealth,\(^ {45}\) the first time that a Soviet aircraft would possess this latter feature. Again, like the ATF, due to the proximity of the programme to the end of the Cold War in 1991, no aircraft went into production during this period. Significant research and development activities did, however, occur at this time, and development of the aircraft carried on well into the 21st century.

CONCLUSION

During the latter stages of the Cold War, US and Soviet approaches to state security differed significantly. Under the Reagan administration the United States believed that communism as a concept should be eradicated, and spent billions of dollars developing a technologically superior military, so that in the event of open hostilities with the Soviet Union it would be able to use that technology to prevent a nuclear war. This policy pushed forward the development of stealth aircraft, such as the Lockheed F-117, which would allow the US to launch a strategic pre-emptive strike against the USSR without risk of being detected. On the other hand, the Soviet policy was more domestic. After years of economic decline under Brezhnev and his immediate successors, Gorbachev’s liberal reforms were aimed at re-structuring his failing country, rather than further antagonising the US and its allies. Fear over the increase of US military spending and introduction of new technologies led to a more defensive posture, and a belief that super-manoeuvrable aircraft, such as the Sukhoi Su-27, could be used to defend Soviet airspace from any American offensive. During the last years of the conflict, both sides were developing next-generation fighter aircraft combining stealth, super-manoeuvrability, and supercruise, primarily in response to perceived aviation threats from the other side. The end of the Cold War, however, halted development on these programmes and neither of them saw any action during this period of time.

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\(^{44}\) Literally translated as Prospective Airborne Complex of Frontline Aviation

US and Soviet approaches to State Security and Aviation Technology during the latter stages of the Cold War

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In a speech to the RUSI Air Power Conference in May 2008, Lieutenant General Graham Lamb¹ made an amusing observation about the planetary origins of soldiers and airmen. It preceded a serious point; that diverse cultures, ethos and perspectives are a source of both strength and friction. No serious soldier would deny the value of mobility and lift or surveillance and reconnaissance, but the wider utility of air power in irregular warfare is less obviously clear. The current air power expression of characteristics and roles work well enough for conventional operations, but says too much about how air power works and has lost the clarity of what air power actually does. This paper outlines the philosophy behind doctrine emerging from the Development, Concepts and Doctrine Centre for air-land operations. It proposes a new definition for and expression of air power, articulates a theory of coercion and develops principles for air-land operations.

THE SHIFTING BALANCE OF CONVENTIONAL COMBAT POWER

The character of warfare is changing, due in part to the overwhelming conventional combat power developed by Western nations in general and the US in particular. Adversaries respond with irregular warfare, including insurgency, disorder, criminal activity and terrorism. They also use irregular and conventional tactics to create hybrid warfare, like that used by Hezbollah in 2006. Tactical engagements are often among populations and increasingly in the urban environment, where situational awareness is no longer enough to support complex operations. Commander of the Field Army believes that we need situational understanding. The motivations and fears of all actors are as important in irregular warfare as awareness of enemy force dispositions and intentions.

THE AUTHOR

AVM Paul Colley retired from the RAF in late 2012. During his RAF service he saw operational service in both Gulf wars and rose through the ranks to become Assistant Chief of the Defence Staff in 2010. AVM Colley was the first Director of Concepts and Doctrine within Joint Forces Command and, post-retirement, has acted as a senior advisor to the Joint Services Command and Staff College.

¹ Commander of the (British) Field Army.
The historic role of land forces has been to close with and engage the enemy and to take and hold ground. For maximum effectiveness of land forces in major combat operations, land commanders have traditionally demanded expansive areas of operation. In post-Cold War combat operations, there has been a shift in the relative roles of ground and air combat power. In conventional operations, all-weather precision air attack can now decisively shape the operational level of warfare. Land power exploits air power’s operational effects and dominates at the tactical level because, despite huge improvements in intelligence, surveillance and reconnaissance, uncertainty reigns in close combat. Even with advances in sensor technology and improvements in command and control for time sensitive targeting, the majority of air systems are not optimised to find, track and engage fleeting targets amongst wider populations. In 2006, Hezbollah inflicted an unprecedented strategic failure on Israel. The Israeli Air Force successfully completed its tasks in the 2006 war and with considerable tactical skill, but failed to deliver the anticipated operational or strategic success through an air campaign.

When combined with political indecision, it led to strategic failure.

As the levels of warfare blur, so to have the air power roles. Many targets formerly associated only with the tactical level of warfare now have direct links to the strategic level. For example, precision air attack in Iraq and Afghanistan in 2008 is confined to well-controlled tactical battle space and against very limited target sets. Yet its significant tactical effects strongly resonate – for better or worse – within local populations, which are invariably strategic centres of gravity that are highly sensitive to the asymmetric application of force. Air power promises direct attack of strategic targets and low risk of friendly casualties, but stand-off through technology can be perceived as a blunt instrument for a hearts and minds campaign. Although there is a place for discrete air attack of strategic targets, air capabilities will be over-sold and underemployed if the difference in air power utility for conventional combat operations and irregular warfare is misunderstood.

Land power will normally determine the enduring outcome of conflict, even where air or sea power is the decisive instrument. Armies’ traditional strengths have been the ability, by threat, force or occupation, to gain, sustain and exploit control over land, resources and people. Fixed wing air power is more flexible than long-range precision artillery or attack helicopters, because airmen can switch between targets at relatively short notice across an entire theatre of operations. However, with relatively small numbers of aircraft now serving multiple theatres of operation, some land commanders have concerns about the assured delivery of air effects. Much contemporary land warfare is relatively static, especially in urban areas. With organic accurate direct and indirect fire support, some soldiers question the relevance of using heavy air weapons in towns and cities.
Even where ground commanders need air power, it can be resource-intensive to coordinate. Yet organic indirect fire support is relatively inflexible where the theatre of operations is expansive and the density of friendly forces low. Attack helicopters are also vulnerable to small arms. However, there is capability still to be unlocked at the seam between air and land power, not through technical and tactical interoperability, where we are investing well in equipment and training, but by better understanding how air power might achieve or support decisive conditions, particularly in irregular and hybrid warfare. The real advantage of surface capability enhanced by air power (and vice versa) is more profound than a simplistic supported or supporting relationship.

A LITTLE BIT OF HOW AIR POWER WORKS

It is worth reflecting briefly on some aspects of how air power works, starting with air strategy. A combined air operations centre is optimised for high volume tasking and large scale mechanical integration of plans. In conventional operations, a strategic air planning process drives it, but current warfare is dominated by constant requests for tactical air support from multiple theatres of operation. This makes strategy difficult, because adversaries are adapting their tactics so quickly in theatre that only a local headquarters has the ability to sense and respond in context. There may be unifying themes across multiple theatres of operation, for example international terrorism. However, there can be no meaningful unified air strategy to address operations as disparate as those in Iraq, Afghanistan and the Horn of Africa. Air strategies are in reality being driven from within the specific theatres of operations.

History has consistently demonstrated the value of collocated headquarters. The Montgomery-Tedder combination in the North African campaign is widely referenced as a strong catalyst for enduring doctrine. Collocation resolves tension, exploits the strengths of different perspectives and better overcomes the naturally dissimilar tempos of air and land planning cycles. Commanders should position land and air component headquarters together or within easy reach wherever possible. The doctrine needs judgement in its application. Where headquarters cannot be collocated, the planning effort must be, using mobile planning teams for deliberate planning. Embedding expert and well-trained detachments of land and air staffs in counterpart headquarters is vital when headquarters are geographically separated. The air staffs in land headquarters enable rapid planning. The commanders who donate liaison officers to other headquarters must make clear to what extent their charges are empowered to commit resources and take decisions. The structures and processes to achieve this are within current air doctrine.

The UK philosophy of command promotes decentralisation for speed of action and initiative. Commanders ensure that subordinates understand intent and then exercise a minimum of control over them, commensurate with experience and ability. Upholding the philosophy is difficult for an air commander in widely dispersed coalition operations, yet the imperative for decentralisation was rarely greater than now. The cardinal air control principle of centralised control and decentralised execution is valid. However, in irregular warfare or even conventional operations unfolding at pace, commanders who fail to emphasise the primacy of decentralised execution — and to adapt structure and process accordingly — risk inviting adversaries to operate inside coalition decision cycles. Decentralisation is the only way to achieve responsiveness compatible with the character of dispersed operations and irregular warfare. Some scarce high value air assets, such as intelligence platforms and air refuelling aircraft must be centrally controlled, because demand will always outstrip supply.
But if airmen do not sensibly interpret the air command and control mantra, ground forces will lack the assurance that they seek and naturally argue for organic air support. The paper now articulates the essentials of air power in a contemporary context, so that airmen can more safely ‘under-promise and over-deliver’ and so that soldiers can better appreciate how to integrate air operations into planning at all levels.

THE UTILITY OF AIR POWER

All military strategies except total destruction seek to influence the behaviour of people. Influence is invariably an ultimate goal at the strategic level of warfare, but it also has utility at the tactical level of all contemporary warfare. An understanding of coercion is therefore vital, because without mastery of coercion, there is no mastery of warfare; coercion is central to the threat or use of all military force and crucial for developing contemporary air power strategies. To coerce is to ‘persuade an unwilling person to do something by using force or threat’ and it is closely linked to deterrence. Air power’s current definition may be outdated. The new one proposed below embraces the primacy of influence in air strategy and the paper subsequently describes a theory of coercion.

Air power is the ability to project power from the air in order to influence the behaviour of people or the course of events.

Airmen are well versed in air power characteristics and the Future Air and Space Operational Concept describes Core Air and Space Power Roles. These remain useful, but tend to say as much about how air power works as what it can do. This paper will express what air power can do, cast as four fundamental roles within the Joint Action doctrinal framework. The framework helps visualise the proper relationship between manoeuvre, fires and influence, which is central to coercive strategy.

Joint Action is the deliberate use and orchestration of the full range of available military capabilities and activities to realise effects.

Air power achieves influence in many ways, from promoting international relations to managing crises. When engaged in combat, shattering an opponent’s cohesion and breaking his will have their roots in doctrine for conventional combat operations, where they remain valid. However, the emphasis in irregular warfare is more often on discrete application of force to support a broader influence campaign. The evolution of planning at the strategic and operational levels of warfare (and recent experience at the tactical level) supports a shift away from pure destruction of an enemy’s fighting power. Where information operations once supported combat operations, influence can dominate the contemporary approach and it requires a more subtle and nuanced application of fires, influence and manoeuvre. Air power delivers most fires through precision attack. However, it also has non-lethal capabilities. When properly integrated and synchronised into an overall scheme of manoeuvre, fires achieve influence and the bridge between the two is most often achieved by understanding the theory and practise of coercion.

Fast jets are well suited to rapid manoeuvre and surprise. Helicopters and larger fixed wing aircraft also move at pace and significantly enhance ground manoeuvre. However, air power’s greatest contribution to freedom of air and ground manoeuvre is through control of

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2 Concise Oxford English Dictionary.

3 DCDC Joint Doctrine Note 1/07 Joint Action.
Soldiers are from Mars and airmen are from Venus: does air power do what it says on the tin?

Two air power capabilities are crucial for Joint operations, but not proposed as air power roles, because they are enablers and not outputs. Those capabilities are position, navigation and timing, and air command and control. Both enable battle space management. The US Global Positioning System invariably provides position, navigation and timing and, although vital for many battle space functions, including the synchronisation of communication networks, it is transparent to most users. Air command and control has a major bearing on the effectiveness of air power and is complex, particularly in coalition operations. It is therefore described later in the paper. However, what air power actually does can be boiled down to four fundamental roles: Control of the Air; Rapid Mobility and Lift; Intelligence and Situational Awareness; and Coercion.

The active control of military airspace above Fallujah in 2004, to enable high tempo air support to ground urban combat operations, and of the airspace above Baghdad and Basra in 2008, to integrate military and civil air operations, was underpinned by air control capabilities. It is rarely possible to achieve complete control of the air; although fixed wing aircraft may often enjoy considerable freedom from most threats after successful counter-air operations, adversaries invariably contest the lower airspace with man-portable missiles and small arms.

Rotary and large fixed wing aircraft are particularly vulnerable to such threats. Air control operations are highly specialised and tactical doctrine best describes how it is done. Operational level Joint doctrine simply makes the point that air control is an absolute pre-requisite for Joint operations.

ROLE 1: CONTROL OF THE AIR

If we lose the war in the air, we lose the war, and we lose it very quickly.\textsuperscript{4}

Without control of the air, operational success is fatally compromised. Control of the Air enables freedom of air and surface manoeuvre and therefore the ability of commanders to retain the initiative. Control of the skies above Northern and Southern Iraq for a period of 11 years denied Iraq much freedom of surface manoeuvre by containing air threats and an integrated air defence system. It also paved the way for lower risk major combat operations in 2003. As a result, coalition soldiers did not look up at the sky in dread in the way that those who they fought did. Even where air threats are largely absent as a result of successful air control operations, control still allows the successful integration of military and civil air into Joint, multinational and inter-agency plans.

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ROLE 2: RAPID MOBILITY AND LIFT

Air mobility and lift enable the global, regional and local deployment of people and materiel. With acknowledged limitations in payload compared with surface lift, it is nevertheless a fast way to deploy and sustain forces. Like air control, mobility and lift is a fundamental enabler of surface manoeuvre. It has particular utility for light and special forces and is vital for casualty evacuation from austere locations. Where risks to life in combat are high, intra- and inter-theatre air mobility strongly underpins the moral component of fighting power; it is often the only way to get wounded soldiers to specialist medical support quickly. In 2007, there were over 40,000 tactical airlift sorties flown in Iraq. In Afghanistan, there were over 10,000 tactical airlift sorties and more than 500 air drops. Air lift can be used for discrete disaster relief operations, but has also successfully been used to achieve other positive influence within local populations, for example by supporting development projects and evacuating local casualties to medical facilities.

\textsuperscript{4} Montgomery.
Large fixed wing aircraft like the C-17A Globemaster and C-130J Hercules are capable of both inter- and intra-theatre lift. A C-17A can deploy from the UK to areas of operation in days or even hours. A C-130J can reach from its forward operating bases to typical areas of operation in hours or even minutes. Whilst operations in and out of main operating bases allow maximum effectiveness for handling large numbers of people and high volumes of materiel, even the largest fixed wing transport aircraft can operate independently of main operating bases where the need is urgent and the ground threat manageable.

All air transport aircraft are vulnerable to ground fire, including small arms, particularly when at lower speeds and operating close to or on the ground. Where threats to surface movement are high, for example through improvised explosive devices, tactical fixed wing aircraft can re-supply ground forces at lower risk than ground convoys by using precision air drop.

**Precision air drop**

In 2007, RAF C-130Js in Afghanistan conducted low altitude night missions to re-supply forward operating bases using an air dropped container delivery system. Between May and December 2007, crews delivered nearly 1000 containers containing 800 tons of food, water, ammunition, fuel, generators and even power plants for CVRT fighting vehicles. The C-130J will soon be capable of precision air drop from even greater height, further improving its survivability and utility by allowing precision daylight delivery of materiel over hostile areas.

Helicopters like the Chinook HC2 and Merlin HC3 are the tactical mobility workhorses. Typically operating at lower heights and speeds than fixed wing aircraft, they nevertheless enable rapid tactical movement of people and materiel. They are fundamental enablers of ground manoeuvre and surprise, allowing troops to circumvent difficult terrain and to bypass ground threats to troop movement and re-supply. Helicopters are invariably in great demand and often in short supply.

**Rotary wing aircraft – tactical workhorses**

In June 2007, the crew of a Merlin HC3 extracted a seriously wounded soldier from Basra at night under sustained small arms fire. It was assessed that, without the rapid insertion of the Immediate Response Team, the soldier would have died within 15 minutes.

In one month early in 2008, Joint Helicopter Force (Afghanistan) helicopters flew 293,000kg of cargo and over 6000 troops within its Area of Operations. Helicopters supported Immediate Response Teams and High Readiness Forces 24hrs a day and were on standby for casualty evacuation and the Quick Reaction Force to support Troops in Contact.
Soldiers are from Mars and airmen are from Venus: does air power do what it says on the tin?

**ROLE 3: INTELLIGENCE AND SITUATIONAL AWARENESS**

Contemporary operations place an ever-increasing emphasis on the weight of effort dedicated to the find function. Even with a good capability to direct, collect, process and disseminate information, there are limitations to what air and space systems can find. However, air power contributes enormously and, with current systems, including long endurance unmanned air vehicles, provides an almost *unblinking eye*, albeit sometimes with high resolution and narrow fields of view. Video and other forms of air-derived information have proved to be crucial enablers for irregular warfare. However, staff at all levels must integrate air and surface inputs to promote situational *understanding*. Because much information is time sensitive, a cardinal principle is to integrate information at the lowest practical level of command. The finest granularity and texture of information often comes from the ground; this is what tends to unlock the pathways from awareness of something happening to understanding what it means.

The airman’s vantage allows sensors to provide an almost unhindered view across the electromagnetic spectrum. Air and space sensors can detect and identify innumerable objects, including individual people. They can map terrain, infrastructure and even patterns of behaviour, routinely penetrating poor weather and overcoming concealment techniques. Sensors also intercept other signals, which help build the intelligence picture. However, it is difficult to plumb the depths of strategic nuance and tactical complexity from the air. Finding some things is quite simply a job for boots on the ground rather than eyes in the sky, because the best sensor is often the person familiar with the physical and social terrain. Otherwise, imagery and signals create an illusion that you understand what is going on.

Air intelligence, surveillance and reconnaissance provide situational awareness, whether for operational level commanders taking a theatre-wide perspective or individual soldiers exploiting live intelligence feeds. Because land warfare remains fundamentally uncertain due to the human, psychological, political and cultural dimensions of conflict, air technology will not lift the fog of warfare. Nevertheless, several thousands of intelligence, surveillance and reconnaissance sorties flown in Iraq and Afghanistan indicate the priority that commanders are now placing on the *find* function of contemporary warfare; and on the part that air power plays. The essence of good surveillance is to provide both broad context and detailed information. Airmen can provide a measure of both, but land and air sources must be closely integrated to build understanding from awareness.

**The limitations of surveillance – Operation ANACONDA**

In 2002, commanders in Afghanistan planned an attack against a concentration of Taliban in the Shab-i-Kot valley. Intelligence preparation was extensive and focused considerable surveillance effort (most of it from air and space) on a relatively small target area. Yet US infantry made the initial assault by air almost directly on top of undetected enemy positions. Soldiers came under immediate fire from small arms, mortars, rocket-propelled grenades and machine guns as their helicopters landed. Attack helicopters providing direct fire support were hit and rendered inoperable. Units were pinned down by enemy fire and many of the wounded could not be extracted until the following night. As the fight developed, it became clear that a large number of the enemy positions and hundreds of al-Qaeda fighters had gone undetected.
ROLE 4: COERCION

Air power’s reach is measured in hundreds or even thousands of miles and responsive precision attack at range is one of air power’s greatest strengths. It provides an ability to coerce an adversary by holding him at continuous risk. The capability to attack at will supports the credibility of diplomatic warning and military signalling, including operational and tactical non-kinetic shows of force. If force is used, it too can be graduated and the ability to escalate is an important part of coercive strategies. Commanders can use precision attack to deter opponents and if necessary destroy capabilities, punish adversaries or deny courses of action. However, the ultimate goal at the strategic level of warfare is invariably to influence somebody, therefore precision attack is a means to an end.

Coercion underpinned by precision attack can be used at the strategic, operational or tactical levels of warfare, but it no longer helps to define air roles associated only with one level of warfare. Air platforms are extremely flexible and the levels of warfare are so blurred in contemporary operations that artificial boundaries undermine the essential clarity of air power’s coercive capability; the notion that particular aircraft have only strategic or tactical roles inhibits creative thinking. For example, large fixed wing bombers designed for strategic attack are equally capable of tactical close air support if integrated with surface forces. Conversely, short range tactical aircraft are capable of achieving strategic effect; it is the context in which they are used and how that matters. It is therefore better to accept that coercion is almost unlimited in its flexibility, because aircraft can attack an enormous range of mobile and static targets across multiple theatres of operation.

Precision air attack is so effective against conventional forces that it can be used in preference to land force-on-force engagements. In 2003, of nearly 20,000 targets hit during combat operations in Iraq, over 15,000 in the close battle were by air power. The percentage of air sorties flown in support of land increased from 55% in the first Gulf War to 78% in the second. Direct attack of land forces by air reduces friendly casualties. Because attack helicopters in general and land-based tactical missile systems in particular have not proven as effective as fixed-wing aircraft in conducting deep operations, air component commanders should be supported where there are opportunities to attack lucrative conventional target sets. In these circumstances, Joint commanders can use land forces to manoeuvre against and fix enemy ground forces (and provide targeting support) so that air power can attack before land forces close to contact. This idea tends to draw a familiar response from advocates of traditional land warfare, but if we do not grip this idea, we will miss future opportunities to shatter an opponent’s cohesion in conventional warfare. It needs a change of mind set and a more serious progression of the old debate about which commanders control fire support coordination lines and where they are placed. It may also need some decent investment in friendly force tracking capabilities.

Planners should exploit air power’s speed and reach to create an emphasis on deep attack and interdiction wherever possible, attacking and disrupting enemy forces before they can engage in close combat. These are typically denial strategies, seeking to physically reduce the enemy’s ability to continue successfully or making his ultimate objectives unachievable. However, adversaries sometimes deliberately seek to engage in direct combat in order to create casualties and undermine political or public will. In the event that a land battle unfolds, land forces can of course exploit air power in the close battle by using traditional counter-land procedures, such as air interdiction and close air support.
In irregular warfare, particularly when an adversary chooses to fight in the urban environment, collateral damage and unintended effects are more likely. The more precise our weapons become, the higher the expectation of no collateral damage. Air power can execute so-called ‘surgical strikes’, but even a surgeon’s knife lets blood and creates scars. Proportionate air attacks are too often perceived as delivering brute force. Absent the means to defend against or respond to air attack, adversaries will use information strategies to project an image that asymmetry is a cruel overmatch. Although our adversaries create unhelpful media profiles when air weapons cause casualties, airmen are creating a small proportion of civilian casualties in contemporary warfare. This is arguably due to two factors: firstly, the standards of precision now possible; and secondly, the depth of education and training required to operate a combat aircraft. Like soldiers, aircrews are subject to considerable pressure in combat, but airmen often have a useful detachment from the intensity of ground combat and can more easily exercise discretion of weapon release. This is not to suggest that soldiers exercise less discretion, but the pressures and perspectives are very different; height and speed buy fast jet crews thinking time and they can be relied upon in contemporary operations for deliberate no drop decisions as much as their ability to hit the right targets. Therefore, air weapons have undoubted utility for irregular warfare, but planners and operators should not underestimate the potential for unintended psychological effects on the population, whose trust we seek to maintain when targets are in and among the local population. Technology may deliver ever-greater precision and control of direct effects, but the expectation of no collateral damage will increase in direct proportion to any new standards set. Nevertheless, coercion through precision air attack will continue to be one of the greatest asymmetric capabilities for surface commanders to exploit.

Urban and human terrain are vital ground in irregular warfare and the majority view is that there are fundamental differences between flying urban missions and those flown in other environments. The use of air power in urban operations is a big challenge, even where there are limited enemy air defences and no enemy aircraft. High density of friendly aircraft over an area of interest, such as operations over Fallujah in November 2004, requires intensive planning and coordination. It can be hard for an inbound attack pilot to build situational awareness and there can be a drastic difference in perspective between those on the ground and those in the air. The speed, operating height and turning circles of fast jets make it harder for aircrews to provide actionable information to ground units in urban operations; even with the most capable targeting pods, crews can struggle to assist in the pursuit of some mobile targets. One pilot in Iraq described tracking non-distinct vehicles in urban areas as the hardest thing he had ever done. However, a soldier sometimes needs to know only what is on the other side of a wall or round the next block and aerial
surveillance can be invaluable. Helicopters have excellent observation and tracking capabilities, but are vulnerable to small arms, particularly in daylight, as operations over Mogadishu, Iraq and Afghanistan have all demonstrated. However, attack helicopters have sensors and weapons that allow increased standoff and can increase survivability by operating from higher altitudes. The US AC-130 gunship can provide excellent close air support capabilities and often operates at night to increase its survivability.

The Spectre AC-130 Gunship

‘In the history of the 1st Battalion, Princess of Wales’s Royal Regiment (PWRR) in Maysan province in Iraq, Richard Holmes noted that: ‘[The AC-130] effect on morale was palpable…some of the 1 PWRR’s soldiers undoubtedly owe their lives to the ability of Spectre crews to understand the ground battle and weigh in with super-accurate fire at midnight in a burning town’.5

Fast jet close air support in urban operations is feasible, but demanding, therefore crews must be well trained and familiar with the local urban terrain. The principles are thorough training and planning, common reference systems and execution at the lowest practical level of command. Weapons can be used with discretion to support troops in contact and aircraft can generate useful psychological effects.

Air/land coordination in urban operations

Even with perfect procedures, the vast number of potential targets in urban areas makes air/land coordination of urban air attacks difficult. There were 800 building reference points for Fallujah in 2004, including separate designations for the four corners of some structures. This exceeded aircraft automated capacities for some aircraft, whose pilots had to use manual directories of designation codes.

There are non-lethal means for coercion, but techniques are classified and beyond the scope of this paper. However, air power’s established reputation for reliable precision attack can be used to generate psychological effects. It can be used for shows of presence and shows of force.

‘Air power was of great value. One night we were [grabbing a suspect] and the streets cleared as we were driving out, which meant something was about to happen. I had two F-16s fly low right down the street [which created] a tremendous noise, and we had no problems’.6

Although there are limitations sustaining psychological effect, there is little doubt about the immediate impact. Similar effects have been noted from attack helicopters in all current theatres of operation. In one example, Apaches flew deliberately across a compound, imposing an instant ceasefire. They circled for forty minutes and when they broke away to refuel, firing began again almost immediately. There was a concurrent reassurance to the friendly soldier on the ground:

‘So accustomed was I now to the sound of that aircraft and the implied power of its presence that I noticed instantly when it flew away. As so often during this confrontation, we were engaged almost immediately afterwards by machine-guns’.7

7 Mark Etherington, interview with Russell W. Glenn (RAND), 22 March 2006.

5 Richard Holmes, Dusty Warriors (in Countering Counterinsurgency Challenges 2006).
The reader may at this stage be slightly clearer about what air power can do. Nesting the capabilities in a Joint Action framework helps forge the essential link between fires and influence. An essential tool for air strategists to achieve that link is the theory and practise of coercion.

**THE THEORY AND PRACTICE OF COERCION**

Coercion is defined earlier in this paper and closely linked to deterrence. Deterrence seeks to *‘discourage someone from doing something by instilling the fear of the consequences’*. Thus, to coerce involves deterring people from or compelling them to do something. It depends not just on making an adversary’s intended behaviour appear unappealing. It should also make what you want an adversary to do look more attractive. Rewards can work as well as threats. The two forms of coercion (deter and compel) resemble each other more than they differ, but a good strategist should pay attention to both and this requires an understanding of personal motivations. Coercion works at many levels and can include, for example, integrated sanctions and other political pressures. It involves graduated pressure and multiple approaches, therefore a comprehensive approach and the ability to escalate is important.

Air power can provide an impressive asymmetry of force and it is attractive in a low stakes contest, because it allows an attacker to escalate at small political cost, with lower risk of mass casualties and the possibility of avoiding ground invasion. Global reach and precise weapons endow air power with the potential to hold an adversary at continuous risk, and it is an unusually seductive form of military strength. Unfortunately, air power is not an omnipotent coercive instrument and the history of air power theory includes strategies built on flawed coercive mechanisms. In the past 20 years, nations have tried to decapitate or coerce rogue leaders with air power, but it was ineffective or backfired in many cases. Decapitation of rogue leaders is one approach and can be a successful part of wider coercive strategies. However, leaders can be replaced and martyrdom or revenge has consequences. Therefore, air power is best confined to 3 broad coercive strategies: destruction; punishment; and denial.

Destruction is a simple concept, but can be difficult if the goal is too ambitious, like completely eliminating an adversary’s ability to fight. Coercion seeks to change the behaviour of an adversary and differs from force that is employed solely to destroy a target. At the tactical level of conventional warfare, force can predominate and the objective of attack is usually to destroy or incapacitate an enemy force. The link to changed behaviour is the contrast with typical strategic level objectives, where destruction is rarely the ultimate goal of armed force. There are exceptions to this, such as the 1981 Israeli Air Force attack against the Osirak nuclear reactor, but they are rare. When a state or coalition seeks to make an enemy surrender, it is engaged in coercion, because the goal is to compel the enemy to make a choice. Wars in which no surrender will be accepted do occur, but the military, political and social costs can be very high. Therefore, coercion usually seeks concessions well short of national surrender. However, where destruction is part

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8 The theory is an ongoing DCDC adaptation of work by Dr Karl Mueller and others, including Daniel Byman, Matthew Waxman and Jeremy Shapiro.

9 Oxford English Dictionary.
of an overall coercive strategy, the role of precision air attack is clear. Destruction also has its place in irregular and hybrid warfare. However, what might be justified as acceptable collateral damage for military objectives in conventional warfare might have higher risk of alienating populations in irregular warfare, which could undermine strategic objectives.

**Israeli destruction of nuclear capabilities**

In 1981, 8 Israeli F-16 fighter-bombers and 2 F-15 fighters took off from a base in Egypt’s Sinai Desert, which was occupied at the time by Israel. Their target was the Osirak nuclear reactor in Iraq. The mission flew unchallenged at low level through Jordanian, Saudi and Iraqi airspace. At 20km from the target, the F-16 pilots climbed to height for the attack and released pairs of 1,000kg bombs at the target. The reactor was destroyed before it received its first load of nuclear fuel and never entered operational service. By dusk, all 10 aircraft returned unscathed.

In 2007, Israel launched a similar attack against what was believed to be a nuclear reactor under construction in Syria.

At the opposite end of the coercive spectrum lies punishment, the use of force to change an adversary’s policy choice, but without affecting absolute capabilities. Examples include the US punitive air raids in 1986 against Libya and Israel’s frequent retaliatory attacks against targets in Lebanon. Such attacks have no significant effect on the adversary’s absolute capability to persist in their chosen courses of action, but if the punishment demonstrates political will and the coercer has the ability to escalate, punitive attacks can affect the enemy’s will to persist. Where punishment strategies are used in irregular and hybrid warfare, they must be well integrated with information operations if the target audience is to understand both the message being sent and the required change of behaviour.

**Punishment of Libya**

**Operation EL DORADO CANYON**

In 1986, US Naval and Air Forces launched an operation to punish Libya for terrorist attacks. The raid was also designed to deter future behaviour. Targets included: barracks and terrorist headquarters in Tripoli and Benghazi; a naval commando school in Tripoli, where terrorists had trained; terrorist support facilities at Tripoli’s main airport; and an airfield near Benghazi, which was a direct military threat to the operation.

Targets were attacked with a large air package, including USAF aircraft flown from the UK. The attack lasted less than 12 minutes, during which time aircraft dropped 60 tons of weapons and narrowly missed the Libyan leader. It may have precipitated the subsequent terrorist bombing of Pan Am Flight 103. However, the credible threat of follow-on attacks could have helped the subsequent international strategy that eventually changed Libya’s behaviour.

Between the coercive extremes of destruction and punishment lies denial. Denial involves changing an adversary’s behaviour by making the undesired course of action appear pointless, either through physically reducing the enemy’s ability to continue successfully, or by persuading the enemy that it cannot succeed. It seeks to reduce options to a choice between submitting now or surrendering later. Denial has much in common with destruction; both seek to make the enemy’s objectives unachievable. However, denial is coercive, for it targets the adversary’s beliefs about the future and calls upon
him to make a choice. The attacks mounted in a denial strategy may resemble those contained in destruction, since the best way to convince someone that defeat is inevitable is usually to make it so. However, a strategy to make an adversary surrender is likely to have significant differences from one to destroy an enemy outright.

In conventional and irregular warfare against highly motivated and determined adversaries, air power has an asymmetric advantage. Where control of the air is assured, there can be few effective replies to air delivered weapons; insurgents cannot directly fight precision bombs. It is not the fear of death that removes the will to fight in such cases, but the feeling of helplessness about the inevitability of it.

A good coercive strategy is one in which the target has no reasonable choice but to succumb, because it would be contrary to practical reason. Successful strategies are generally built on 3 principles or the three Cs: credibility; capability; and communication.

A threat will only carry weight to the extent that the adversary believes the coercer will carry it out. Whether the adversary’s perception is correct is irrelevant; what matters is whether the threat is believed. Even small chances that a coercer will follow through a threat may be sufficient in some cases to carry considerable coercive weight. Severe threats are often more expensive to carry out, and thus can be less credible than milder ones. Because credibility is so central to coercion, but can often be quite difficult to establish, it demands considerable thought on the part of strategists.

Capability is an often-neglected part of coercion. If the adversary does not believe that the coercer has the ability to carry out a threat, it is worthless, even if the coercer’s will to try is not in doubt. Although linked with credibility, capability can draw less attention in coercive strategies where asymmetry of force exists in favour of the attacker. However, capability can be problematic, even for powerful nations. Israel, the most powerful military nation in the Middle East, arguably had to recover both its capability (for conventional land operations) and its credibility (for coercion of irregular and hybrid threats) after the 2006 war in Lebanon.

Threats must be communicated to be effective, which is challenging if the messages are complex. This is particularly so if the coercer wishes to send threats through actions rather than words, for example by demonstrations of force. Even words can be difficult where there are cultural barriers, including language, to overcome. We often judge actions and words from our own cultural perspective and may take it for granted that what we mean to convey is easily translated. This can be mitigated by education, training and cultural empathy, but never eliminated. It is equally critical to communicate what will happen if the adversary does accede to the coercer’s demands. Threats of harm must be communicated as conditional on the target’s behaviour, if they are to encourage compliance. There is evidence that non-lethal posturing of attack aircraft can communicate intent and influence behaviour (see the psychological effects of air power above). However, there is no substitute for the effectiveness of face-to-face communication with all of its non-verbal subtleties.

Coercion theory assumes some rationality in behaviour. Behaviour can fall short of rational for many reasons, for example tribal or ethnic interest groups pursuing parochial instead of national interests, inefficient government bureaucracies and imperfect communication, which can make coercion more difficult. However, truly irrational behaviour, which should not be confused with people rationally pursuing objectives that seem senseless to others, is rare. A factor that profoundly shapes the success and failure of coercion is the interests at stake. Almost nothing will persuade most states to sacrifice their sovereignty or national survival, yet even very limited pressure may be enough to coerce an adversary to give up
something trivial. Some insurgents in Iraq had lost power and privileges to the extent that the stakes for them had become incredibly high.

Air strategists should not be seduced by a quest for critical or panacea target sets, the destruction of which they believe will unhinge the adversary’s will or ability to resist. Opportunities do exist to achieve physical and coercive effects that are out of proportion to the modest effort required for attacks, but identifying these requires a depth of analysis that may not be possible in the time available. Moreover, coercive mechanisms usually include assumptions about follow-on effects, but despite efforts to achieve strategic insight, strategists will rarely fully appreciate how an adversary makes policy decisions, or how an economy, society or individual and collective psychology of enemy leaders and citizens works. Trying to understand an adversary is right, but trying to scientifically model behaviour and the effects of air power applied against key nodes is folly. An effects based approach can be applied, but it can only be taken so far. A good strategy is agile, where the best assessment is made in the time available, where people are willing to learn and where strategies are built on anticipated first and second order effects only. The ability to sense and respond to what then unfolds becomes crucial. Only then can coercive strategists adapt, learn, gain deeper insights into their adversaries, and retain the initiative. It is a question of balance; failing to inflict the damage called for by the initial strategy, or abandoning a sound strategy before it has time to work are problems that an astute strategist considers. ‘Select and maintain the aim’ will always be apposite, but allegiances shift, centres of gravity change and desired end states must sometimes morph.

Coercion is usually competitive. It is the party with the greater will to win relative to the pressure being applied against it that should prevail.

The logic of coercion indicates that success is most likely when: the expected net costs of resistance are high; when the costs of compliance appear low; and when there is little or no prospect that resisting will lead to a result that would be better than complying. In each case, the effectiveness of communication and the perception of the coerced party is vital ground. Strategists should focus not on the targets to be attacked, but on the coercive mechanism that they expect will lead to the objective. A coercive target set is only as important as the chain of events that attacking it will trigger, so what to attack should be decided only after the strategist knows why to attack it. Many states (and non-state actors) have an underestimated capacity for adaptation. As a rule of thumb, coercion has a good chance of succeeding if the coercker can bring about four related conditions. First, the enemy should believe that victory is impossible, because even a slim hope of eventual success may be sufficient motivation to hold out against great coercive pressure. Second, if the stakes are high, the enemy should be further convinced that continued resistance offers no hope of leading to any result better than complying. Even when victory appears out of reach, the enemy is likely to grasp at straws such as the prospect of forcing a negotiated compromise. Third, early surrender should appear to be a better deal than later surrender, either because resistance is costly, or because the terms demanded are likely to become more severe as time passes. Otherwise, even futile resistance will be attractive. Clear communication of the ‘better deal’ is vital. An ability to escalate the pressure will strengthen a strategist’s hand. Finally, complying must be acceptable in absolute terms, for if compliance looks too awful to contemplate, then any alternative is likely to appear preferable, no matter how unpleasant, hopeless, or desperate. Strategists should not undermine cultural aspects including the concept of honour. Coercion may succeed without achieving all of these conditions, particularly if the demands are not great. However, failure to fulfil any of them may be sufficient to make a strategy fail.
CONCLUSION

The differences in Service culture, ethos and perspective are sources of both strength and friction. It seems intuitive that Joint education might overcome some friction, but the Armed Forces have limited quantities of that most precious resource of time to squeeze too much more into their programmes without undermining single Service competencies. What helps is for each Service to articulate its strengths in a way that others comprehend. It also helps if we are more brutally honest about single Service limitations and I hope that this paper helps to expose what air power cannot do as much as what it can. If soldiers reading this air power message get it, integration and trust might more easily follow. I doubt if the paper is written in perfect Martian, but if General Lamb’s green men reading it remember that air power has only four fundamental outputs, we will have some useful oil for the Joint machinery. This is the label that the author would put on his air power tin:

Air power allows control of the air, which provides freedom of air and surface manoeuvre. It enables rapid mobility and lift, which gets people and materiel quickly to and around the battle space. It also provides intelligence and situational awareness to help commanders develop a deeper understanding of the battle space. Air power allows airmen to fight an enemy before anybody else has to and it can use a credible threat of precision attack for coercion. Air weapons are now accurate enough to be exploited throughout the battle space and the presence of an aircraft can sometimes be enough to shape behaviour. The integration and synchronisation of air and land operations will only be achieved by placing sufficient emphasis on decentralisation of some air planning. This will enable air effects to be planned in sufficient detail for accurate final execution; in a way that will reassure and not alienate the people amongst whom we currently fight.
CAN NEW ZEALAND’S MILITARY MEET THE CHALLENGES OF THE SOUTH PACIFIC?

Wing Commander C.P Clark, RNZAF

This Research Report was originally written by WGCDDR Clark whilst a student at the Air War College, Air University, Maxwell Air Force Base, Alabama, USA in 2013.

With the expanse of the South Pacific isolating many small nations during times of crisis, New Zealand (NZ) is a natural selection to provide aid through proximity and its association with many of the islands. Most aid from NZ invariably comes in the form of military assistance. With a changing Pacific likely to demand more from NZ — including greater demands from an already stretched New Zealand Defence Force (NZDF) — it is only a matter of time before holes will appear where NZ can no longer meet its share of the increasing burden in the region. What options then remain for NZ? This inevitable scenario deserves serious consideration with the increasing number of factors that will determine the shape of the Pacific in years to come. While NZ has already taken steps to address some of these — with very good effect — alone they are insufficient to bridge the growing gap between what is needed and what can be provided, for NZ’s interests. This paper demonstrates that while the NZDF has renewed its strategic direction, modernized its capability, and enhanced international alliances, it still lacks the necessary investment by government to meet the challenges presented by a changing South Pacific.

THE AUTHOR

WGCDDR Clark is a RNZAF pilot who has flown the C-130 Hercules and B-757 on numerous operations, including within the South Pacific as part of peacekeeping, relief and humanitarian assistance missions. WGCDDR Clark is currently the Director of Operating Airworthiness (Auckland).
THE SOUTH PACIFIC

Defining the South Pacific Region

NZ’s area of national interest in the Pacific is defined by cultural ties, its proximity to nations and its history of obligations and assistance. Normally this region is described as the Oceania areas of Melanesia and Polynesia, but typically only including that area of Polynesia south of the Hawaiian Islands and west of the Tahitian group.¹

For this paper, the term South Pacific will denote the region described. Figure 1 defines this South Pacific region diagrammatically.² In recent times this region has

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Can New Zealand’s military meet the challenges of the South Pacific?

experienced increasing “environmental degradation”, criminal activity and social instability.³ It has also been the target of increasing external interests.

An important aspect of resolving South Pacific challenges for NZ is to work with key allies, such as the US, who — in countering a rising China — now have a greater interest in the Pacific.⁴ Interest by China, as it looks at resources further afield and secures access to greater natural reserves, has also realised an increased presence in the South Pacific.⁵ China’s interest in the Pacific in past years has been to counter Taiwan in an effort to secure votes in the United Nations General Assembly and gain “diplomatic recognition.”⁶ Now China’s aim is to provide financial assistance, or build infrastructure, for Pacific Nations and thereby secure its access to the region.⁷ As a significant trading partner with both NZ and Australia — noting that both countries now have Free Trade Agreements with China — the unintended consequence has been an unwitting invitation for China to secure stronger ties to the Pacific region.⁸ The United States pivot to Asia, in response to China in the Asia-Pacific area, has resulted in an increased presence in the Pacific and brings representation to a greater number

of engagements.⁹ The permanent deployment of 2,500 Marines to Darwin— in the North East of Australia—has been a military response.¹⁰ Secretary of State for the US would previously never have attended a South Pacific Forum, yet 2012 heralded Hilary Clinton’s presence in the Cook Islands for the 43rd Pacific Islands Forum.¹¹ Increased external interest in the South Pacific is a growing issue that works in NZ’s favour by bringing the US to the region.

New Zealand’s Link to the Pacific

NZ has inseparable ties to the South Pacific through politics, responsibilities, culture, and ethnicity. It has ties to three nation states within the South Pacific that form obligations greater than any other country in the region. The Cook Islands, Niue, and Tokelau are all dependent on NZ for defence.¹² The Cook Islands and Niue are both defined as countries that are “self-governing in free association with New Zealand.”¹³ In the case of Tokelau it “is a non-self-governing territory and has been administered by New Zealand since 1926.”¹⁴

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⁷ Wallis, “China’s South Pacific Diplomacy”.


⁹ Parry, “U.S. Marines to be Based in Darwin.”


¹¹ Wallis, “China’s South Pacific Diplomacy”.


¹³ Ministry of Justice, “The History of New Zealand’s Pacific Connection.”

¹⁴ Ministry of Justice, “The History of New Zealand’s Pacific Connection.”
NZ’s specific obligation to these nations can be a weighty one considering that it spans more than just territorial or environmental threats. The surveillance of respective Exclusive Economic Zones forms an area of over two and a half million square kilometres requiring significant resources from maritime patrol air assets and naval vessels.\textsuperscript{15} However, beyond these obligations are even more significant cultural aspects.

NZ as a population now consists of a number of descendants and immigrants from the South Pacific. The 2010 report, *Inquiry into New Zealand’s Relationships with South Pacific Countries* — a report by the Foreign Affairs, Defence and Trade Committee — notes that “New Zealand is a small multi-ethnic country in the South Pacific, with 20 percent of its population of Polynesian descent.”\textsuperscript{16} By way of example, the largest Polynesian city in the world is now Auckland, NZ. Professor Stephen Hoadley notes, “Cook Islanders, Niueans, and Tokelauans are New Zealand citizens, and more of them now reside in New Zealand than in their home islands.”\textsuperscript{17} This connection engenders a moral responsibility to support cultural and blood-ties to NZ family abroad, beyond merely a concern due to proximity. This brings with it domestic obligations which are now increasing, particularly given the frequency of disasters.

**Environmental Threats**

The South Pacific has been facing an increasing number of environmental threats that challenge the societies and cultures of Pacific nations and, in some cases, the very physical existence of some states.\textsuperscript{18} Environmental occurrences in the South Pacific have steadily increased.\textsuperscript{19}

\textsuperscript{15} Mapp, “In Defence of our Interests,” 10.


With NZ governmental policy, including obligations of assistance in the Pacific, military aid is always the first to be offered from NZ and is always assumed. The environmental threats are vast. The sinking island nations of Kiribati and Tuvalu are two of the countries suffering significantly from rising water levels and it is estimated that in ten years permanent migration may need to take place from the major villages. Relocating an entire nation and culture is not a quick or easy solution, and NZ’s role once again is assumed as part of the solution. Add to this droughts that might have been unheard of previously, and the NZDF may again be tasked with relocating desalination equipment, as was the case in Tonga and Tuvalu in 2011 with NZDF assets.

While earthquakes are also more frequent, the outcomes from these are not as devastating as the ensuing tsunamis. Given the lower level of infrastructure on most of the islands, direct earthquake damage can often be minimal compared with that typically observed in many western towns or cities. Regardless, while the earthquakes may not threaten the populations directly, the resulting tsunamis typically do, with high tolls. This was evidenced with the 1998 tsunami in northern Papua New Guinea, the 2007 earthquake and tsunami in the Solomon Islands claiming 52 lives, and the 2009 tsunami in Western Samoa where 189 were killed. The NZDF participated in the assistance missions for all of these incidents and, in the case of Samoa, utilized the majority of air transport assets for a number of days, along with army personnel and naval vessels. In each case of environmental disaster in the South Pacific, there is an increased demand on both NZDF assets and personnel to bring relief to the affected nations as these events occur more frequently.

South Pacific Social Instability

The social and community challenges facing Pacific nations have been equally as concerning as the environmental ordeals. Instances of civil unrest have escalated in the last 15 years, which also demanded NZDF involvement. In each case the NZDF has been called on and, as such, forms the larger part of the NZ contribution, each time extending NZ’s military with its commitments. One of the first examples in a string of events — that still continues — started in 1997 when NZ helped broker peace talks following civil war in Bougainville, which ultimately led to autonomy on the island. Assistance from the NZ Army, Air Force, and Navy continued for a number of years beyond this time as assistance was provided to set Bougainville back on track. In 1998 civil unrest was sparked in the Solomon Islands, which then escalated into civil war in 1999. Australia and NZ rejected an initial request for assistance from the Prime Minister, due to cost and other commitments, but as the situation progressively declined — despite the Townsville Peace Agreement — both countries committed forces in 2003 under OPERATION RAMSI (Regional Assistance Mission to Solomon Islands). NZ still maintains a force in the capital, Honiara. NZ also played a crucial military role in deploying personnel to Tonga, when it experienced riots in 2006, and Fiji experienced its fourth coup d’état in 2006, which proved a setback in relations amongst many of its neighbouring island states.

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Finally, on-going instability and violence in Papua New Guinea continues, escalating during elections, which further draws from NZDF resources to varying degrees, often in conjunction with Australian efforts.  

The issues facing all members of the South Pacific are significant. Outside of the more traditional challenges discussed are also the rising threats of criminal activity “such as poaching, smuggling and drugs…” With most island states in no position to effectively combat these challenges alone, it falls upon NZ, and often Australia, to provide and address the crisis; in almost every case, this is a military solution. Were there not the political and cultural ties, it might be easier for NZ to cap assistance and maintain a smaller defence force. Instead, these ties place greater demands on the NZDF — often concurrent with other operations or deployments — as the South Pacific continues to display escalating occurrences of environmental disasters and social instability. In isolation these events are manageable; however, with significant numbers of deployed personnel to East Timor off-and-on from 1998 to 2012 and commitments to Afghanistan since 2002, amongst others, it is an understatement to say that the NZDF has often been stretched to meet regional obligations in the Pacific.

EVALUATING THE NZDF

To evaluate the NZDF, in respect to regional demands, four key areas are examined here. While some of these areas have only recently been overhauled by the NZ Government, they are worthy of further examination noting the significant and recent changes with all factors.

NZDF STRATEGIC DIRECTION AND MODERNIZED CAPABILITY

Under a new National Government in 2008, three significant steps were taken to change the shape of the NZDF to good effect for national interests in the South Pacific. First, only one year after being elected, the government released The Defence White Paper 2010, which stated clearly the direction in which NZ’s interests lay and how defence needed to be moulded. From this the Defence Capability Plan was released by the NZDF in 2011, tying it in with government’s direction in the white paper.

Second, this built on the significant capability upgrades that had commenced under the previous Labour Government to replace or upgrade nearly all Royal New Zealand Air Force (RNZAF) platforms and Royal New Zealand Navy (RNZN) ships and describes a picture of the NZDF’s capability out to 2020. Third, in early 2012 the NZDF released its goal of creating “an expeditionary Joint Amphibious Task Force.” Key aims with this were to provide a “Task Force...capable of working independently in the South Pacific or as part of a larger coalition operation...[to]...provide an integrated and effective response to our security needs.” The JATF will be fully operational from 2015 and will be an integral part of what is being termed Total Defence Capability in

2020. Given that defence shows better alignment with government direction than it has for decades previous, it now addresses earlier concerns of an “isolate[d] defence from other elements of national power” and sets a good trajectory for the future defence strategic path to address national interests in the South Pacific.

**Joint Amphibious Task Force**

The NZDF’s new direction for a JATF sets up the NZDF to work better with its allies than before, and to better effect in the Pacific. The JATF strategy is remarkably similar to the strategy laid out by the US Department of Defense’s naval branches. In 2007, the departments of the US Navy, Marine Corps, and the Coast Guard came “together to create a unified maritime strategy.” The intention has been to integrate sea-power with other elements of national power. Looking at NZ’s JATF currently underway, to meet NZ Government’s direction, there are a lot of similarities. One only needs to look at some of the equipment to realize there are greater benefits from future exercises together, or from conducting coalition operations.

On a wider scale, both countries have already participated in exercises in the tactical and strategic air transport world and have also shared space under the coalition umbrella. The NZDF Provincial Reconstruction Team in Bamyan has furthered levels of interoperability with the US. This has also moved to the Pacific realm where the RNZN only this year participated with the US Navy at RIMPAC 2012 in Hawaii along with RNZAF elements. Joint exercises such as PITCH BLACK, conducted recently in Australia, are now another avenue for NZ and US to conduct exercises which test interoperability within the Pacific. These examples demonstrate the synergistic approach with both Australian and US forces that the JATF can bring to the Pacific. To further this, the US presence in Darwin will now create an opportunity outside traditional arenas where the South Pacific becomes the setting. This successful route for the JATF ultimately means a more effective NZDF within the South Pacific through offshore relationships that have been enhanced with more recent US-NZ diplomacy.
Can New Zealand’s military meet the challenges of the South Pacific?

Improved Alliances

NZ has largely experienced a rocky relationship with the US over the last three decades, but one which has recently seen the two nations draw closer. The nuclear-free concept that was fostered by NZ in the 1980s separated NZ from the traditional Australia, NZ, US Treaty — known as ANZUS — that it had previously enjoyed. Under successive Labour Governments this morphed into an anti-offensive direction and continued to shape the NZDF for some years beyond. NZ’s anti-nuclear stance stood for almost two decades with the US working around the policy. The 2008 National Government worked hard to change NZ’s previous stance with good outcomes. Prime Minister John Key summed up the relationship well after only two years in government stating, “We have got very good ties with the US that are going from strength to strength. We all understand the historical events that have dogged the relationship around New Zealand’s anti-nuclear position. I believe we have come to an agreement that we can put that to one side.” The military exercises discussed earlier demonstrate how this agreement is now working. During US Secretary of Defense Leon Panetta’s visit to NZ in September 2012, he reaffirmed this track.

Military expenditure of New Zealand

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Conventions:
- US$ m. = Million US Dollars;
- .,.. = Data not available;
- () = Uncertain figure;
- [] = SIPRI estimate.
- th. = thousand; m. = million; b. = billion

Military expenditure figures in local currency is presented according to the financial year of the country in question. Figures in constant US dollars and as a share of the GDP are presented by calendar year.

FIGURE 2: MILITARY EXPENDITURE OF NEW ZEALAND 1988–2011

41 Key, “New Zealand in the World,” 3.
43 Key, “New Zealand in the World,” 3.
44 Key, “New Zealand in the World,” 3.
Focussing on the stronger bonds between the two countries, and growing the ties between the NZ and US militaries, is how the Secretary of Defense envisions the future between the two nations. Given the greater US interest in the South Pacific — and a stronger alliance between the two nations — this provides some flexibility for NZ in dealing with regional issues into the future and will potentially relieve the defence burden during demanding times. Vangelis Vitalis — NZ’s current Ambassador to the European Union, North Atlantic Treaty Organization, and Eastern European nations — sums up the balance of cooperation and workload between such countries as NZ and the US quite succinctly by stating, “working together really does matter and that small states cannot be seen to shirk their share of the burden.”

While great inroads have been made in the areas discussed, the last statement still requires the aspect of defence investment to be assessed to provide a full evaluation of effectiveness.

**Defence Investment**

As recognized by Peter Cozens — former Director of the Centre of Strategic Studies New Zealand — in his 2010 paper, *Prospects for a NZ Marine Corps*, NZ has been operating on a reducing budget and, on a number of occasions, has been over extended. This financial trend is confirmed when analysing the defence budget and comparing the figures from the last three decades. Figure 2 represents an extract from the Stockholm International Peace Research Institute and details the last 25 years of military expenditure in NZ.

The overall trend is one of decreasing defence expenditure during this time, to the point where percentage GDP expenditure is now almost half that of 25 years ago. In adjusted dollars — labelled *constant* in Figure 2, which gives an accurate comparison over time — it shows a current defence expenditure of only 87 per cent that of 23 years earlier. While the loss of the air combat force might account for some of the reduction, the greater number of offshore deployments, personnel overseas, and the high running cost of technological equipment is much greater. Noting that the demands are also greater, and the budget allocation is less, Professor Stephen Hoadley’s comments are more apt now than in 2003 when he noted that NZ continues to be one of the lowest defence spenders globally as a percentage of GDP. “Only one per cent of GDP is available for personnel, equipment, and operations after taxes and depreciation levies are taken out....” He reaffirmed his view again in 2007, during a review of NZ’s security interests, noting a “present level of 0.9 per cent of GDP...” after taxes and depreciation levies. It is no surprise that when the National Party came to power in 2008, the Defence Minister’s primary concern was over “how stretched the armed forces are by operational deployments, personnel shortages and platform upgrade projects.”

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46 Panetta, “Secretary of Defense Speech: Auckland War Memorial Museum.”


50 Stockholm International Peace Research Institute, “Military Expenditure of New Zealand.”


Can New Zealand’s military meet the challenges of the South Pacific?

So with such responsibilities in the South Pacific, also referred to as NZ's backyard, why is it that the NZDF constantly falls short on the investment stakes in peacetime?

NZ has long been removed from many of the threats facing the rest of the world with many ‘Kwis’ believing in a strategy of security through strategic isolation. As a result, most New Zealanders exhibit the belief that defence funding can be better spent elsewhere. “The New Zealand taxpayer is generally apathetic about defence issues and considers domestic issues such as health, education, unemployment, (and rugby), to be more important.” Little is appreciated by the majority of the NZ population of the strategic value that comes with assisting allies. Placing such limitations on a military that has such key obligations in the South Pacific cannot continue indefinitely without making some compromises. Currently, the compromise is between the demands on the NZDF, and the demands of the NZ public.

RECOMMENDATIONS

This paper established that NZ cannot escape a deteriorating South Pacific because of its cultural ties and obligations and, while it is has done very well in three key areas to address concerns, it still falls short by not adequately addressing defence investment. NZ has clearly made inroads with a South Pacific solution through much better aligned strategic direction between government and defence. It has also met this with capability upgrades and a JATF that has the ability to ‘plug-in’ with the US military. Given that the US and NZ are now on the best terms they have been for decades, these factors indicate a solid approach in principle for meeting the challenges of the South Pacific. This partly addresses Hoadley’s concerns of influence in the South Pacific when, in 2003, he contended that, “Relative to the past, and relative to new players in the Pacific Ocean region, New Zealand’s influence appears to be declining…” Yet he also confirms what has been demonstrated, regarding defence investment, when he continues, “It cannot be arrested without increased budgetary resources…”

The straggling issue of investment in defence is addressed with two recommendations. It requires identification of where defence investment should be made, and — through public support — engaging NZ as a whole in the investment. On the former point of where to invest, a quick look at the areas of defence typically under pressure during times of crisis provides the answer. In total it is a combination of the availability of personnel and assets, and the ability to have them available at short notice. While the RNZAF is typically the first to respond to crisis offshore, it is generally something that will affect the entire NZDF. To that end, funding specifically trained personnel — over and above existing total defence force personnel numbers — could form a dedicated Ready Reaction Force. Assets spanning naval vessels, transport aircraft, and ground transport would form the assets, but such that they could be drawn from a larger pool to ensure maximum utilisation. These are not necessarily an increase of huge proportions, but rather, a sufficient increase to guarantee a timely response with adequate resources without impacting on other commitments. While identifying a Ready Reaction Force as the first part of the solution, the second part requires a more collective approach.

Noting the weight of public opinion in NZ, the second recommendation is that the government engages the NZ public much more regularly on issues of the South Pacific, not on defence. Connecting the South Pacific to NZ through ethnicity, and not solely on more defence

55 Keating, New Zealand Defense Policy Framework, a Strategic Reappraisal, 10.
spending, is wholly more acceptable in the eyes of New Zealanders. With increasing numbers of the NZ community affiliated with the South Pacific, this presents the problem with an internal perspective, and one that matters to the ‘average Kiwi’. Actively publicizing the true state of affairs in the South Pacific, and the real plight that many face, connects with the population. The subsequent funding and growth of defence to meet these South Pacific challenges then becomes a much more supportable proposition. This also allows NZ to better demonstrate its defence capability and commitment in the region with its allies and, in doing so, show NZ to be doing its share of the work as Vitalis proposes.  

Ultimately, NZ as a whole must balance the value of investing in defence with the cost of not doing so measured in a deteriorating South Pacific.

CONCLUSION

This paper has shown that while the NZDF has renewed its strategic direction, modernised its capability, and enhanced international alliances to good effect, it still lacks the required investment to meet the challenges presented by the changing South Pacific. A strategy has been identified, with two recommendations that firstly proposes where investment in defence can be effective and secondly suggests how NZ public ‘blessing’ for that expenditure can be sought. The solution of investing in a Ready Reaction Force was described as the most efficient and effective means of responding to South Pacific challenges to meet NZ’s national interests in the region, and one which would earn greater credibility with allies. The understanding that New Zealanders can identify with issues connected internally to NZ was elicited. As a result, New Zealanders would show a greater interest in addressing South Pacific issues and in turn support a NZDF-funded solution. Noting that further investment is unlikely to get off the ground without the NZ public on-board, this becomes the priority.

As is the way in NZ, a collective decision will mean that we all share the credit for doing the right thing. Failing to do so will result in letting down allies, neighbouring South Pacific nations, and will leave an even larger problem on the doorstep. The most perceptive insight on this was offered by Terence O’Brien, Former President of the United Nations Security Council, when he stated, “The NZDF is a prized national asset to be sustained and improved in order to serve New Zealand interests….”

The challenge is for the NZ public to realize this too.

58 Vitalis, Thucydides, the Peloponnesian War and Small State Foreign Policy in the 21st Century: Lessons for New Zealand, 10.


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Can New Zealand’s military meet the challenges of the South Pacific?


BOOK REVIEW:
AIR WARFARE: HISTORY, THEORY AND PRACTICE.
By Peter Gray – Reviewed by Mr Simon O’Neil

“This hallowed status [of Air as an independent service], and the quest to retain or achieve it, led to many claims being made in favour of warfare in the third dimension, some of which were pure speculation and wishful thinking. But once articulated, they became articles of faith.”

In his conclusion, Peter Gray articulates what has always been the issue with air power doctrine and many related texts: the airpower *über alles* message ignores the synergies of joint effect and the realities of modern military power. Thus I was a little wary when APDC asked me to review Peter Gray’s 2016 take on *Air Warfare: History, Theory and Practice*. I was pleasantly surprised. I enjoyed this book. I kept stopping to go back and re-read parts that I liked.

Gray does not tell us WHAT to think about air power so much as he discusses HOW to think about it without taking one side or another. Cutting right to the chase, this is a work that should lead our professional study and discussion of air power. It could form the foundation for an Introduction to Air Power course. That we might not always agree with him is simply greater reason for constructive discourse.

Gray’s style is smooth and easy-going; he never preaches or expounds. In 120 pages (the remaining 80 pages are endnotes and bibliographies), he leads the reader through the history of air power thinking, describes the core air functions, and discusses air power through the lenses of the strategic, operational and tactical levels of conflict. Each supporting case study acknowledges the political dimension that complicates effective campaigning and challenges clearly achievable end-states. Any reader, layman or airman, will finish this book with a better grasp of air power, its application and its challenges.

In his discussion of the history and theories of air warfare, Gray frequently acknowledges air power institutions in the UK, USA, Canada and Australia; New Zealand warrants only one small mention in relation to our wartime histories. It is disappointing that, although we are frequently acknowledged as punching above our weight in air operations, we are apparently not seen as contributing in a similar manner to air power thinking. Maybe we don’t – yet – and if we take nothing else away from this book, it should be this challenge...

Similarly, although NATO’s effort to promote standardisation is acknowledged on a number of occasions, there is no mention of the ASIC contributions that underpin many of NATO’s technical and doctrinal products. Interoperability is so critical in modern modular operations that the role of agencies like ASIC and ABCA must be considered in any discussion of contemporary operations.

*Air Warfare: History, Theory and Practice* is a refreshing review of the first century (and a bit) of practical air power thinking. It is a valuable guide for those considering air power related research and a catalyst for professional discussion. Don’t just read it – or put it on the shelf for show – walk the walk and talk the talk....