

# CONTRIBUTIONS TO THE ROYAL AIR FORCE AIR POWER REVIEW 

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

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

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## FOREWORD

The leading article in this edition of Air Power Review is by the Commander-in-Chief Strike Command, Air Chief Marshal Sir Brian Burridge. The article is taken from his closing presentation to this year's Air Power Conference on the air war over Iraq 2003, held at the RAF Museum this May. The Conference covered the war from both historical and thematic angles with speakers ranging through senior Allied officers involved in the planning and conduct of the war to a broad spectrum of leading academics. The CinC's presentation, which was prepared as the Conference progressed, is a tour de force in its depth and breadth, addressing air power issues of the moment and the future. The article is published here in advance of the Conference proceedings to give it greater exposure; it is highly recommended reading for all RAF personnel.

Dr Seb Ritchie's article on the use of Allied air power on Burma from 1943 to 1945 is an excellent overview of that little-known campaign. As with all these studies, lessons emerge and re-emerge. For example, ASOCs are nothing new and the need to follow-up heavy bombing attacks with tactical aircraft during the assault was clearly not passed on to the European Theatre. But the key lesson is that properly integrated air/land operations work.

Dr Paul Rexton Kan is an academic at the USAF's Air Command and Staff College at Maxwell AFB. His article analyses the "new" theory of axiological targeting propounded by Lt Col Peter Wijninga (RNLAF) and Richard Szafranski. Kan makes the point that axiological targeting is not really new, but belongs to the "soft" school of coercive thought, exemplified by Col John Warden rather than the "hard" school (in terms of what they consider are the ideal targets to achieve strategic coercion) of Robert Pape. However, its utility is in challenging us to think more deeply about how we can apply air power in the diverse conflicts of the modern world.

Dr David Mets, from the School of Advanced Air and Space Studies, also at Maxwell AFB, is a regular contributor to this Journal. His article on the Battle of
the Bismark Sea is, as befits a paper that was initially published in the Journal of Military History, a detailed and extensively researched examination of the subject. The article makes an interesting point concerning how previous appointments can influence a commander's actions: General George Kenney, Commander 5th Air Force having been on the staff of the Air Corps Tactical School in the 1920s. In addition to providing a good overview of the Pacific War at this stage the article also serves to highlight the "effects" that can be achieved by air power in a joint context.

By way of a change, Air Cdr Peter Dye's article examines the experiences of pilots and observers at the 3rd Battle of Ypres in 1918. The author starts by detailing the suicide of Lt Robert Cameron RFC who was officially reported as "killed in action". He then examines the issue of combat stress of the aircrew, but within the context of the limited medical understanding of the subject and the societal pressures within the services as WWI drew to a close. However, his comments on the value of leadership and crew (or unit) cohesion as bulwarks against combat stress are equally valid today.

Finally Wg Cdr David Winstanley's article on Air Power in Operation MARKET GARDEN is taken from his Defence Research Paper written whilst on ACSC6. Whilst the broad lessons of the Arnhem landings are well known, the author examines the operation by asking the question " could a more effective application of air power have resulted in Allied victory ?" He rightly castigates the Allied commanders for failing to exploit the air superiority that existed over the Continent after D-Day and for being "risk averse" in the selection of the Arnhem drop zones. However, he concludes that whilst Operation MARKET GARDEN was an air power failure it was also - and the Editor would suggest far more importantly - a failure of overall joint planning and execution.

The penultimate article, which was submitted by Sqn Ldr Dave Watkins as a candidate for the Gordon Shepherd Memorial Prize, looks at the issue of how
to deal with the contemporary threats to Deployed Operating Bases. Although since the article was written the decision has been taken to concentrate all UK GBAD within the Royal Artillery, under a joint command structure, the points made about GBAD are still pertinent. Whilst primarily tactical in its approach, the article gives a good description of the problems involved in the active ground defence of a DOB, but only makes passing mention of the NBC threat and how that is dealt with. However, the sections on command and control of the force protection battle are informative reading for those about to go on deployed operations.

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## IRAQ 2003 - <br> AIR POWER POINIERS FOR THE FLIUURE CLOSING ADDRESS

## By Air Chief Marshal Sir Brian Burridge <br> Commander in Chief, Headquarters Strike Command

The aim of this year's Air Power Conference at Hendon was to stimulate debate on the air power aspects of Iraq 2003. This was planned to embrace both the military and the academic communities. We were asked to look at the Combined aspects of the air campaign from both the US and the UK perspectives and analyse the role of air power as a manoeuvre force; this we have done. But the reality of yesterday is worth little unless we can draw out the salient pointers for the future, and that is my job now.

Iraq 2003 represents a good case study for two reasons. It was the first war of its type but, I submit, it is also the last war of its type. It was the first war because it was the first time that we could take a true effects-based approach, enabled by precision, enabled by greater granularity of information, enabled by the ability to move that information across networks (at least to a limited extent) and thus develop at least some degree of common situational awareness. That awareness allowed us to generate very high tempo.

The 5 Corps advance on Baghdad is probably the highest tempo piece of armoured warfare that we have ever seen. Next, information operations mattered. It was an operation fought in the glare of the international community fed by their respective media. It was also a war fought in an ambiguous and non-linear battlespace. So, the first war of its type. Conversely, Iraq 2003 could be regarded as the last war of its type as we are pretty much running out of rogue states The notion of what it means to be a rogue state is now taking root.

Our aim for this Conference was to make you think, because I need people who can think. I cannot run a headquarters with people who will
not think because I cannot empower them as decision makers. I have a prejudice. My prejudice is that airmen do not like thinking. Airmen are obsessed with bombs, fuses, cockpits and screens and are actually rather uncomfortable exploring the underpinning logic and doctrine. So producing a thinking air force is a strategic requirement for me, and I am absolutely passionate about that.

However, before I summarise the Conference, I wish to say a few words of thanks. Thank you to the co-sponsors, firstly, the RAF Museum. This is an impressive museum and I commend it to those of you on stations grappling with your leadership programmes and the generation of ethos amongst your people. This museum is one of the best visual

## Iraq 2003 could be regarded as the last war of its type as we are pretty much running out of rogue states

An RAF Tornado departing on a mission



> In Iraq we could see that, within a very small piece of the battlespace, we would have: high-intensity armoured warfare, with a lot of 'shot-and-shell'

aids you can have. Secondly, the Air Historical Branch, it too provides a rich seam of material that you should be using. Finally, to the Director of Defence Studies (RAF), and to his staff, not only for sponsoring it but for organising the Conference.

In summarising the proceedings, I will examine those aspects that I feel to be important pointers for the future using the components of fighting power as the template. I will start by looking at the context in which the future pointers are going to be important to us. The context itself is significant because we have to ensure that Air Power is relevant in the future. Air Power comes with a good brand. Ministers and others in this country have, historically, regarded air power as being an effective and efficient tool in international relations. It provides us with the ability to exhibit and project the will of our nation. That is deep rooted. However, these things do not come free and they have to prove themselves over and over again. So, what does Iraq represent as a first example of post-modern warfare? What was the type of battlespace in which we were engaged and could be engaged in the future? I said it is ambiguous and non-linear, but what does that mean? As a starting point, we can go back to what General Krulak used to say about three-block warfare.

In Iraq we could see that, within a very small piece of the battlespace, we would have: highintensity armoured warfare, with a lot of 'shot-and-shell'; we would have standard framework type operations conducting peace support and then we would have peacekeeping in terms of distributing humanitarian aid. Sometimes the traditionally linear became non-linear because we had long lines of communications with the front end of them punching through with armour and the back end of them delivering humanitarian aid as they went forward. But the difference between the reality and what General Krulak saw was that he understated the dynamics. The dynamics of Iraq was that these three blocks kept changing in location and varying in intensity, such that yesterday's humanitarian aid distribution point became the scene of tomorrow's firefight. And that is an aspect that makes command, planning and execution very difficult. Add to that urban Close Air Support and you start to get a feel for just how complicated these dynamics can be.

The second point about the nature of this battlespace is that we were fighting amongst the indigenous people. That was certainly the case in

Kuwait in 1991 and it was also the case in Kosovo and Bosnia. So a significant change since the Cold War in that our military activity, the application of military violence in the battlespace, is now being undertaken amongst the people. That is significant because, in any operation, there is always going to be a Phase 4 . The degree to which you win or lose the hearts-and-minds of the indigenous population will be predicated on your conduct in battle. The degree of violence, and the way in which that violence is applied, will influence the indigenous people and will undoubtedly affect their ability to accept you when you get into a nation-building
phase. Nation-building is also about infrastructure and much of our conduct in battle has to have an eye on preserving the infrastructure as much as possible. When we did the targeting for Iraq, it started very much as a multi-missioned, 'breakeverything', target list. But, by the time we had applied strategy to it, we were quite clear about what aspects we needed to attack and what aspects we should avoid. Of course, all of this was being done in the glare of the international media. We cannot ignore the media. The power of the digital image is here to stay. The pictures of alleged abuse of Iraqi prisoners that were spread

> The degree of violence, and the way in which that violence is applied, will influence the indigenous people and will undoubtedly affect their ability to accept you when you get into a nation-building phase



An F3 on patrol as the sun rises

## In this post-modern world, we now see more and more the need to get to problems early, and to get to problems nearer their source. You can either pay now or you can pay later but pay you will

over our national newspapers earlier this year provided stark images to the public. Whether they were real images or whether they were fakes is almost immaterial, because the impact they had, particularly in the Gulf region, was enormous. So, given this complexity, why would we ever want to get involved in something similar in the future. From the UK Government's point of view, there are probably three threats that should worry us most.

Firstly, the proliferation of weapons of mass destruction is a real and present danger. It is not one to be underestimated and not one that we should ignore simply because our assumptions over Iraq may have been wrong. Secondly, international terrorism has taken root and we therefore have to consider the degree to which we
can deal with such terrorism close to its source. It was clearly a very important aspect in Afghanistan and we still have much more to do. And, thirdly, there is the impact of failing states that can, and do, cross the spectrum of security challenges. There is much discussion going on now about the difficulties generated by failing states, the circumstances in which we would be prepared to use military force, and the international political constructs that we would need to support our actions. There are three cases for military action. The first is self-defence. Article 51 of the UN Charter is black-and-white, and is about the inherent right of self-defence of against armed attack. But what about the need to defend national interests? In a globalised world, how do you define vital national interests? Do you define them by geographic borders, do you define them in

> Support for TELIC rose to $85 \%$ by the time we got to the start line and in the first few days of fighting. However, it subsided to 50\% even before we had finished fighting and has dropped considerably below $50 \%$ since then
economic terms, do you define them in human terms, or indeed any other terms? Self-defence in a globalised world is not as clear as it was in 1949 when the Charter was written. Secondly, there is humanitarian intervention. In Kosovo in 1999, the Government attached much importance to what, at that stage, was termed an ethical foreign policy, founded and formulated around humanitarian intervention. That well-publicised policy conjured up in the minds of the British public a rather warm feeling of benign intent, of a 'force-for-good'. The third case is the really difficult one: The threat to international peace and regional security. It
is difficult because it is likely to be collective in nature and it is likely to affect an entire region, just as Iraq was an issue for all the Gulf States. It is also likely to affect a number of major international players, clearly the US in the case of Iraq, but also European nations. Action is allowable under Chapter 7 of the UN Charter, but it is hugely difficult to gain an international consensus on what needs to be done. In this post-modern world, we now see more and more the need to get to problems early, and to get to problems nearer their source. You can either pay now or you can pay later but pay you will.


An Argentine Navy Super Etendard during the Falklands campaign

## The last time we had to fight for control of the air was during the Falklands Campaign and that was a very close-run thing

Much of what we do in the future will be in coalition with the US. We therefore need to understand their doctrine on intervention. It is already developing along the lines of 'anticipatory intervention', in other words intervention when you think something might just get out of hand, which may result in a serious situation developing. 'Pre-emptive intervention' could be deemed to be required where things could well get out of hand, whilst preventative intervention is where there are definitely the ingredients for things to get out of hand, but they have not done so just yet. Making judgements on intervention is hugely difficult. The reason that they are difficult is because they have to be based on the interpretation of intelligence which itself can be both fragmented and highly nuanced. The way in which we now need to generate and use intelligence in this post-modern world is important to help us make those very difficult decisions.

Interestingly, we do not hear so much now of the 'something-must-be-done' school of international interventionists. I wonder whether we are
seeing a re-run of the effect of the Black Week of 1899, the first week of the Boer War. The nature of the campaign in Iraq and its aftermath is going to shape public opinion about the way in which military force might be used in the future. There is now this dichotomy between some nations, particularly the US and potentially the UK, wanting to be forward learning in solving problems, against a potential lack of appetite amongst their electorates. But whatever action is taken, there will be an aftermath, and we must recognise and understand how to apply what we, as airmen, can do in future Phase 4s. As I said earlier, there will always be Phase 4s. Afghanistan for example has been in Phase 4 for 2 years. It is important that we understand that only states can legitimately apply military violence. Therefore, it is important to recognise the need for public support, which drives political will. We also need to recognise that public support has to remain in place all the way through the campaign, right to the end of Phase 4. We deployed on Op TELIC with $32 \%$ of public support. That is about the level that existed in 1956 when we deployed in the Suez

# Mission command is the way we should all lead on a day-to-day basis in peace and in war 

Campaign. Support for TELIC rose to $85 \%$ by the time we got to the start line and in the first few days of fighting. However, it subsided to $50 \%$ even before we had finished fighting and has dropped considerably below $50 \%$ since then.

When we are fighting in coalition, the plethora of potential problems is undoubtedly magnified. What will be the long-term impact on public support of the allegations of torture of Iraqi prisoners? More broadly, we can anticipate that International law will have to develop further in order to be able to relate to the conduct of the combat phase and this may be something of a wake-up call to many within the international community. International lawyers have to continue trying to understand how to regulate military violence in these sorts of environments and to keep up with the developments in how we conduct our operations. I also see politicians facing a fine balance the risk to which we are willing to expose our forces versus the prospect that things will actually change for the better.

Let us look at the components of fighting power and see what we can draw out as pointers for the future? Right at the top is control of the air, because if you do not have control of the air you can achieve nothing. But we did not have to fight for control of the air in Iraq to carry out our effects-based campaign. Nor did we in Kosovo, nor did we in Bosnia. Nor did we really in Iraq in 1991. The last time we had to fight for control of the air was during the Falklands Campaign and that was a very close-run thing. But in this post-modern battlespace, some people's mindsets have now been inculcated with the notion that you do not have to fight for control of the air. That is very dangerous. What about the S400 era? The point at which surface-to-air missiles have a range in excess of 300 km is fast approaching. What happens if missile range is developed to balance exactly the laws of physics, in other words if you can target it with your radar, you are necessarily within the range of long-range surface-to-air missiles defending that target. That would completely change our approach to air warfare and would be a major challenge.

We have heard much about centralised command and decentralised execution. It is changing, and it needs to change further to account for a networked
environment and to allow us to capitalise on those networks. We need to understand, and we have never yet fully understood this, the boundary between where centralised command stops and decentralised execution starts. I suggest we need to separate those boundaries so that there is a fluid middle ground, which I will call 'adaptive control'. There are circumstances in which, on one day, I may need to command certain assets centrally, and, on another day, I may not. And there are some strategically important assets which I shall always want to control in an adaptive sense. Amongst those, I would certainly include UAVs and UCAVs. The difficulty of prosecuting Time Sensitive Targets, against complex rules of engagement and difficult calculations over collateral damage, will also mean that a lot of TST clearance will be done in a centralised way.

The centre of gravity in Iraq was Saddam Hussein's regime. Their critical vulnerability was their ability to exercise command and control, and General Franks' intent was along to produce multiple problems in time and space along a number of axes such that the Iraqi regime would be unable to understand them and therefore be unable to react. The degree to which Air Power has to be employed in a manoeuvrist way, taking us away from traditional attrition into more subtle methods of delivering violence, is already mapped out for us. It is the effects-based approach, and that is why it is so fundamental to the development of our doctrine. Mission command is similarly important in enabling us to generate overwhelming tempo. Mission command has to be a contract of trust which takes place within defined boundaries. It is not something you can turn on and off when you go into operations. Mission command is the way we should all lead on a day-to-day basis in peace and in war.

There has been much debate about high-intensity and low-intensity warfare. It was particularly germane during the period of the Strategic Defence Review. The most likely and the most numerous operations call for low-intensity warfare, yet we were quite clear that only by training and equipping for the most demanding high-intensity task could we easily switch to low-intensity and then switch back again as the occasion demanded.

# So we bombed it again, although there was very little collateral damage, the building was wrecked and yet the telephone lines still worked. The Iraqis were just laying telephone lines around the exchange and putting sandbags over them. We simply did not know enough about how to do effects-based assessments 

The regulation of tempo is similar. You will always need the ability to generate high tempo, and you need that for two reasons. Firstly, in adopting a manoeuvrist approach, particularly when you are dealing with regimes and their command and control: overwhelming the enemy with problems is all about generating tempo. The second point is about risk. You have a choice when planning a campaign because you can decide where you are going to take your risks and for how long. Generating a high tempo is a highrisk business initially, but you will be facing that risk for a shorter period of time. Alternatively, you can decide to take a moderate amount of risk knowing that it is going to endure. The British have a propensity in warfare to take a lot of risk up-front in the knowledge that it will subside later. It gives you the choice of going fast or slow. We studied this intently in the Iraq campaign and did a fair amount of adjustment to the plan based on the results of Exercise INTERNAL LOOK, a computer-assisted wargame. Although our goal was to generate early regime collapse, it was vital that the regime actually recognised their collapse as it was happening. So, regulating your approach so that there is time for the enemy leadership to recognise at least something of what is happening to them is an important aspect of managing tempo.

Moving on to doctrine, we have heard much about the effects-based approach. The effects-based approach is necessary for a number of reasons. The first one is efficiency. To give an example, the telephone exchange in downtown Baghdad was a high-value target. However, there were five big office blocks and a highway bridge over the river close by so there was potential for significant levels of collateral damage. We wanted to attack the target early to disrupt the telephone lines. Our BDA, however, was not particularly good and the telephone lines were still operating. So we bombed it again, and within 24 hours those telephone lines were still operating. So we bombed it again, although there was very little collateral damage, the building was wrecked
and yet the telephone lines still worked. The Iraqis were just laying telephone lines around the exchange and putting sandbags over them. We simply did not know enough about how to do effects-based assessments.

There are legal and political attractions to the effects-based approach. It is reassuring for politicians and lawyers that we are able to take them through the audit trail of what it is we are trying to achieve and how we are trying to achieve it. They find that very comfortable. Also, it is important to explain to regional powers in a potential area of conflict how you are conducting the campaign, what you are going to try to achieve, and what it is going to look like. It is a very important try to maintain support in the region concerned. Like generating domestic public support, the maintenance of support from the regional powers is a significant diplomatic challenge. If you can convince regional governments of your intent to achieve an end-state by doing no more than the minimum required, then you stand a much greater chance of maintaining their support.

Moving on to information operations, I believe it to be an unhelpful term. I prefer to think about it as a subset of an Effects-Based (EB) approach. As an EB subset, you would be caused to consider the required effects together with how you might achieve them, either kinetically or nonkinetically. But I would also wish to ensure that we consider the information campaign in just the same way that we think of a diplomatic campaign or an economic campaign or, indeed, a military campaign. These, of course, are the levers of national power. The strategic level information campaign throughout IRAQI FREEDOM was not well handled. The messages coming out of London and Washington were being read differently by the regional states, were being read very differently by European states and being read very differently by the internal audience in both the US and the UK. If we had regarded information as a strategic lever of coalition power then I do not


A-10 aircraft provided close air support

# Bizarrely though, there were occasions when fierce fighting was in progress with the addition of close air support, yet one block away there was a market with people selling fruit and vegetables 

believe that this difference would have occurred. As for the battlespace itself, we now need to strive for the generation of high tempo by integrating air power with land manoeuvre. But it has to be efficient and it has to be done effectively; we were not that good at it in Iraq. Returning from CAS missions still with weapons onboard was particularly frustrating. There were also difficulties of simultaneity. Tasks that would have traditionally been seen as sequential, such as establishing air superiority, became simultaneous with the beginning of land manoeuvre. Five air tasks were conducted simultaneously; counter-air, for which the UK Commander was the supported commander; the counter-TBM operation in the Western Desert - and again the Air Commander was the Supported Commander with a discreet AOR. Then there was counter-land, immediate strikes and attacks on fixed pre-planned targets. Of the five different elements of air operations,
$75 \%$ of the total effort went into counter-land. Therefore, it is imperative that we understand how to integrate air power and land manoeuvre effectively in order to generate tempo so as to make best use of this significant effort. We also needed to get our air support measures right. The move of the FSCL out to 200 km one night caused a significant delay in dealing with the Republican Guard south of Baghdad. There was a reason for that; 5 Corps was an analogue Corps and slow to in controlling kill boxes, unlike the Marine Corps which was networked digitally and thus much quicker.

I have already mentioned the politics of generating regional support, particularly where host nation support is concerned. But we have also got to understand the political doctrine of escalation. It was something that we well understood during the Cold War from exercises such as WINTEX.

However, that was a different era and we had to re-create the understanding of escalation and escalation dominance during the Iraq campaign: Our post Cold War experience has generated the belief that we can flick a switch and go from low tempo, highly controlled environments like NORTHERN and SOUTHERN WATCH into the dynamic high tempo, many-moving-parts situation that we had in TELIC.

We also need to understand a little more about the differences in appetites for risk across a coalition. We need to recognise that, in the US, the Powell doctrine is all about the use of overwhelming force to reduce risk. For us, we are more willing to face high risk up-front on the understanding that we will endure that risk for a short period of time. Other nations have different views and so it is very important that we understand how different nations approach risk. One small subset of risk is fratricide. We need to develop further our doctrine on combat ID. But, it is not simplistic and people will erroneously assume that technology will bring us the answer. At the same time that we are applying technology to our combat ID, that same technology is allowing developments that see us driving up the tempo, driving up our ability to move faster and more furiously, and thereby increasing the risk of fratricide. So technology on its own is not the answer.

There were also some gaps in our conceptual thinking. Information management is the first of them. We are not good at information management in the military. We have to improve because, unless we can sort out our approach to information management, we will waste much of the effort and resources that are being expended on Network Enabled Capability. Ultimately, NEC is everyone's responsibility because everyone owns a little bit of information, and everyone has got to understand how to manage that information for the benefit of all. That is what NEC is all about. So, conceptual thinking on information management and applications is hugely important.

Next, urban close air support presents us with a particular dilemma. For fixed targets on the Master Air Attack Plan, we take huge amounts of time making collateral damage assessments
and judging the legality of any particular target. But, in the faster-paced environment of an urban engagement with troops in close contact, this burden falls directly on the pilot. Bizarrely though, there were occasions when fierce fighting was in progress with the addition of close air support, yet one block away there was a market with people selling fruit and vegetables. The integration of urban close air support is thus an area requiring deep conceptual thought.

At the strategic level, we need to understand more about the Effects Based Approach. Recent thinking suggests that the enemy centre of gravity is a governing regime itself. In most cases since the end of the Cold War, the effect we have tried to achieve is to disconnect regimes from their people. It is arguable that had we focussed on Milosevic on Day 1 of the Balkans Campaign, we may have reached the end-state rather sooner. But in the longer term, we would not have gained the political advantage that result from the fact that it was Milosevic's own people who ultimately dealt with him. But making judgements in these areas requires accurate, factual intelligence, which can lead to robust assessments. Even then, there are complex legal issues involved. So, yet more conceptual thinking is required. One significant question in all of this is what can air power do in this asymmetric world? Certainly, air power can solve many of the information problems. Through ISTAR we can, with sufficient granularity, tell you what is happening. The next step is to turn an asymmetric target into a symmetric target for a fleeting moment in time. It is these capabilities that will make air power relevant in the strategic environment of tomorrow.

So therefore some difficult issues to solve but what are the specific challenges for air forces. Firstly, let us consider the physical component of fighting power; our manpower and our expeditionary ethos. In a $360^{\circ}$ battlespace there is no longer an ability to differentiate easily between what is a front-line, what is a rear area, and where people might be shooting at you next. That has considerable implications for training and is what is behind my mantra of "warfighter first, specialist second." The number of Air C2 trained augmentees that we need to make our

# So when it comes to making a contribution to coalitions there is a degree to which we need to think of burden-sharing in terms of risk. This puts a different emphasis on the hackneyed phrase, "coalitions of the willing" 

headquarters work in operational environments is very significant. We do not currently have enough. And accurate intelligence, down to the most granular piece of detail that the mission commander needs, has to be relayed quickly and effectively; that also takes people to sift analyse and assess. So we have to adjust our priorities and organise for war and adapt for peace is a good starting point.

Our aircraft must be multi-role, offer true precision, with datalinks, and have the ability to talk to the weapons so that we can use them effectively. The nature of defence procurement tends to give us a rearward view of technology. New acquisitions tend to end up in the paradigm of 'yesterday's technology tomorrow'. There is a systemic weakness in our military acquisition that is founded in history. Some of it is about the nature of airmen and their souls. Back in 1914, the Royal Naval Air Service and the Royal Flying Corps existed in less than harmonious co-existence. They were two very different characters, defined by their different approaches to technology. The Royal Naval Air Service aircraft had radios in them, they had drift-compensated bomb-sights and they also had a compass. The Royal Flying Corps' answer to that was to ask for the names of the railway stations to be painted on their roofs and to give every pilot a copy of Bradshaw's Railway Guide!

When it comes to the amount of equipment or the numbers of platforms we need, we tend to think in terms of being able to provide a certain percentage to a coalition. That may represent a pragmatic starting point, but it is not actually what coalition warfare is about. It is actually about sharing the risks. Our land component provided $25 \%$ of the armoured combat power in Southern Iraq. 1(UK) Armoured Division is a very powerful armoured division, but they did not take $25 \%$ of the risks. That is not to belittle the efforts of the British Army, it is just a fact based on the nature of the battlespace and the way in which we were employed. So when it comes to making
a contribution to coalitions there is a degree to which we need to think of burden-sharing in terms of risk. This puts a different emphasis on the hackneyed phrase, "coalitions of the willing".

Whilst considering equipment, let me just mention something on networks. It links to my point on the intangible aspect of NEC in that centralisation of information costs communications capability; communications cost bandwidth; and bandwidth is what we are short of. Bandwidth is what we will always be short of and so we need to think carefully about the degree to which we centralise knowledge and the ability of warfighters out in theatre to engage in information pull. That was an issue that we had hardly considered at all before IRAQI FREEDOM in terms of the way in which we train our warfighting commanders.

Also on equipment, we see a direct linkage between effects-based warfare and precision weapons. But what do we really know about the stockpiles requirements of precision weapons? What do we know about realistic usage rates in varying numbers of campaigns? What do we know about how much that will cost? That is something we have to understand.

Training for a complex battlespace requires complex collective training in realistic scenarios. This is how we approached the counter-TBM operation in Iraq's Western Desert. In these cases there is a clear need to exercise command and control from end to end adding all the friction that exists when the need exists to deal quickly with very granular information. The only way that we are going to do that in future is to embrace synthetic environments as part of our training regimes. We will have to bolt synthetic environments onto real environments so that we have real action and virtual action running simultaneously so as to test our ability to exercise command and control. One of the things that concerns me is that airmen tend to get comfortable when they are back at their well-found main operating bases. That is not what the future


J-UCAS-X-47B unmanned fighter (Andrew Hull, MoD)

## The notion of using UCAVs controlled from 10 time zones away to prosecute a battle is not something international law of the future will regard as acceptable

is about. For air power to be relevant, all our people have to have an expeditionary mindset. That is why collective training is very important in maintaining their warfighting edge, to make them realise that they are warfighters first and specialists second. Conducting such training in representative theatres at strategic range is expensive. SAIF SAREEA held in Oman in 2002 is just such an example but it was money very well spent. It generated confidence and understanding based on experience in real conditions.

Sustainability is another issue. General Moseley talked to you about fuel. What he did not say, was that this air campaign was fuel-limited. There was no other way we could get more aircraft in the air because we just did not have the fuel flows into the air bases. You saw those 4.8 miles of $8,500-$ gallon fuel trucks queuing outside PSAB. PSAB
was pumping 4.5 million gallons of aviation fuel per day into aircraft. There just was not any more fuel anywhere. A huge challenge in a large-scale operation.

The final part of my summation concerns the moral component of fighting power. When we go into combat, we have got to be sure that what we are doing is both legal and moral. I do not believe that, in future, even though technology will allow it, we will be allowed to indulge in robotic warfare. I simply do not see the international community regarding that as an appropriate way to fight. The notion of using UCAVs controlled from 10 time zones away to prosecute a battle is not something international law of the future will regard as acceptable. I think the notion of a person in the loop, the notion of positive ID, the notion of someone feeling the texture of what is going on
in the battlespace, is going to be more and more prevalent. The same aspects also mean that we will be asking more of our crews. Overall, I think robotic warfare drives you away from what I term as emotional connectivity with the battlespace. My view is that winning the hearts-and-minds battle with the indigenous population requires this emotional connectivity.

The media will be influential in the outcome of this debate. They are hugely powerful in terms of both generating and depleting public support. I worry over the degree to which the media now drives public opinion in every aspect of public life. An aspect of this is the degree to which this nation will always be a warrior nation. I wonder whether societal change will take us in a different direction. I wonder about the degree to which the role and rights of the individual are now so dominant in what is a consumerist society that we cannot, and will not, see the same sense of understanding and support for military action that we have always taken for granted. It is certainly the case that, as a society, we are developing in a way that would seemingly tend to drive us away from the understanding of what warfare is; that warfare is a dirty, disgusting and dangerous business. The mindset of the media leading up to the Iraq campaign was focused more on trivial stories rather than grand strategy; they simply did not understand what warfare was about. It is interesting to think that the military heroes of today, the Jessica Lynches, are actually the victims. Does this mean that society has turned round what they regard as suitable role models in a military context?

We see more jointery but what does that do for our motivation? Let me say something about the importance of single Service roots in a joint context. I describe this as the ' 3 Ps '. The first is professionalism, because it is your basic military credibility that comes from your single Service roots, your single Service ability to discharge your bit of the military campaign. That is where your professionalism comes from. The second is parenting. It is the esprit de corps, it is ethos, it is what you use as a touchstone in steep and scary places. It is tradition, it is about history, badges, squadron standards and identity: a sense
of where we have come from, it is all that is about your single Service parentage. It is that which motivates you to fight; it is that which motivates you to potentially put your life on the line. And thirdly, there is passion. If you are not passionate about what you do in a single Service context, you will never make the jump from single Service into joint command. So professionalism, parenting and passion are actually fundamental to motivation in the moral component of warfare.

Finally, let me move on to leadership. It is not something you can switch on when the moment comes. Part of leadership is trust and mission command is based on trust. The generation of trust, both in a command chain and in a coalition, is simply about doing what you say you will do. It is simply about being honest about what is in the art of the possible. There is also the need for robustness and particularly the need for robustness in the face of shocks. We know we are going to lose people, we know we are going to lose aircraft, that is what war fighting is about. But developing robustness and making sure that you have answered all the 'what-if' questions are vital aspects of leadership.

Good planning is also part of good leadership. In warfare there are a huge number of moving parts. The detail really matters and when some of those moving parts come from coalition partners then the requirement for good planning is even greater. Campaign planning is a relatively recent innovation to Royal Air Force officers, whereas it should be our stock-in-trade. It has to be that way otherwise, as a commander, you will not be in a position to guarantee that most of these moving parts will mesh. That brings me to the really important issue of operational art. "Technology cannot revive the genius" was never a truer quote. You do need to think of command, of leadership and of war fighting as an art that is founded on a science. But it is not a science; it is distinctly right brain not left brain. The only way you will find yourself able to confront that is through education and through training.

So, what are the main points? Air power can get you control of the air and it can get you the information you need to unravel an asymmetric
world. We are aiming at the ability to achieve precise campaign effects, at range, in time. We know that the 'time' part of it is the difficult one. We know we need to be warfighters first and specialists second. By doing so, we will make air power relevant because we can turn asymmetric targets into symmetric targets for a fleeting moment in time, but we must be able to do it again, and again, and again. That is what
persistence is all about. We know that this is a deeply human endeavour. It is not possible to delegate much of this to technology. We now need flexible platforms and agile people whereas in the past we needed agile platforms and flexible people. We need really agile people and the only way we can have that agility is for you to take it upon yourselves to educate yourselves and think deeply and conceptually about the issues we face.

## Air power can get you control of the air and it can get you the information you need to unravel an asymmetric world

RAF C-130J Hercules at an Allied base during Op TELIC



# Rising from the Ashes <br> Allied Air Power and Air Support for 14th Army in Burma, 1943-1945 

## By Dr Sebastian Ritchie

On the afternoon of 2 May 1945 the Officer Commanding 110 Squadron, Wing Commander AE Saunders, piloting a de Havilland Mosquito, was making a reconnaissance of Rangoon airfield when he observed a large white marking, as though a cloth had been laid out in surrender. He decided to land. Finding no Japanese at the airfield he proceeded to the city gaol, where some 1,400 Allied POWs had been incarcerated. There he was received by the senior officer, Wing Commander LV Hudson, Royal Australian Air Force, who
confirmed that the enemy had abandoned Rangoon a few days earlier. ${ }^{1}$

It was entirely appropriate that Rangoon should have been liberated, symbolically at least, by the Royal Air Force. For the advance that brought General Slim's 14th Army from northern Burma to within 50 miles the capital in just six months, after more than two years of stalemate, would have been impossible without air power. During the campaign, transport aircraft of the Combat

There was . . so little intelligence on the Japanese that the RAF did not know of the existence of the Zero fighter

Cargo Task Force supplied an army of more than 300,000 ground troops; without their efforts, Slim's operations would have been logistically unsustainable. Close air support aircraft were guided onto ground targets by forward air control teams, helping to punch through Japanese opposition wherever it was encountered. Medium and heavy bombers cleared particularly difficult obstacles in so-called 'earthquake' operations. In January 1945 an especially well prepared enemy defensive complex at Gangaw blocking Slim's crucial right hook to the west of Mandalay was the target of one such attack; afterwards it was captured at a cost of only two infantrymen wounded. Allied fighters also shielded Slim's advance from Japanese reconnaissance aircraft, ensuring that their high command remained oblivious to the developing threat on their flank until it was too late; at the same time Allied aerial reconnaissance provided an abundance of vitally important targeting intelligence and battle damage assessment information. And as the ground troops moved southwards, so too did Allied air power: by the early months of 1945 former enemy airfields
were being brought into operational use within days of their capture by Slim's forces. This both ensured the maintenance of airborne supplies, and enabled close air support and fighter aircraft to be positioned near to the battlefront.

On the eve of hostilities with the Japanese, Allied air power in South-East Asia was virtually nonexistent; in 1940 the Royal Air Force possessed only a handful of largely obsolete aircraft in theatre. ${ }^{2}$ According to one leading historian:
"There were few airfields, a small maintenance unit on Singapore, few spare parts and supplies, few trained pilots and so little intelligence on the Japanese that the RAF did not know of the existence of the Zero fighter." ${ }^{3}$

Yet in 1944 the British Empire and American air forces in Burma participated in one of the war's most outstanding feats of air support for a land campaign. Moreover, they did so in a theatre where climatic and topographical conditions combined to produce one of the most hazardous flying environments in the world. The full range of land-based air operations which underpinned 14th Army's victory

## During the early stages of the war with Japan, Allied air forces in South-East Asia found themselves heavily outnumbered and outclassed by their adversaries

Japanese Ki-43 Oscar aircraft prepare for take-off

included air defence, offensive counter-air, close air support, air interdiction, strategic bombing, photographic reconnaissance, tactical air transport, airborne operations, glider operations, special operations and maritime air reconnaissance. A truly dramatic transformation had occurred.

Histories of the air war in Burma have predominantly offered narrative accounts of the growth of Allied air power from its inauspicious beginnings through to the victories of 1944 and 1945, culminating in the liberation of Rangoon. The aim of this paper is to provide a more analytical approach to the problem. By focusing here on air superiority, air transport, and close air support operations, the objective is to demonstrate how and why air power came to play such a crucial role in the Allied victory.

Inevitably, the specific issue of army-air cooperation, whether through airborne supply or close air support, has featured very prominently in the historiography of Allied operations in Burma. Yet it is important to remember that none of the air operations in support of 14th Army would have been possible without one fundamental precondition - air superiority: the air-air battle had to be won before the air-land battle could be won. During the early stages of the war with Japan, Allied air forces in South-East Asia found themselves heavily outnumbered and outclassed by their adversaries. On 7 December 1941 the RAF
possessed just 181 serviceable aircraft in theatre, and their principal fighter, the American-built Buffalo, quickly proved to be no match for modern Japanese fighters like the Zero and the Oscar. Although reinforced by small numbers of British Hurricanes and American P-40s, the squadrons committed to the defence of Burma fell victim to determined counter-air operations by large formations of Japanese aircraft early in 1942, and were soon wiped out. ${ }^{4}$

The task of rebuilding Allied air power in Burma afterwards passed to the British and American commands in India. It was a painfully slow process. The 'Germany first' strategy pursued by the Allies ensured that South-East Asia was invariably accorded lowest importance in the allocation of resources and although more aircraft began to reach India during 1943, the most modern fighters and bombers were held in Europe. The first Spitfire fighters only arrived in October 1943.5

But such aircraft would in any case have been difficult to employ to optimum effect without the necessary supporting infrastructure, which had to be created almost from scratch. This inevitably took time, but it enabled air power to be far more decisively projected later on. The various infrastructure projects included a massive airfield construction programme, the multiplication of supply and maintenance depots, the improvement of communications, and the establishment of a radar chain (augmented by ground observers), and

> Over Burma, by January 1944, the Allies possessed an advantage of almost 5:1 in fighters over Japan


Spitfire VIIIs belonging to No 607 Squadron RAF; this squadron flew fighter and ground attack sorties in support of the Allied armies in Burma. A US Army Air Force B-25 Mitchell prepares to take off in the background

# By January 1945, after the diversion of some of their forces to the Philippines, the Japanese could field only 126 frontline aircraft in South-East Asia, while Air Command South-East Asia numbered more than 1,500 aircraft 

fighter control facilities. ${ }^{6}$ No less important was the creation, in the final months of 1943, of a properly unified and integrated command and control structure, Air Command South-East Asia, covering all British and American air forces in India and Burma. ${ }^{7}$

While these preparations were under way, Allied air strength was being steadily augmented. Compelled to spread their air forces across several theatres, and unable to produce sufficient numbers of aircraft or pilots, the Japanese lost the numerical superiority that they had enjoyed in 1942. Over Burma, by January 1944, the Allies possessed an advantage of almost 5:1 in fighters over Japan; moreover, by then fighter squadrons were being re-equipped with aircraft like the Spitfire, soon followed by American P-38s, P-47s and P-51s, which proved more than a match for the best Japanese fighters. Japanese air operations over Allied territory began to incur unsustainable attrition rates. ${ }^{8}$ In the second Arakan campaign in February, 1944, Japanese air attacks on the so-called 'Admin Box' were beaten off, and the Japanese Army Air Force proved unable to stop airborne supplies from reaching the surrounded Indian ground troops; 65 Japanese aircraft were destroyed or damaged, for the loss of only three Spitfires. The same pattern was to be repeated in the battles of Kohima and Imphal. ${ }^{\text {. }}$

At the same time Allied long-range fighters and bombers embarked on an offensive counter-air campaign against the principal Japanese airfields in Burma, destroying numerous aircraft on the ground and in air combat. The Japanese were compelled to operate from distant bases; some of their sorties over Imphal were flown from airfields 600 miles from the front. ${ }^{10}$ Concurrently, Allied air strikes against Japanese supply lines left numerous aircraft at forward airfields grounded by shortages of spare parts. ${ }^{11}$ Replacement aircraft, pilots, and spares were also stopped en route to Burma after details of their movement were intercepted by

Allied signals intelligence. ${ }^{12}$ The final tally of Japanese aircraft destroyed or damaged between December 1943 and May 1944 was $760 .{ }^{13}$ By mid1944 the Allies were able to conduct air operations virtually unchallenged; air superiority was won over Burma at approximately the same time as it was established over Western Europe. By January 1945, after the diversion of some of their forces to the Philippines, the Japanese could field only 126 frontline aircraft in South-East Asia, while Air Command South-East Asia numbered more than 1,500 aircraft. ${ }^{14}$

The advantages which air superiority conferred on the Allies were nowhere more in evidence than in the air transport operations mounted in support of 14th Army between 1943 and 1945. Logistics lay at the very heart of the British Army's inability to confront the Japanese in 1942. Throughout the Burma campaign the Japanese had consistently mounted flanking movements through the jungle around road-bound British columns. While engaging British forces frontally, they sent mobile units on foot to strike the vulnerable British lines of communication. To protect them, the British then withdraw troops from the front line, only for the Japanese to increase the intensity of their frontal assault. The British were repeatedly left with no alternative but to retreat.

The potential for the Japanese themselves to be outmanoeuvred through the application of air power only gradually became clear. In the late 1930s the RAF had largely been constructed around Bomber Command and Fighter Command, and when Burma fell in 1942 an air transport force was still in the early stages of development. ${ }^{15}$ But air transport occupied a far more prominent position in USAAF doctrine, and the United States possessed significantly larger numbers of transport aircraft. ${ }^{16}$ Air transport was employed effectively but on a limited scale by both air forces during the retreat from Burma in 1942 to bring emergency supplies to ground troops and to evacuate personnel. It subsequently became

central to American efforts to support China from India, and to the supply of isolated garrisons such as Fort Hertz, and ground troops cut off from surface transport by the monsoon. ${ }^{17}$ Elsewhere in the Far East, such as Papua, transport aircraft were successfully used to supply American and Australian ground forces. ${ }^{18}$

But the real turning point in Burma was the first of Wingate's long-range penetration expeditions in February 1943. Although the direct military impact of his expedition was limited, Wingate demonstrated beyond doubt the feasibility and military economy of air supply of ground troops in jungle combat. Each of his columns had its own RAF liaison officer, responsible for relaying supply
requirements to the supply base at Assam, and for organising drop zones. ${ }^{19}$ In all, some 178 sorties were flown by RAF transport aircraft in support of Wingate's forces, the so-called 'Chindits', dropping 303 tons of supplies. ${ }^{20}$ Thereafter, the potential for supplying ground forces by air would always be considered by Allied commanders.

The second Arakan campaign began in November 1943. For the first time, Allied planning now presupposed total dependence on airborne supply for at least one of the divisions involved, 81 West African Division, on the eastern flank. After early progress, the Allied advance was itself confronted by a Japanese offensive in February 1944 which was conducted on exactly the same tactical

## The second Arakan demonstrated that through the use of airborne supply, Japanese jungle tactics could be defeated

principles that had proved so successful in the past. The difference was that Messervy's 7 Indian Division did not respond to the Japanese flanking manoeuvres by retreating: instead they were ordered to stand and fight, and to rely on airborne supply.

Concentrated around the Admin Box, they heroically repelled the Japanese onslaught in some of the bloodiest fighting of the war in Burma, while a steady stream of Dakotas sustained them with rations, weapons and ammunition. These missions were executed in very close proximity to the enemy, and many aircraft were damaged by small-arms fire from the ground; nevertheless, 700 supply sorties were flown to the Admin Box, while in total Allied transport aircraft flew more than 3,000 sorties to convey 10,000 short tons of supplies to the divisions involved in the Arakan campaign in the crucial month of February 1944. By mid-February the forward Japanese units were themselves running out of supplies, and by the last week of the month they were in full retreat. The second Arakan demonstrated that through the use of airborne supply, Japanese jungle tactics could be defeated. ${ }^{11}$

The experience was to be repeated on a larger scale at the battles of Kohima and Imphal in March 1944, but not before a further radical development in the employment of air transport in Burma. This was the movement of an entire division, 5 Indian Division, from the Arakan front to shore up the defences around Imphal, which was threatened by the second stage of the Japanese offensive; the division's redeployment required about 750 transport sorties, in addition to those needed to airlift reinforcements from India into the area. The ground forces at Kohima were subsequently maintained in a tiny garrison area by transport aircraft flying in daylight at an altitude of only 200-300 ft, invariably under small-arms fire from the Japanese. At Imphal a force of 150,000 troops in contact with the enemy and 138 miles from the nearest railhead had to be sustained entirely from the air. Their requirement of more than 400 tons of stores per day had to be flown into a valley ringed by Japanese guns. In total, Allied transport aircraft brought more than 32,000 tons of stores into the Imphal-Kohima area during April, May and June

1944, moved nearly 59,000 personnel into or out of the battle area, and evacuated 15,000 casualties. By the end of June it was once again the Japanese who were compelled to withdraw.

At Second Arakan, Kohima and Imphal, 14th Army had drawn decisively on air transport, but had largely done so spontaneously, as a desperate measure to stave off defeat. However, the potential for building air transport into many different stages of operational planning was in the meantime illustrated by the second of Wingate's long-range penetration expeditions. The first Chindits had their powers of endurance stretched to the very limit by their infiltration through the Burmese jungle on foot; they only depended on the air for supplies. But Wingate's second, far larger, operation relied on air transport for deployment, supply, casualty evacuation, and in part for extraction. The initial deployment, undertaken by transport aircraft and gliders, conveyed 12,500 troops into the field along with full field equipment, pack animals, bulldozers, jeeps, tractors, armoured cars, ammunition, rations, anti-aircraft guns and artillery; this force was then sustained by 2,000 tons of airborne supplies per month. Light L-1 and L-5 aircraft evacuated more than 1,300 casualties, and RAF Sunderland flying boats brought out a further 500 wounded by landing on Lake Indawgyi, after forward air strips had been flooded by the monsoon. ${ }^{22}$

In summary, between the beginning of 1943 and mid-1944, air transport operations in Burma established a range of precedents, which came to exert a decisive influence on Allied planning and tactics. The first Wingate expedition introduced the principle of airborne supply for fielded forces in Burma. The second Arakan campaign witnessed the deployment of a regular division dependent on air supply, and the first defeat of a Japanese offensive in Burma, partly through airborne supply. The second Wingate expedition saw the deployment of a major ground force by air, and also the partial extraction of that force by air. Imphal demonstrated the Allies' capability to use air transport to switch an entire division from one front to another, and to sustain an entire corps by air. Hence, given the availability of sufficient transport aircraft, air power could demonstrably


air support (CAS). The RAF's limited tactical capability during the early years of the war is well known and requires no further comment here. In fact it could be argued that the doctrinal obstacles to effective CAS which had so influenced the RAF in the late 1930s had largely been swept away by the time hostilities commenced with the Japanese, as a result of experience gained in northwest Europe and North Africa. Again, however, resource constraints impeded the development of CAS in Burma in 1942 and the first half of 1943.

During the first Arakan campaign in late 1942 and early 1943 the only bombers available for CAS were three squadrons of Blenheims, which proved quite unsuited to the task. Fighters also provided direct support, but were more successful strafing enemy lines of communication. Enemy targets in jungle locations were often impossible to identify from the air, so instead they were indicated to pilots by pinpoint positions or by smoke shells
fired by the artillery. The effectiveness of such methods was often hard to gauge, however, and there was a chronic shortage of accurate battledamage assessment information. On the ground, Army units at first supplied wildly over-optimistic reports on their effectiveness; many Japanese bunkers and foxholes in fact emerged unscathed from bombing attacks. It also proved difficult to co-ordinate air and ground operations effectively; assault troops were assembled too far from the Japanese lines, and the defenders usually recovered from the effects of bombing before the ground attack started. ${ }^{24}$

During the operation 224 Group, based at Chittagong, had overall responsibility for providing air support, while an organisation called the Army Air Support Control operated alongside 14 Division's headquarters to control tactical aircraft engaged in CAS. Air Support Controls were linked to Brigade and RAF Wing headquarters. They first appeared in the Western


Desert in 1942. The Army Air Support Control seemed to function well enough, but the small scale of operations probably meant that it was not very rigorously tested. ${ }^{25}$ Wingate's first expedition likewise provided few opportunities for developing CAS tactics or organisation. ${ }^{26}$ The decisive impetus would only come at the end of 1943 and in early 1944.

By the second Arakan campaign, Allied air forces were numerically stronger and more capable, but could hardly be considered modern by the standards of the air forces in northwest Europe. The aircraft available for direct support included Hurricane fighter-bombers and Vengeance dive-bombers, and American B-25s and British Wellingtons from the Strategic Air Force also participated. But the results were far from satisfactory and were in many respects similar to those observed in the earlier campaign. Accurate targeting again proved exceptionally difficult in the jungle terrain; Japanese defences were deep, strongly protected, well camouflaged, and hence very resilient. The heavier bombers could only periodically be diverted from other operations
to assist the offensive, and any advantage which they conferred on the attacking forces from the impact of their bombing was invariably offset by their greater margin of error, which compelled Allied ground troops to begin their assault too far away from their ultimate objective. The problem of co-ordination was exacerbated by the fact that the larger bombers were based hundreds of miles behind the battlefront.

Operational control of CAS aircraft engaged in Second Arakan was again vested in 224 Group, but the Group headquarters was separated from 15 Corps headquarters by a distance of about 100 miles. During the second Arakan campaign, CAS was therefore once again directed through the medium of an Army Air Support Control located with 15 Corps. Difficulties arose because, while 15 Corps was entirely committed to the Arakan offensive, 224 Group was engaged in a variety of other operations, including long-range attacks on enemy lines of communication and fighter escort duties. In these circumstances there was inevitably strong competition for resources between the two headquarters, and it proved difficult to strike a
mutually acceptable balance. ${ }^{27}$
The second Arakan offensive nevertheless witnessed two tactical developments of considerable long-term significance. First, in the later stages of the campaign, ground forces communicated directly by radio with tactical aircraft to guide them towards their targets - a technique then also emerging in Italy and (under American sponsorship) in northern Burma. Second, a system was introduced whereby heavier bombing attacks were swiftly followed up by precision attacks by tactical aircraft, designed to keep enemy forces pinned down until ground troops had closed on their positions. Properly practised and refined, these tactics would in time provide the solution to co-ordinating air and ground attacks in the Burmese theatre. ${ }^{28}$

Ground operations in the spring of 1944 provided a further stimulus to the development of CAS organisation and tactics. The tactical aircraft of 221 Group flew more than 25,000 sorties from March to July in support of ground forces at Kohima and Imphal. Slim later acknowledged that "without the victory of the air forces there could have been no victory for the Army". The battle raised many of the same tactical issues that had arisen on the Arakan front, but inter-service co-operation improved considerably, not least because 221 Group headquarters was located forward on Imphal plain, along with some of the squadrons actually engaged in CAS. This greatly facilitated army-air liaison. ${ }^{29}$ Closer co-operation was reflected in more effective targeting and co-ordination between air and ground forces; during the battle assault troops were brought to within 200 yards of enemy targets being attacked by tactical aircraft. ${ }^{30}$

In the same period Wingate's second expedition witnessed the more systematic employment of ground-to-air radio to direct tactical aircraft on to their targets. In a sense there was no alternative, because Wingate's forces were operating hundreds of miles from Allied air bases; the situation on the ground was liable to change between the time that air support was requested and the arrival of the aircraft in the target area. So RAF sections - the RAF Component Special Force - deployed with Wingate's six brigades. During tactical air operations
they worked as forward air controllers, guiding aircraft towards enemy forces, which were also illuminated by smoke shells from mortars or artillery.

The supporting aircraft were themselves assigned to a special unit named the Air Commando Force, a controversial measure but one that worked in the specific circumstances of the expedition. Tactical air operations during the expedition provided ample opportunity for comparing attacks by aircraft with and without radio contact with the ground, and it was found that CAS was far more effective when ground-to-air radio was employed. The difficulty of targeting enemy forces in the jungle environment also encouraged efforts to exploit photographic reconnaissance more effectively. Altogether, some 382 tactical operations were conducted during the campaign involving 1,900 sorties. ${ }^{31}$

In the first half of 1944, 14th Army's campaigns contained numerous lessons on CAS. They demonstrated that operations would benefit from closer army-air co-operation at headquarters level, that tactical air control could be improved by the more widespread use of ground-to-air radio and photographic reconnaissance, and that air and ground attacks could be better synchronised without undue risk to ground troops. During the second half of the year these issues were studied intensively, together with developments in the application of CAS in Europe. The result was a series of organisational changes, which drew on European experience while at the same time making allowances for differences between the two theatres. These included the far greater distances between deployed formations and units that were often a feature of operations in Burma, and the relatively poor standard of communications there. ${ }^{32}$

First, the decision was taken to co-locate the headquarters of 14th Army with the headquarters of 221 Group, which was to be responsible for controlling all CAS aircraft engaged in the forthcoming campaign in central and southern Burma. ${ }^{33}$ When the speed of 14th Army's southward advance threatened to open too great a gulf between the headquarters and units near the battlefront, it was decided to form what was known as a Group Control Centre, which would

# The 'earthquake' operations that resulted were designed to exploit the psychological effect of bombing on the enemy and not simply the material damage inflicted 

move as far forward as possible with the most advanced Wing headquarters to take control of all CAS operations. ${ }^{34}$ Secondly, once the controlling function of the Air Support Controls had passed to the Army / Air headquarters, they were replaced by Air Support Signals Units. Their role was to operate a dedicated signals network solely for the purpose of air support, functioning at corps, division and brigade level and at group and wing headquarters: these units had first been created in Europe earlier in $1944 .{ }^{35}$

At the battlefront itself the basic organisational unit, underpinning the entire system, was the Visual Control Post. Visual Control Posts were joint mobile Army / RAF teams functioning at brigade level and equipped with ground-to-air radios. As the name suggests, they controlled tactical aircraft visually from a position on the ground commanding a view of the battle area. Specifically, they were tasked to:

1. Assist aircraft to identify their targets, or to adjust them.
2. Cancel or delay operations if necessary
3. Direct aircraft to secondary targets.
4. Direct aircraft from a 'cab rank' (orbiting patrol).
5. Co-ordinate and control heavy bomber operations in support of ground forces. ${ }^{36}$

Alongside this new organisation, important tactical changes were introduced to maximise the impact of Allied air support. There were particularly marked improvements in the exploitation of heavy and medium bombers immediately preceding the assault of enemy strong points by the Army. The tentative experiments witnessed during the second Arakan campaign were rationalised and refined; there were extensive exercises and rehearsals. The 'earthquake' operations that resulted were designed to exploit the psychological effect of bombing on the enemy and not simply the material damage inflicted. According to one contemporary document:
"Air bombardment can NOT completely neutralise an area . . . At Cassino and Caen . . . reports show that the numbers actually killed were small but that there was a most marked stunning effect for a period of time . . . Our infantry and armour must take immediate advantage of this period of stunned uncertainty. ${ }^{37}$

Earthquake operations scheduled an initial strike by heavy or medium bombers, followed by fighter-bomber attacks that receded as the ground troops advanced, and finished with dummy attacks. Ground troops were brought to within 700-800 yards of their objectives during the heavier bombardment, and closed to 200-300 yards while the fighter bombers were in action. By launching their final assault so close to the Japanese positions, they were able to exploit the demoralisation and disorientation which bombing invariably generated among enemy forces to overwhelm their defences. ${ }^{38}$

In 14th Army's southern offensive to liberate Burma in 1945 all the basic components of Allied air support for ground operations described in this paper can be identified. When operations commenced, Allied air superiority protected Slim's troops from all but the most limited and ineffective attacks by the Japanese Army Air Force. It also ensured unhindered air transport and CAS in support of ground forces; air transport provided the army's logistical chain, while CAS played a crucial part in destroying Japanese resistance. As soon as territory had been seized, captured airstrips were re-opened, bringing air superiority fighters and ground support aircraft close to the front, and allowing supplies and reinforcements to be flown in; this in turn provided the impetus behind further advances on the ground. The application of these tactics had almost brought 14th Army to the gates of Rangoon when the monsoon started at the end of April 1945. By that time the Japanese had fled the city.

The process by which air power was developed to support Allied ground forces in Burma can only be described as incremental - the absorption of lessons from previous operations and from other theatres, and their application to future campaigns.


A C-46 Commando aircraft airlifts supplies and troops in to the battle-

By 1944, it was air power that gave the Allies a means of defeating the Japanese army, particularly (although by no means exclusively) through the systematic exploitation of airborne movement and logistics, and close air support

After the initial defeats of 1942, Allied air power was gradually rebuilt, like the proverbial phoenix rising from the ashes. Air superiority - the key to full exploitation of the air medium - had been won by mid-1944. The scope for using air transport to solve the army's fundamental problems of movement and logistics became clear partly from unplanned measures of last resort implemented to avoid defeat, and partly from the inventive and far-sighted initiatives of Wingate's expeditions. In Wingate's second operation it was for the very first time planned that virtually all long-range movement and logistical arrangements should depend on air transport. The same basic approach, vastly extended, was then employed by 14th Army during the re-conquest of central and southern Burma. The evolution of CAS was similarly incremental, the exigencies of battle producing organisational and tactical changes which were then studied, refined, rehearsed, and adapted in the light of European experience. After a great deal of trial and error, the Allies had by the later months of 1944 established a formidable CAS capability, which was applied with devastating effect in the final Burmese campaigns.

An explanation of air power's triumph in Burma in 1945 must begin with the disastrous defeats of 1942 and early 1943. These early campaigns showed that the Japanese were better prepared for jungle warfare than the Allies in almost every respect experience, doctrine, training, equipment, tactics and logistics. In a straightforward confrontation
between Allied and Japanese ground forces, the Japanese clearly held too many advantages; the task of evicting them from Burma using ground forces alone would have proved enormously difficult, drawn-out and costly. By 1944, it was air power that gave the Allies a means of defeating the Japanese army, particularly (although by no means exclusively) through the systematic exploitation of airborne movement and logistics, and close air support. At the same time these vital capabilities were denied to the Japanese, so that their ground forces were placed at a decisive disadvantage. Behind these developments lay the Allies' pursuit of a general air strategy, and their willingness to allocate material and human resources to air power on a scale that dwarfed the combined efforts of the Axis powers, who tended to view air warfare merely as an adjunct to land or naval warfare. ${ }^{39}$

The final word may be left to Slim himself: "The Allied air forces ranged all over Burma as far south as Rangoon, on a plan designed almost entirely to help 14th Army. Enemy fighter squadrons were driven farther and farther back, his communications harried all round the clock, his movement by day made perilous and by night delayed. Our attacks were preceded by devastating 'earthquake' bombardments; our bridgeheads as we clung to them screened from fire by the air. Never, I believe, was air co-operation closer, quicker or more effective; never was it more gratefully appreciated than by 14th Army and its commander." ${ }^{40}$

## Notes:

${ }^{1}$ Air Ministry and Central Office of Information, Wings of the Phoenix: The Official Story of the Air War in Burma (London: HMSO, 1949), 136. The Phoenix was the emblem of South East Asia Command.
${ }^{2}$ RJ Overy, The Air War, 1939-1945 (New York: Stein and Day, 1981), 114.
${ }^{3}$ Ibid.
${ }^{4}$ Air Commodore Henry Probert, The Forgotten Air Force: The Royal Air Force in the War Against Japan, 1941-1945 (London: Brasseys, 1995), 84-6, 93-4; British Intelligence Objectives SubCommittee report, BIOS/JAP/PR1987, Air Operations in China, Burma, India, World War II, 11-12, copy held at Air Historical Branch.
${ }^{5}$ Hilary St George Saunders, Royal Air Force, 1939-45, Vol. 3, The Fight is Won (London: HMSO, 1975), 299. Photo-Reconnaissance Spitfires had arrived earlier, however.
${ }^{6}$ Saunders, The Fight is Won, 299, 307-8.
${ }^{7}$ BIOS/JAP/PR1987, Air Operations in China, Burma, India, World War II, 7-8.
${ }^{8}$ Ibid., 14.
${ }^{9}$ Probert, Forgotten Air Force, 168, 192.
${ }^{10}$ Saunders, The Fight is Won, 331.
${ }^{11}$ BIOS/JAP/PR1987, Air Operations in China, Burma, India, World War II, 14-15.
${ }^{12}$ Alan Stripp, 'Japanese Army Air Force codes at Bletchley Park and Delhi', EH Hinsley and Alan Stripp (eds.), Codebreakers: The Inside Story of Bletchley Park (Oxford: Oxford University Press, 1993), 292.
${ }^{13}$ BIOS/JAP / PR1987, Air Operations in China, Burma, India, World War II, 15.
${ }^{14}$ Probert, Forgotten Air Force, 244.
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${ }^{16}$ Arthur Pearcy Jr., The Dakota (London: Ian Allan, 1972), 13-20. ${ }^{17}$ BIOS/JAP / PR1987, Air Operations in China, Burma, India, World War II, 27; Air Command South East Asia, Air Transport Operations on the Burma Front (unpublished official account, 1944), 8, copy held at Air Historical Branch.
${ }^{18}$ JG Taylor, Air Supply in the Burma Campaigns (Air University USAF Historical Division Study, 1957), 12, copy held at Air Historical Branch.
${ }^{19}$ Taylor, Air Supply in the Burma Campaigns, 14-15.
${ }^{20}$ Saunders, The Fight is Won, 302.
${ }^{21}$ Probert, Forgotten Air Force, 169-70; Air Command South East Asia, Air Transport Operations on the Burma Front, 14.
${ }^{22}$ BIOS/JAP/PR1987, Air Operations in China, Burma, India, World War II, 31.
${ }^{23}$ Air Chief Marshal Sir Keith Park, Despatch on Air Operations, from 1 Jt June 1944 to the Occupation of Rangoon, October 1945, 20, copy held at Air Historical Branch.
${ }^{24}$ The Campaigns in the Far East, Vol. 3, India Command, September 1939-November 1943 (unpublished official narrative, undated), 82-7, copy held at Air Historical Branch.
${ }^{25}$ AP3235, Air Support (unpublished official monograph, 1955),
126-7, 139, copy held at Air Historical Branch.
${ }^{26}$ Probert, Forgotten Air Force, 136.
${ }^{27}$ The Campaigns in the Far East, Vol.4, South East Asia, November 1943 to August 1945, (unpublished official narrative, 1952), 56-8, copy held at Air Historical Branch.
${ }^{28}$ Ibid., 56-7, 369.
${ }^{29}$ Probert, Forgotten Air Force, 188-92.
${ }^{30}$ The Campaigns in the Far East, Vol. 4, 125.
${ }^{31}$ Ibid., 184; Probert, Forgotten Air Force, 174-9; AP3235, Air Support, 139.
${ }^{32}$ Air Marshal WA Coryton, Despatch covering operations of Third Tactical Air Force from 1 June 1944 to 4 December 1944, December 1944, 8, 41, copy held at Air Historical Branch. ${ }^{33}$ AP3235, Air Support, 134.
${ }^{34}$ The Campaigns in the Far East, Vol. 4, 377-8; Air Headquarters Burma, The Reconquest of Burma: A History of the Air Support Rendered to Ground Forces, 14 Army, by No. 221 Group, RAF, January 1945-September 1945 (unpublished official narrative, 1945), 88, copy held at Air Historical Branch.
${ }^{35}$ AP3235, Air Support, 118, 134; Ian Gooderson, air power at the Battlefront: Allied Close Air Support in Europe, 1943-1945 (London: Frank Cass, 1998), 26-7.
${ }^{36}$ AP3235, Air Support, 135.
${ }^{37}$ Air Marshal WA Coryton, Despatch covering operations of Third Tactical Air Force from 1 June 1944 to 4 December 1944, December 1944, 8, 43-4.
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${ }^{39}$ Overy, The Air War, 262.
${ }^{40}$ Probert, Forgotten Air Force, 264.


# What Should We Bomld? Axiological Targeting and the Abiding Limits of Airpower Theory 

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## By Dr Paul Rexton Kan

"Airpower is an unusually seductive form of military strength because, like modern courtship, it appears to offer gratification without commitment." (Eliot A Cohen)

In the 100 years since the advent of airpower and its subsequent use in warfare, airmen and strategists still debate the appropriate targets for aerial bombing that will ensure victory. Early airpower advocates promised quick and decisive victory in modern war by selecting and striking targets critical to an enemy's war efforts. They reasoned that by depriving modern nation-states of their ability to use certain key features of their societies,
airpower would prevent the horror of trench warfare witnessed in World War I, thereby limiting overall human suffering.

In the post-Cold War era, Western air forces have fought against states led by dictators, ethno-nationalist tyrants and religious fundamentalists; all had little industrial might to sustain open hostilities for a long period of time. Nonetheless, victory came at a substantially lower cost to civilians than was the case during the air campaigns of World War II. The promise of the early airpower advocates seems to have been realized. Although the civilian casualties and significant hardship caused by recent conflict do not match those incurred during

# Coercion involves the destruction of certain targets but does not require complete annihilation of the adversary or of his necessary means of resistance 

An F-16 drops a Laser Guided Bomb (LGB)

World War II, they continue as features of post-Cold War air campaigns.

This article explores a new theory that reopens the debate over airpower's targeting priorities: axiological targeting. Lt Col Peter Wijninga of the Royal Netherlands Air Force and Richard Szafranski first explored this theory in their article Beyond Utility Targeting: Toward Axiological Air Operations. The term axiological, which combines two Greek words: axios (worthy) and logos (reason or theory), is the study or theory of values - what they are and where they are placed. Wijninga
and Szafranski argue that the Air Force should explore axiological targeting as a way of refining the theory and practice of coercive airpower. For them, "the aim of axiological aerospace operations is to use air, space, and information power to force a behavior shift in belligerent leadership in the quickest and most economical ways possible . . . Value targeting engages the minds and needs of leaders at all levels, knowing that they, and not their war-fighting stuff, are the real source of the conflict and its prolongation and the essential ingredient to its resolution. ${ }^{11}$ Axiological target sets might include bank accounts and finances, as well
as entertainment, sports, and recreational facilities, used by the senior leadership. In other words, axiological targeting sees non-military centers of gravity as more strategic and counter-value targets as more important than counterforce targets.

This new theory seeks to coerce adversaries by holding at risk those things they value most. The authors reason that one can reduce the suffering of innocents even further by striking more personal targets. Unlike previous airpower theories, axiological targeting does not focus on elements that an adversary uses to mount a military campaign. Rather, it is more flexible and more notional in its identification of counter-value targets that may be centers of gravity.

However, this approach is fraught with dangerous assumptions that may put civilians and armed forces at greater risk. In fact, axiological targeting represents the limits of airpower in practice and the complicated logic of airpower as theory. Now that the context of warfare has shifted away from trench fighting of the early twentieth century, one must evaluate how axiological targeting may be
applied against today's adversaries on today's battlefields. This article explores the risks of this new theory and demonstrates how it represents the overall limits of airpower in confronting opponents during the early twenty-first century.

## What is axiological targeting?

Axiological targeting is part of the school of coercive-airpower thought that believes airpower is uniquely suited to force an adversary to accept the demands of the attacker. It accepts the challenge issued by Robert Pape, who maintains that coercive airpower has significant drawbacks: "The key problem with coercion is the validity of the mechanisms that are supposed to translate particular military effects into political outcomes." ${ }^{2}$ Coercion involves the destruction of certain targets but does not require complete annihilation of the adversary or of his necessary means of resistance. As such, axiological targeting becomes a logical extension of the airpower theories of the interwar period. By identifying the correct target set within a center of gravity, airmen can use that set as a lever to modify an enemy's behavior and attitude.

## Utility targeting

 is designed to strike at the means of waging war. Troops, airfields, bases, ships, trains, tanks, aircraft, and command and control (C2) facilities exmplify targets...

# The most persuasive case favoring the effectiveness of axiological targeting may be the North Atlantic Treaty Organization's (NATO) air campaign against Yugoslavia in 1999 

One can easily recognize a campaign of coercion by examining the rhetoric employed by the political leaders of an attacking state - bombing campaigns are designed to 'send a message to the leadership' or 'ratchet up the pressure' in hopes the adversary will acquiesce to the attacker's demands. The modern airpower of many Western militaries is uniquely suited for a strategy of coercion since adversaries can do little to inflict substantial casualties against air forces that can evade their air defense networks.

The United States Air Force, in particular, can deploy rapidly and bring to bear tremendous and persistent firepower: "The USAF offers a highly versatile coercive instrument. air power can attack strategic, operational and tactical targets. It can re-supply friendly forces and provide essential intelligence. One, some, or all of these functions may play a role in successful coercion." ${ }^{3}$ In addition, airpower represents a large part of political calculations that include the quick resolution of a conflict on American terms. One of the advantages the Air Force has over other services is its ability to halt ground invasions or limit aggressions before they become a faits accomplis. ${ }^{4}$

Although the Air Force is a potent fighting machine, the challenge of axiological targeting (as with all airpower theory) lies in acquiring the necessary intelligence to glean some insight into the mind of the adversary. How does he meet his particular idiosyncratic needs? What does he value most, and what level of military pressure would make him capitulate? As such, axiological targeting stands in contradistinction to the current theory and practice of utility targeting.

Utility targeting is designed to strike at the means of waging war. Troops, airfields, bases, ships, trains, tanks, aircraft, and command and control (C2) facilities exemplify targets that have a direct use in military campaigns - what Wijninga and Szafranski call "war-fighting stuff". For them, John Warden's five-ring theory is the epitome of utility targeting. According to Warden, one can treat the enemy as a system comprised of five concentric rings (from the inside out): leadership, organic or system essentials, infrastructure, population, and fielded forces. One can target these elements
with airpower, either to create a malfunction in the system or induce paralysis, thereby bringing about surrender. Wijninga and Szafranski believe that axiological targeting further refines the center ring of Warden's theory by identifying objects that enemy leaders use to sustain themselves by fulfilling their basic needs. ${ }^{5}$

If Warden's five-ring approach is the epitome of utility targeting in theory, then the epitome of such targeting in practice is the air campaigns of the first and second Gulf wars. Leadership targets were of primary interest to air-campaign planners because by 'decapitating' the Iraqi regime, the coalition could prevent Saddam Hussein's military from mounting an effective resistance. In effect, coalition forces paralyzed the regime by targeting enemy leaders, communication systems, and infrastructure in major cities. During Operation IRAQI FREEDOM, the press referred to targeting by using the terms 'shock and awe', which suggested that by conducting precise and simultaneous attacks on utility targets at the initiation of hostilities, the coalition hoped to create so much fear and disarray that the enemy would have little choice other than capitulation. ${ }^{6}$ At first glance, hitting Saddam's palaces may seem in line with axiological targeting. However, we considered them utility targets due to the possibility that they contained labs for the production of weapons of mass destruction and / or that they served as fortified bunkers to protect senior Ba'ath Party leaders.

In contrast, the most persuasive case favoring the effectiveness of axiological targeting may be the North Atlantic Treaty Organization's (NATO) air campaign against Yugoslavia in 1999. The goals were purely coercive: "to demonstrate the seriousness of NATO's purpose so that Serbian leaders understand the imperative of reversing course, to deter an even bloodier offensive against innocent civilians in Kosovo, and, if necessary, to seriously damage the Serb military capacity to harm the people of Kosovo."7 Early on, political leaders selected airpower as the military instrument, excluding any use of NATO ground troops. Debates over centers of gravity and targets soon emerged within the US military and among NATO allies. Although conventional
utility targets - fielded forces in Kosovo and C2 nodes - were struck, American air commanders argued for more strategic attacks to break Yugoslav leader Slobodan-Milosevic's will. Days of air strikes continued, but the Serbian offensive against the Kosovars intensified, and the humanitarian catastrophe worsened. After much debate and political maneuvering, targets shifted to include institutions that Milosevic used to maintain his rule. As asserted by the Air Force's Lt Gen Michael Short, NATO's joint force air and space component commander, the threat of destroying everything that kept the Serb leadership in power and comfort did the job. ${ }^{8}$ Shortly thereafter, Milosevic capitulated to NATO demands.

Axiological targeting has a seductive quality about it - ground forces avoid the harshness of direct conflict, and standoff attacks focus on leadership rather than on civilians. With the advent of greater precision in munitions, targeting has become more accurate, thereby reducing suffering and hardship on both sides of the conflict. However, like the airpower theories before it, axiological targeting is not without its dangers. In fact, these liabilities reveal the genuine limits of airpower in modern conflict.

## Influencing behavior through bombardment

Much of airpower theory and practice is designed to influence behavior of the adversary. Early airpower theorists concentrated on 'civilian morale' believing that a population undergoing sustained bombardment would rise against its government and demand an end to hostilities. At the very least, citizens would be afraid to go to their jobs, thus crippling the target state's economy. Modern airpower thought during and after the first Persian Gulf War focused on paralyzing the leadership or shocking it so completely that it had no choice other than surrender. In this context, morale would mean very little if the adversary were simply incapable of organizing himself to resist.

Axiological targeting represents a return to the belief that airpower can influence behavior. Yet, throughout the history of airpower's use in warfare, human behavior has remained difficult to predict. In many cases, bombing elicited the opposite of the desired response - instead of
inciting rebellion, it strengthened enemy resolve; instead of crippling an economy, it led to the streamlining of industry. The case of Kosovo is not clear-cut in terms of illustrating effective airpower coercion or the overall value of axiological targeting. We simply do not know why Milosevic capitulated, but we do know about many other events that occurred during the bombing. For example, the US Army widened roads in Albania, some NATO allies deployed ground troops to Kosovo's borders, and the Russians actively engaged the Serbs diplomatically. Any of these events - or all of them - together with the bombing campaign could have figured into Milosevic's calculations.

## Ball-bearing factories or banks?

Although axiological targeting aims for greater precision and the further reduction of civilian casualties, issues of discriminating between combatants and noncombatants remain salient. Although such targeting is designed to inflict more pain on the leadership by striking those things it values, citizens will still suffer. Much like the ball-bearing factories so critical to Nazi Germany's war machine, axiological targets such as banks and sports stadiums are staffed by civilians. Clearly, the targeting of a Serb television station in Belgrade during Operation ALLIED FORCE compelled war fighters to face concerns about the cost to civilians.

Axiological targeting also fails to heed Pape's advice to study more carefully how state policy can depend upon a single leader. Dictators have proved adept at presenting those things they value as popular symbols of their rule as well as co-opting national treasures as part of their government. If air planners using axiological targeting determine that an ancient bridge is the dictator's most valued item, they cannot dismiss the possibility that the citizenry feels the same way about it. Moreover, knowing that it probably will be bombed, citizens by the hundreds might voluntarily stand on the bridge, hoping to prevent its destruction. Under these circumstances, bombing the bridge would likely fail to conform to the law of armed conflict (LOAC), thereby limiting the flexible application of force that axiological targeting presupposes.


> The strikes against the World Trade Center, whose towers symbolized American power and prestige, were a potent example of axiological targeting, but they did not elicit the desired response from the United States

Conversely, if the attacker values something within the target country, such as an ancient temple or museum that contains items of cultural significance, the adversary can position highvalue targets and resources nearby in an effort to thwart a bombing campaign. Aerial bombing, no matter the theory, will always be subject to political considerations, moral questioning, and the LOAC. These constraints and strictures do not disappear upon the adoption of axiological targeting and will continue to force airmen into difficult decisions about defining the effectiveness of airpower operations.

## Effectiveness of axiological targeting

Not an entirely new theory of airpower, axiological targeting instead demonstrates the same shortcomings that have accompanied airpower thought since its inception. Such targeting theory does not solve the puzzle of human behavior, political questions, and moral quandaries. In fact, the most recent example of axiological targeting used by terror groups points to the theory's major drawback.

The attacks by al-Qaeda against the United States on September 11, 2001, prove instructive when one examines the central thesis of axiological targeting. The strikes against the World Trade Center, whose towers symbolized American power and prestige, were a potent example of axiological targeting, but they did not elicit the desired response from the United States. Why, then, should we think that an
adversary would act differently if it were subjected to a US axiological-targeting campaign?

The underlying assumptions of axiological targeting continue to be plagued by problems of 'mirror imaging' - the notion that Western air forces will confront adversaries who rationally conduct a cost-benefit analysis of their actions. This fallacy further assumes that all enemy leaders value certain things subject to targeting from the air. They may in fact believe it more prestigious to stand up to a bombing campaign conducted by a powerful Western air force. Perhaps the greatest problem of mirror imaging, however, is the belief that Western air forces will inevitably face state actors in the future

## Globalization and non-state actors

Threats beyond those presented by nation-states demonstrate a growing need to understand the role of airpower as an instrument of national power. Axiological targeting still struggles with significant drawbacks when applied to non-state actors who operate in an increasingly globalizing world. Any new theory of targeting must take into account these actors and the context in which they operate.

Globalization, as described by Malcolm Waters, is a "social process in which the constraints of geography on social and cultural arrangements recede and in which people become increasingly aware that they are receding" ${ }^{9}$ This global social process has dispersed information and technology to greater reaches of the planet and, as a result, has empowered various types of human social organizations with the authority to declare war. These groups, such as ethno-nationalist zealots, clan-based warlords, terrorist organizations, and even criminal syndicates, now have both the means and the willingness to follow through and wage war, often justifying and employing violence in ways that challenge contemporary understanding of air operations.

Globalization also provides new sources of funding for such groups, permitting them to become more self-sufficient than they were during the Cold War, when the superpowers provided them support. They now take advantage of the
transnational nature of globalization by funding their activities through the international trafficking of narcotics, people, small arms, and illegally seized natural resources such as diamonds. Unlike nation-states, these groups do not rely on a national industry, so identifying proper targets for airpower continues to present problems for axiological targeting.

Striking against drug crops or diamond mines valued by a particular non-state leader still raises issues of behavior modification, morality, and effectiveness when axiological targeting is applied to nation-states. A rebel leader may see his stature elevated merely because the United States or some European country orders an air strike against him. One must also address the problem of discriminating between combatants and noncombatants. Do people who earn a living from drug crops represent legitimate targets? What about those forced to work in diamond mines? Also, regardless of whether one uses utility targeting or axiological targeting in a military campaign against non-state actors, the LOAC may serve as a hindrance to air-campaign planners and to overall military effectiveness against these types of actors. It is worth exploring whether a conventional counterforce approach would prove more effective.

## Evolution of airpower thought

Far from fulfilling the promises of early airpower advocates, axiological targeting serves to sustain the conversation about the effectiveness of airpower. If globalization continues to define the context in which challenges to national and international security arise, one would do well to discuss how airpower should be coordinated among various nations and alliances rather than debate what targets to strike from the air. In fact, NATO's campaign against the Serbs in Kosovo does not illustrate the effectiveness of axiological targeting so much as it demonstrates the need to think of ways to use airpower more effectively in concert with indigenous forces on the ground, such as the Kosovo Liberation Army. After Kosovo, the US airpower operation in Afghanistan also worked closely with another indigenous force on the ground - the Northern Alliance.

Axiological targeting remains true to the spirit of early airpower advocates by demonstrating that airpower's use in war continues to be more art than science

Since the end of the Cold War, the United States has used airpower in conjunction with various coalitions and alliances, bringing it to bear against an array of adversaries, from dictators to a radical religious regime. The coordination of these coalitions and the campaigns against these adversaries may foreshadow the challenges presented to us at the beginning of this new millennium. Clearly, further study of how we organize coalitions and how nonstate actors operate would benefit airpower thinkers and leaders. Undoubtedly, however, issues related to morality, effectiveness, and the unpredictability of human behavior will continue to intertwine with future airpower campaigns no matter who participates or against whom we direct them. These basic issues have accompanied advocates of airpower since its advent and application in warfare.

Rather than serving as a point of departure for airpower, axiological targeting asks us to think more creatively about how to meet violent challenges of the near future. The engendering of more discussion on one of the most lethal instruments of power in the world can only help. Thus, axiological targeting remains true to the spirit of early airpower advocates by demonstrating that airpower's use in war continues to be more art than science.

## Notes

${ }^{1}$ Lt Col Peter W. W. Wijninga and Richard Szafranski, Beyond Utility Targeting: Toward Axiological Air Operations, Aerospace Power Journal 14, no. 4 (Winter 2000): 53, 56, http: / / www. airpower.maxwell.af.mil/airchronicles/apj/ apj00/win00/ szafranski.pdf.
${ }^{2}$ Robert A. Pape, Bombing to Win: air power and Coercion in War (Ithaca, NY: Cornell University Press, 1996), 329.
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${ }^{4}$ Daniel L. Byman, Matthew C. Waxman, and Eric Larson, air power as a Coercive Instrument (Santa Monica, CA: RAND, 1999), 3.
${ }^{5}$ Wijninga and Szafranski, Beyond Utility Targeting, 48.
${ }^{6}$ Recent reporting, however, tends to downplay the significance of shock and awe. T Michael Moseley reveals that less than 10 percent of coalition bombs targeted Iraqi leadership or military command structures. The majority of air attacks went against fielded forces. See Operation Iraqi Freedom: By the Numbers
(Shaw AFB, SC: Combined Forces Air Component, Assessment and Analysis Division, 2003).
${ }^{7}$ Ivo H. Daalder and Michael E. O'Hanlon, Winning Ugly: NATO's War to Save Kosovo (Washington, DC: Brookings Institution Press, 2000), 101.
${ }^{8}$ John A. Tirpak, Short's View of the Air Campaign, Air Force Magazine
82, no. 9 (September 1999), http://www.afa.org/magazine/sept1999/
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# The Battle of the Bismarck Sea 

1-3 March 1943<br>A proving ground for air theory and doctrine?



We have just passed the 60th anniversary of the Battle of the Bismarck Sea. It occurs to me that it is worthwhile to revisit the experience to examine its implications for the history of the evolution of airpower theory and doctrine in the subsequent years. I will begin by examining the context of the Battle: its environment, climate and the forces arrayed on both sides. Then we shall turn to a summary of the strategies being pursued on both sides. We will follow that with a brief description of the way that the Battle unfolded and the results. We will then conclude with speculations on the ways that the experience affected, or failed to affect, the articulation of post-war air theory and doctrine. Perhaps the case study will also suggest some areas in which the traditional view is not completely accurate and some of the implications for the current doctrine of the Expeditionary Air Force. ${ }^{1}$

## The context

In the spring of 1942, the military fortunes of the United States and Australia were at their lowest
ebb ever. The Japanese rampage had conquered a huge physical arena containing millions of people and vast natural resources not theretofore found in the Japanese Empire. We shall see below, that the Japanese planned the establishment of a huge defensive perimeter and a stand that would wear down Allied counteroffensives. That was to cause the latter to settle for a negotiated peace that would substantially strengthen Japan as a great power. ${ }^{2}$

The Allies were in a bad way. The Germans were still rattling the gates of Moscow and threatening the Suez Canal. The US fleet was badly damaged, and General Douglas MacArthur had fled the Philippines under the orders of the President. He was installed in Australia, and for all he knew, the Japanese did not intend to stop at the north shore of that land. ${ }^{3}$ The navies available to him were weak, combat weary, and largely devoid of airpower. The air doctrines of the Americans did not seem to fit the problem facing him, and the organization of the US military forces had a long way to go. The Australian Allies were also stressed. A substantial fraction of their best forces had been

deployed far away to assist the British in the war against the European Axis. The population and material resources of their land were clearly not up to fending off the Japanese alone. ${ }^{4}$

The background to the Japanese onslaught in 194142 is complex and extends well back into the $19^{\text {th }}$ century and beyond. Japan had emerged from a kind of feudalism only at the end of that century and had been modernizing at a rapid pace in industry and technology. This was announced to the world in their great victory over the Russians culminating in the final defeat of the Tsarist Fleet at the Battle of the Straits of Tsushima, in May, 1905. The Japanese went on to make enormous gains in Asia and in the Pacific as a result of the First World War. They did so at minimal cost, and had enjoyed successful diplomacy at the Versailles Peace Conference and generally in the naval disarmament negotiations in the years that followed. All this had been possible because of the preoccupation of the great powers of Europe with each other. ${ }^{5}$

We saw that the Germans were on the outskirts of Moscow in December 1941. The British, though relieved of the threat of renewed air attack on the British Isles by the German move east, were nonetheless in a bad way. The submarine campaign threatened them and the Axis was menacing the

Suez lifeline. The Nazi armies occupied Norway, Belgium, the Netherlands and France. Japanese resources were running short, in part because of US economic warfare, so they grasped at the Second World War as another opportunity.

## The Japanese grand strategy

The Japanese undertook a massive campaign to make huge gains while the Europeans and Americans were tied down. They planned to grasp the oil-rich European colonies in the East Indies and the rubber and other resources of Southeast Asia. Then as we noted above they aimed to set up a defensive perimeter and wear the Allies down until a negotiated peace became possible. Things started to go wrong for them in the summer of 1942. The Japanese took Rabaul with its splendid harbor in January 1942, along with positions along the northeastern shore of New Guinea. They probably could have easily taken Port Moresby as well then, but neglected to do so. Then the first invasion attempt of Port Moresby was turned back in May with the Battle of the Coral Sea, and the next month they lost four large aircraft carriers and many airplanes at Midway. ${ }^{6}$

For all the Allies knew they intended to invade Australia. At that point, the Allied objective was merely to hold off the Japanese until the job against Germany was completed.

The geography and climate of the theater The geography of the region made that part of World War II quite different from the struggle in Europe. Though the area of the campaigns in New Guinea and the Solomons is in an oceanic environment characterized by huge distances, there are many islands. Those in the Solomons chain stretch for six or seven hundred miles, and William Manchester describes New Guinea as the second largest island in the world being over a thousand miles from east to west. It has high mountains and many rivers running out of them to the sea on all sides. New Guinea is subject to frequent earthquakes and has many large swamps. Terrain in Solomons is also mountainous, and they are also subject to volcanoes and earthquakes. ${ }^{7}$

The climate in the Pacific also made that part of the war much different than the ones in Europe and North Africa. Both the Solomons and New Guinea are hard by the equator and subject to heavy rainfall. The temperatures are exceedingly high and the weather humid. This leads to a multitude of tropical diseases and infections that make the maintenance of the health of troops a major challenge. ${ }^{8}$ There is not much temperature variation through the year. The climate to the east in the Solomons is similar, with frequent typhoons. New Guinea was heavily wooded, and very little of it could be successfully farmed. The situation was similar in the Solomons. There were few roads and airfields. Clear areas for building air bases were scarce. Offshore coral reefs were many and often uncharted. ${ }^{9}$
$5^{\text {th }}$ Air Force and New Guinea natives, 1943

The people in the Southwest and South Pacific were also far different from Europeans. The natives of New Guinea were mostly Melanesian, Papuan, Negrito, Micronesian, and Polynesian. The vast majority of people in the Solomons were Melanesians. But there were also a few Caucasians in both areas almost all of whom were favorably disposed to the Allied cause. Especially in the case of the Guadalcanal Campaign, their coastwatching was to yield as much as an hour and a half warning of Japanese bomber raids for the air defenders. That was more than the radar of the day could provide. The coastwatcher service was vital what with the slow-climbing fighters available at Henderson field. ${ }^{10}$

The natural resources sought by the Japanese were in large part further to the west and in Southeast Asia. In New Guinea there were gold, copper, silver, natural gas, tropical timber, oil and seafood resources. Most people there nonetheless lived in a primitive, subsistence economy. Notwithstanding the New Guinea petroleum resources, the principal oil fields in the Southwest Pacific Area were to the west in the Netherlands East Indies (now Indonesia).

In large part, the Japanese grand strategy arose from their environment on the home islands and their limited natural resources and dense population. Partly because of those limitations, Japan had been the first among Asian nations to industrialize. The grand strategy was to take advantage of World War II to create a more balanced economy over a larger area. As explained by Ronald Spector, there had been some talk in Japan about a possible attack on the Soviets to expand the Japanese holdings on the Asian mainland, but because of the need for a dependable source of oil, the decision was to expand to the south and west. This was to be done largely at the expense of the holdings of the Allied European powers that were fully occupied by the War there. ${ }^{11}$ The idea was that Japan would supply the leadership, technology and manufacturing; the other Asians would provide the raw materials and labor. ${ }^{12}$

## The Japanese grand strategy and initial results

 By mid-1942, the Japanese campaign strategy in the south was in large part governed by events ofthe preceding six months. Having been checked in its drive to the east by the Battle of Midway, Japan decided it was time to go over to the defensive and to consolidate its gains while the War was being fought out in Europe. However, the exception to a general defensive was to be in the south. There, in the summer of 1942, the Japanese sought to continue the offensive to take positions at the eastern end of the Solomons and at Port Moresby. The ultimate desire was to threaten the line of communications from the US to Australia and thus to hamper the generation of a counter-offensive as well as to complete a defensive perimeter for Japanese bases in the South Pacific. ${ }^{13}$

## Forces

Before the war, the Japanese military forces were by far the most potent in the region. But, in 1941 the naval forces certainly were not capable of standing up against those of the Allies except for the fact that the German submarine campaign was at its height and the Mediterranean sea line of communications was still blocked. Thus the US and British fleets could not be fully released against the Japanese. The Japanese naval and air forces outnumbered the combination of Australian and American forces and were better trained and experienced at that point. Their ground forces were also more numerous and were well seasoned though not so much so in jungle warfare. ${ }^{14}$ By and large the navy and army dominated Japanese doctrine and the air forces in both cases existed to support the surface battle. Furthermore, the Allies underestimated the naval and air technologies of
the Japanese. ${ }^{15}$ But though the enemy was ahead in a few areas, across the board their military technologies were not yet up to western standards. Radar was shortly to be a huge advantage for the Allies both at sea and in the air, but it was not fully ready for the campaigns of 1942 and 1943. Landbased radar was not available at Port Moresby until September, 1942, and prior to that the Allies were largely dependent upon the 'poor man's radar' - coastwatchers. ${ }^{16}$ In Japan, there was no separate air force, and Army-Navy rivalry was even more intense than in the West. ${ }^{17}$ According to Henry Sakaida in The Siege of Rabaul, that rivalry extended to the Japanese forces involved in the Southwest Pacific:
"The Japanese Army had their priorities in New Guinea; their ground troops needed air support which the Navy could not or would not provide. There was very little cooperation between the Army and Navy at Rabaul or elsewhere. Thus Rabaul's Army air regiments achieved very little success, and by the end of August, 1943, almost all of the Army fighters had been transferred to Lae and Wewak. If Rabaul was the Graveyard of (naval) Fighter Pilots, New Guinea was the Army's." 18

## Allied grand strategy

The Allied declared grand strategy was to use all of the instruments of power to first achieve the defeat of the more dangerous enemy, Germany. Only after that was achieved was the Alliance to turn its full effort against Japan. But there were some Americans who chafed under this idea, especially in the Navy. ${ }^{19}$



#### Abstract

The Americans largely dominated allied theater strategy making in the Southwest Pacific Area. The traditional plan had been to mount a naval campaign straight across the central Pacific capturing bases and building them up as we proceeded. Then, somewhere in the vicinity of the Philippines, a great sea battle would be fought. Having defeated the Japanese navy, the Americans were to then either blockade or bomb the enemy into submission or use some combination. This had been known as War Plan Orange before the War. ${ }^{20}$

But, largely unpredictable and fortuitous circumstances confused US Pacific strategy making. No one had expected the Japanese advance to move as far to the south as rapidly as it did. There had not been much concern about Australia, but now a threat to her seemed real and, also fortuitously, General Douglas MacArthur wound up there. Almost inevitably, he was given command and the mission to protect Australia and its lifeline from North America. ${ }^{21}$ According to Stephen Taaffe and others, some US Navy leaders saw this as an Army intrusion into a naval theater, ${ }^{22}$ and agreement on a single strategy did not prove feasible. Rather, MacArthur was to be permitted his return to the Philippines along the New Guinea coast to the west and thence northwest back to the Philippines. After that, the Japanese would somehow be defeated. Meanwhile, another strong man, Admiral Ernest King, also was


## General George C Kenney


to be permitted his preferred strategy, essentially a return to the War Plan Orange thrust across the central Pacific. But his strategy could not be implemented until the US carrier and amphibious fleets had been built up. In the desperate days of late 1942, for a time the only operational aircraft carrier left in the Pacific was the battle scarred USS Enterprise.

Having been frustrated in their effort to take Port Moresby at the Coral Sea, the Japanese Army decided to give it a shot with an overland march from the Buna area via the formidable Kokoda Trail. They made it most of the way but were frustrated by the fierce opposition of the Australians on the ground with assistance from the $5^{\text {th }}$ Air Force through aerial resupply and air-to-ground attack. After the Coral Sea and the defeat of the Japanese at the Kokoda Trail in September, their advance had been checked and the lifeline to Australia was assured. ${ }^{23}$ This required a modification of Allied strategy. As early as April 1942 the Combined Chiefs of Staff agreed that a limited offensive with two wings could be contemplated notwithstanding the Germany First Strategy. ${ }^{24}$ The western prong would be under MacArthur and drive up the New Guinea coast to the westward and thence along New Britain to threaten the great Japanese base at Rabaul from the west. Similarly, the Navy would drive up the Solomons chain to threaten it from the east. The great naval fortress was to then fall to the combined thrusts. ${ }^{25}$

After the Battle of Midway, the forces of both the South Pacific including the Cactus Air Force and those of the Southwest Pacific containing $5^{\text {th }}$ Air Force were directed in 'Phase II' to proceed westward to isolate and then capture Rabaul. The removal of that base would so undermine the Japanese position that it would permit the Allies to proceed on to later phases leading to the conquest of the Philippines or other objectives.

## Allied Air Forces in the Southwest Pacific: Campaign strategy, doctrine and forces

 Ideally, doctrine constitutes one input to air strategy. The $5^{\text {th }}$ Air Force Commander, Lieutenant General George Kenney, had been an instructor at the Air Corps Tactical School (ACTS) in the
# The Lightning pilots quickly learned to use those assets rather than engage in turning fights and the result was superiority 

late 1920s, and had managed the air attack course there. He had also served on the operations staff of the GHQ AF. It is clear from his operations that he applied the concepts later found in Army Field Manual (FM) 100-20 to his campaigns. Those concepts suggested that the strategist: collocate the air commander with the ground commander, deem air superiority as the first mission, see interdiction as usually next, then ground support (which can come earlier in case of a ground emergency), then reconnaissance and finally tactical airlift. ${ }^{26}$ Kenney was fully cognizant of the Industrial Web strategic bombing theory, ${ }^{27}$ but had little opportunity or equipment to apply it in his theater.

On the eve of Kenney's assignment as an instructor at the Air Corps Tactical School in 1927, one of his predecessors, William C Sherman published a book, Air Warfare, that was derived from his World War One experiences and his own service at the School during its formative times. In the work he is quite clear on the primacy of air superiority. ${ }^{28} \mathrm{He}$ asserted that pursuit existed to control the air and all the other air missions were dependent upon that control. In his next chapter, he describes 'attack' aviation and asserts that direct support of the troops in contact or as a substitute for artillery are certainly legitimate functions, but ones to be deemed exceptional. He asserts that the assignment of the command of aviation to the lower units of the Army gives away its primary virtue: the ability to mass its effects anywhere in the battle zone. Thus, it should be controlled in a centralized way and usually be used at places that artillery cannot reach. He had written all these things in the early 1920s at the School and published them commercially in 1926. He had been close to General Billy Mitchell and Thomas DeWitt Milling from the First World War onward.

At the Army War College in 1921, Mitchell spoke of the primacy of the air superiority mission and of direct air attack on enemy land and sea forces. He was explicit in calling 'auxiliary' air work to enhance the operations of the surface forces "secondary." ${ }^{29}$ In a 1923 lecture at the same school, Mitchell also dwelt upon the importance of centralized control of air forces by one person. ${ }^{30}$ Thus, the ideas expressed were common ones
inside the Air Service and Air Corps from 1918
forward, and George Kenney shared them. ${ }^{31}$

## Bombing experience prior to the campaign against Rabaul

Earlier in the War, the US Army Air Forces level bombers at Midway got no hits on the Japanese ships and the USN torpedo aircraft were slaughtered there. Through 1942 the SWPA and South Pacific operations against convoys were decidedly disappointing. According to B-17 pilot James T Murphy, who was there:
"The 19 ${ }^{\text {th }}$ Bomb Group . . . had arrived in Australia from the Philippines in March 1942, the same month the Navy brought General MacArthur by PT boat. Their bombing continued to be from altitudes above 25,000 feet. The percentage of their hits on Japanese shipping, however, was less than one percent of all bombs dropped." ${ }^{32}$

One $38^{\text {th }}$ Bomb Group wag, B-25 navigator Hollis Rushing, reminisced that he and his mates used to taunt the high-level B-24 crews by accusing them of helping the Japanese - by being unable to hit the Pacific Ocean and by killing so many fish with their bombs as to supply the enemy with food. ${ }^{33}$ Kenney's $5^{\text {th }}$ Air Force dive-bombers did little better and were quickly used up. On 29 July 1942, five out of a force of seven A-24s went down after they lost their escorts going across the OwenStanley Mountains and were caught by Zeroes. Only one got back to Port Moresby and the seventh was so badly shot up that it had to recover at Milne Bay. Nor did Kenney's level bombers get enough hits from medium altitudes. ${ }^{34}$

But during 1942, even though the European Theater had the first priority, $5^{\text {th }}$ Air Force did grow. In the beginning of the year, its fighter forces were largely composed of ragged survivors of the northern campaigns, largely P-40s. They were joined by some P-39s along with the P-400 which was the export version of the same aircraft. The lattermost was especially useful in close air support (CAS) because of its 20 mm cannon and many machine guns. But neither was as capable as the Japanese Zeros, though their inferiority was somewhat diminished as the Allied pilots learned not to engage in dogfights with the Japanese. ${ }^{35}$


Late in 1942, though, the older American and Australian fighters were joined by the twin-engine P-38 Lightning. That airplane was not favored in Europe as it was not quite competitive with the best German fighters, but its long range was a great asset out in the Pacific. ${ }^{36}$ Also, it was not as maneuverable as the Zero, but it had a higher speed, heavier armament and a high rate-of-climb as well as superior diving speed. The Lightning pilots quickly learned to use those assets rather than engage in turning fights and the result was superiority. In fact, America's leading wartime ace, Richard Bong, won all his victories in the Southwest Pacific in P-38s (40 kills), starting in the winter of 1942-43. ${ }^{37}$


General Kenney also served as the commander of Allied Air Forces, and the Australians made significant contributions to the outcome. They, too, were equipped with P-40s, along with A-20s and B-25s. But they also had a number of British designed Beauforts equipped for dropping torpedoes and Beaufighters armed with 20 mm cannons along with machine guns. ${ }^{38}$

All the way back to colonial times, a typical American response had been to seek technological solutions. In the SWPA, commanders deliberately and systematically sought technological and tactical innovations. As noted, Midway had also demonstrated that torpedo attack against well-defended ships could be highly dangerous. Later, an Army-Navy agreement had taken the USAAF out of the torpedo business in any event. Yet, we have seen that ships often could not be hit from altitude. The solution was to modify the B-25s and A-20s by removing the bombardier (and the lower turret in the case of the B-25) and installing as many machine guns as the space would allow all firing forward. This was rather a radical modification to be carried out under field conditions:
" . . . Knowing that replacements (for the guns of new Douglas A-20s that had arrived without their weapons) were not on the horizon, the mechanics of the 3d Bomb Group, under the supervision of Maj Paul 'Pappy' Gunn, went to work modifying their A-20s. To increase range, mechanics installed two 450-gallon

B-25 gunship and crew, New Guinea, 1943
fuel tanks in the forward bomb bay. The resultant loss of bombload was offset by inserting four .50-caliber fixed, forward-firing machine guns in the nose in place of the bombardier station. This package installation was a masterpiece of design and was eventually adopted throughout the Pacific, European, and China-BurmaIndia theaters. When these guns were combined with the remaining four fixed, .30-caliber fuselage guns, the A-20A became a potent strafing weapon." ${ }^{39}$

Similar modifications were made to some of $5^{\text {th }}$ Air Force's B-25s. Lieutenant Colonel Jarred Crabb provides one example. On taking his medium bomb group into combat he quickly found that it had very poor results from medium altitudes. He immediately prevailed upon General Kenney to make his unit one of those sent to Brisbane for modification into gunships. Crabb was sure that a 14-gun strafer would be much more effective than an unmodified bird. ${ }^{40}$

All the modifications and maintenance were done under trying conditions. Not only was the climate particularly deadly in generating extra maintenance requirements, but the European theater took priority for supplies and replacement aircraft. The distance from the US factories was another major factor - parts took 26 days to move from the West Coast to Australia. Moreover, once the aircraft arrived in theater, they required modifications just for openers. Most of the multiengine aircraft were flown over, and they came in a winterized condition suitable to the fight in Europe - but unsuited for the Southwest Pacific. Thus, before they could go into combat, they had to be dewinterized by removing the de-icing boots and other cold-weather equipment. Too, unlike the semi-permanent maintenance facilities in Europe, those in the Southwest Pacific had to move forward as the fight progressed northwestward. Though it was only a little help at first, Australia did have an airline industry and a budding aircraft manufacturing capability that grew in 1942 to where some of the time delays involved in shipment from the US could be avoided. Early in 1943, all of the drop tanks needed for the $5^{\text {th }}$ Air Force were being manufactured in Australia. Also of a little help was the deliberate salvage effort in the theater that was suffering substantial losses of aircraft. Teams were sent out into the jungles to


38th Bomb Group B-25 skip-bombing off New Guinea. Note bomb about to hit the water
recover the parts from airplane wrecks and came back with adventure stories all their own. ${ }^{41}$

The heavy fire forward on B-25s and A-20s could suppress the anti-aircraft fire (AAA) coming from ships long enough for the medium bombers to make a low-level attack in relative safety. Though all of the crews involved in this were commanded by American pilots, many had been fleshed out with Australians who brought a wealth of flying experience to the work. ${ }^{42}$ The tactical innovation was to use skip bombing instead of torpedoes in such attacks. ${ }^{43}$ Although it was to be the medium bombers that would use that technique in the Battle of the Bismarck Sea, B-17 pilots also developed it. As Fortress pilot James T Murphy described it in a mission to Rabaul on October 2, 1942:
". . . I then let down again; this time I broke out at 2,500 feet. Dawn was just breaking and I was fortunately flying east right into the sun . . . When Lombard and Hirsh, my bombardier and navigator both saw the huge transport about forty degrees off to our

# The training was so realistic that one B-25 was lost when its wing hit the mast of the wreck and two others received fragment damage from bombs that went off early 


#### Abstract

left, I dropped down and angled into the biggest ship I had ever seen. I had told Lombard to drop the four $1,000-$ pound bombs simultaneously when we reached the target. We knew we would have little time to get away at dawn. Everything around the harbor seemed to be firing at us. I had a good 20-second run, straight and level. The bombs went exactly as we hoped - one hit the ship directly, with the other three very close to it. Major fires broke out all over the ship. The results were fantastic. I had hit a $15,000-$ ton transport . . . On that mission, I received a number of holes in the wings and tail. At 2,000 feet, we just couldn't miss! Four ships were sunk that night. Extremely low-altitude bombing was dangerous, but it worked!" "


## The South Pacific theater campaign

Meanwhile, on 7 August 1942, the Marines had landed far to the east at Tulagi and Guadalcanal in an effort to head off the establishment of a Japanese base there. The entire object of that campaign was to deny the Japanese an airfield they had started in Guadalcanal and to establish one on the same site for the Allies - which became Henderson Field. The Japanese air threat was still serious enough that the American carrier that was supporting the amphibious assault pulled out on D+2,55 and the amphibious vessels themselves were withdrawn soon after - without having completed the unloading of the equipment and supplies belonging to the stranded Marines.

It came to be one of the bloodiest and most hard fought campaigns of the Pacific War, and the first couple of weeks were especially bad. The Marines were devoid of air cover, and it was only on the $20^{\text {m }}$ of August when the first land-based air units arrived at Henderson Field. The Japanese had begun to build the field, but the Marines using captured Japanese hand tools to a large extent, completed it even while under enemy fire. From the beginning, there were airmen from the Marines, the Navy and the Army Air Forces all operating at Henderson. During the Guadalcanal part of the Solomons Campaign, USMC Brigadier General Roy S. Geiger led what came to be called The Cactus Air Force, but later Army Air Force and Navy officers assumed command at different times - and with little complaint from any quarter. ${ }^{46}$ Some of his units had been supplied by AAF General Millard Harmon and others came from

Admiral John S McCain and they all fell under the control of USMC General Alexander A. Vandegrift and did what had to be done with little or no controversy. All the aviation gasoline had to come in by 50 (55) gallon drums. The fighters were using 20,000 gallons a day, all of them wrestled ashore by hand by the combat troops and then pumped into the aircraft by hand. The AAF was staging about 15 B-17 missions per month through Guadalcanal that fall, and those missions had to be provided 20,000 drums of fuel by the same methods until docks and storage tanks had been built in December, 1942.4 By the end of the year, the battle was pretty well won and Army troops were brought in to relieve the battered Marines. ${ }^{48}$

Technological solutions are often important factors, but seldom are sufficient in themselves. Time and again, training has also proven to be a decisive factor in air war. As the Guadalcanal Campaign wound down, MacArthur and Kenney quickly understood that the Japanese would be free to concentrate their forces in New Guinea - if they could move them there by water. ${ }^{49}$

## Southwest Pacific area plans, preparations, and preliminary operations

Thus, once the above technical innovations had been conceived and tested, the $5^{\text {t }}$ Air Force spent a considerable part of the fall training crews against the old German shipwreck SS Purth outside Port Moresby. Much of this done by the B-25 crews of the $90^{\text {h }}$ Bomb Squadron without the bombardiers they had been used to. They soon found that they could get superior accuracy from merely flying at masthead height aiming directly at the ship instead of skipping the bomb. The training was so realistic that one B-25 was lost when its wing hit the mast of the wreck and two others received fragment damage from bombs that went off early. The B-25s attacked in pairs with one strafing and the other strafing and bombing. They used objects on the nose of their airplanes as references for aiming. The crews flew as fast as they could and maneuvered while inbound to throw off the aim of any gunners with enough courage to stand up to the strafing. ${ }^{\text {s0 }}$ The final dress rehearsal was flown on 28 February 1943. General Kenney himself narrated that while the all-out coordinated attack would strike the convoy,
a vital part of the initial plan also aimed a classic offensive couterair attack:
" . . . The combined attack would be covered by all the $P$-38s we could put in the air. In the meantime, to cut down the Jap fighter cover as much as possible, we would attack Lae with all the shorter-ranged aircraft. I also told him (MacArthur) that I expected to have at least one full-scale dress rehearsal of the combined show run off during the next day or two ... ${ }^{51}$

The purpose was to repress the Japanese fighters on the ground at their fields around Lae so that they could not interfere with the Allied assaults on the inbound Japanese reinforcements. The Japanese had planned a similar counter-air attack on the Port Moresby fields as the convoy was getting underway, but just could not generate the air forces for that. ${ }^{52}$ The $5^{\text {th }}$ Air Force commanders knew that large convoys would come, and they were determined that their own airmen would be ready for them.

Modern theories of military affairs argue that neither technological change nor doctrinal adjustment is often decisive without organizational adaptation as well. In the $5^{\text {th }}$ Air Force case, Kenney remained in Australia coordinating with the ground commander and taking care of the administration. Kenney apparently had the confidence to trust his subordinates just as MacArthur seems to have left the air war largely in Kenney's hands. ${ }^{53}$ Kenney in turn put the operations into the hands of the commander of the advanced echelon, Brigadier General Ennis C Whitehead. ${ }^{54}$ Later they further organized air task forces assigned to specific operations and equipped them accordingly. One example was the Buna Air Task Force established to protect that base and the nearby Dobodura airfield. During its tenure, many of the $5^{\text {th }}$ Air Force squadrons rotated in and out of Dobodura for the purpose. ${ }^{55}$

In fact, the experience of the Buna Air Task Force offers some fine precedents for the recent USAF switch from its long-standing forward deployed modus operandi to an expeditionary organization and process. The airfield preparation at Dobodura began even before Buna was completely subdued, and the Task Force was activated the day after
the Battle of the Bismarck Sea was over. It was deployed over the mountains under the command of then-Colonel Frederick Smith and a microscopic staff. Within two days, they had a headquarters up and running complete with the necessary communications. The Task Force set up on the banks of the cold Samboga River for easy access to water for bathing, and with purification, for drinking. There was a handy grove of coconut trees to shelter the tents and the headquarters building. Significantly, the Buna Air Task Force mission was stated as: " . . (1) air superiority . . . (2) the enemy line of communications would be interdicted, (3) direct attack support for allied ground forces, and (4) airborne transportation and supply . . ${ }^{56}$

There was then and long after a need to move fields forward into undeveloped areas to get closer to the war so as to bring more enemy targets into range, to improve the timely response for ground support, and to facilitate higher sortie rates. But once across the high mountains, the effectiveness of radio communications was diminished. But even more important, the quality of the command and control was also reduced. Thus, Kenney and Whitehead thought it necessary to install a leader with the talent for good decisions nearer to scene of the action and yet not burden him with the administrative trivia that was certain to haunt the headquarters further back at Port Moresby and Brisbane. ${ }^{57}$

As noted, the Americans had been reading the Japanese codes for some time, and were quite aware that the enemy was giving up on Guadalcanal and concentrating on New Guinea. The Japanese had been repulsed in their attempts to take Port Moresby first at the Battle of the Coral Sea, and then by their frustration on the Kokoda Trail across the Owen-Stanley Mountains. Once that latter offensive was defeated, the Allies drove on up to the north coast and during early 1943 managed to dislodge the enemy from Buna. ${ }^{58}$ They did all this with the heavy use of aerial re-supply and the rapid construction of forward air fields; however, MacArthur's battered divisions were in no shape for an early resumption of the ground offensive. ${ }^{59}$

A participant of the campaign, USAAF Colonel Frederick H Smith, explained that the Allies were
aware through reading the codes that the Japanese were intent on reinforcing their ground units in New Guinea. ${ }^{60}$ On the 25 February, General Kenney read a decrypted message in General MacArthur's office. It showed him that the prospective convoy would triple Japanese strength at Lae were it to get through from Rabaul.. ${ }^{61}$ One convoy had indeed gotten through to Lae and Salamaua in January 1943 albeit with substantial losses. ULTRA authority Edward J Drea confirms that decryption revealed that difficulty had not dissuaded the Japanese and they were planning to send another major convoy in early March with most of their 51* Division embarked.

They were fully aware of the dangers from Allied airpower, but they could not land the troops outside Allied air range. The jungle terrain was simply too impassable to permit a substantial march overland of the entire division. The Japanese were therefore ready to accept the losses of some to get the rest through to Lae. ${ }^{62}$ In addition to their other motivations, the enemy had the lure of Wau, only 30 miles inland from Lae - but with no roads thence. Not only were there gold mines at Wau, but more importantly the town had been serviced entirely by air since the 1920 s and it had a good airfield that could be used to threaten Port Moresby, only 150 miles across the mountains. The Australians had been defending the place for some time, but they would not be able to hold out against the reinforcements the Japanese were trying to send in. ${ }^{63}$

Meanwhile, USAAF B-17s based in Australia had long been staging through Port Moresby to do reconnaissance and bombing at the harbor at Rabaul with some significant results. The Allied fields at Port Moresby and north of the formidable Owen Stanley Mountains were being developed at a very rapid pace. Until 1943, the heavy bombers (B-17s and B-24s) were based in Australia, but by February new facilities were being set up for them around Port Moresby. The bases north of the mountains were then to support the medium bombers and the fighter units. The latter fields had been taken by troops delivered by aircraft
and supplied by air as well. ${ }^{\epsilon \top}$ There were constant competing demands for materials and engineering labor, and their development were a priority and large time sink for General Whitehead. The waters north of New Guinea were full of coral reefs and largely uncharted so that logistics by sea were not feasible at first. Even the heavy construction equipment had to be brought over by air in airplanes not very well suited to the task. ${ }^{65}$

Battle of the Bismarck Sea: Day One, 28 February 1943: The Japanese deliberately planned to make their deployment by seaborne convoy during a very bad weather period so as to hide from Allied airpower beneath the clouds. (The US had not yet deployed many radar-equipped aircraft to the theater.) Too, their destination was still uncertain for they might have landed west of the Vitiaz Straits or turned through them toward Lae around the Huon Peninsula. Alternative routes were along the north or the south coasts of New Britain, either to be covered by fighter patrols out of bases on that Island. ${ }^{66}$ Notwithstanding the decryption it was thus essential that long-range air reconnaissance spot and track the convoy at the earliest moment possible so as to confirm the route and determine the destination. In fact, Admiral Shofuku Kimura selected the northern option not only in the hopes of weather coverage, but also to keep his enemies concerned that he might turn West toward Wewak rather than east towards Lae. ${ }^{6}$ The Allied commanders wanted the Japanese to know they were under aerial surveillance. That might reduce the chances that the enemy would suspect that his codes had been broken and change them at an awkward moment. ${ }^{68}$

Battle of the Bismarck Sea: Day Two: 1 March 1943: The Japanese convoy of 16 ships had departed Rabaul Harbor at midnight on the 28th. A $5^{\text {th }}$ AF B- 24 crew commanded by Lieutenant Walter Higgins got a glimpse of it about 1500 through the murky weather on the 1st of March, and it was clear that the route was along the north coast of New Britain and that the heading was in the direction of New Guinea. ${ }^{.9}$ The Japanese listened to Higgins' radio report back to Port Moresby in a way playing into Kenney's hands. But whether Kimura's convoy would turn left through the Vitiaz Straits or right along the north shore of New


B-24 Liberators arrive in New Guinea shortly before the Battle of the Bismarck Sea. They featured in the rest of the campaign to isolate Rabaul

Guinea remained uncertain. Attempts were made at bombing the convoy with B-17s on the 1st, but the results were limited.

Battle of the Bismarck Sea: Day Three: 2 March 1943: The weather continued to offer the enemy convoy some protection, and it was still out of range of $5^{\text {th }}$ Air Force medium bombers and fighters. But it had been tracked and harassed with occasional bombs through the night by an Australian Catalina piloted by Flight Lieutenant Terry Duigan, and additional raids by B-17s were launched that day. ${ }^{70}$ Unlike the $8^{\text {th }} \mathrm{AF}$ operations in Europe, they bombed from medium altitudes around 8,000 feet and without escort. They did so without losses notwithstanding Japanese fighter escort and did indeed get hits on three ships, one of which went to the bottom. ${ }^{71}$ Partly because of the murky weather and partly because of the natural inaccuracies of crew reports in the heat of combat, the feedback to the commanders on the exact size of the convoy and the bombing results was uncertain and characterized by conflicting reports.

Battle of the Bismarck Sea: Day Four: 3 March 1943: During the wee hours of the fourth day, the Australians launched some torpedo-equipped Beauforts and though they found the convoy, their attacks did not add any damage. But after the dawn, the Allied prayers were answered. Not only had the Japanese made the desired left turn and sailed into the range of the medium bombers, but also the weather cleared - an unusual event for the region. Further, during the night the Japanese commander had circled about some to incur a delay so as to arrive at Lae at a time he deemed better - a bad mistake according Lex McAulay. ${ }^{72}$ The convoy was then to be caught off shore rather than under the protection of the AAA guns of the Japanese installation on the beach. The local enemy airfields had been largely shut down. The Allied rehearsed operation was launched with little interference and mayhem was worked. About 120 airplanes were involved in the morning strike. Most of the strike aircraft were still based across the mountains. The rendezvous for the entire morning force was made at 0930 over Cape Ward


Hunt, just a few miles northwest of Buna. They departed the Cape on a northeasterly heading and soon found the convoy. While around 35 fighters patrolled above protecting the strike aircraft below, Australian Beaufighters led the parade against the convoy firing their four $20-\mathrm{mm}$ cannons and four machine guns as they approached the Japanese at extremely low altitudes. Their purpose was to clear the enemy decks of anti-aircraft gunners and to concentrate on the bridges of the ships to kill the officers and especially the captains. The Japanese made a mistake. Though we have seen that the Beauforts had a little earlier missed with all their torpedoes, they may nevertheless had done some good. Now, the Japanese skippers apparently thought they were under torpedo attack again and they turned bows on toward the Beaufighters. They wanted to present the narrowest possible targets to the expected torpedoes. That was exactly the wrong move. ${ }^{73}$

By presenting their bow instead of their beam to the Australian flyers, they enabled the Beaufighters to more easily rake the whole length of the ship. One Australian afterward commented that he was caught in a shower of drop tanks as did the inbound pilots of the 3d Attack Group. The American P-38 Lightnings had been sent in high to engage the Japanese escort fighters to prevent the latter from descending to attack the low-level
bombers and Beaufighters. As the P-38s closed in on the Zeroes above, they had discarded their drop tanks to improve their own agility but unknowingly endangered their allies and countrymen flying below.

A 'lesson' learned by the Japanese at Guadalcanal had been that American bombers attacked from high altitudes - and it happened to be the wrong lesson here. They found the P-38s up there, but the bombers and Beaufighters had a relatively free ride far below. ${ }^{74}$ Another Australian pilot remarked that when he looked outside he found that one of the American low-level bombers had arrived a tad early, and launched a 500 lb skip bomb that was zooming alongside practically in formation with his airplane! ${ }^{75}$ The B-17s were bombing from atop. The conventional B-25s were bombing from a slightly lower level. The 3d Group B-25 gunships and the A-20s were coming in low with their forward guns blazing.

Major Ed Larner led an eleven ship B-25 3d Group squadron, attacking almost simultaneously with the Beaufighters. About five miles out, he ordered a peel off, but as he approached his target, he found that he still had some of his mates on his wing. He came up on the radio and chased them off after their own targets wanting his own victim to himself. The Japanese were completely

# The lifeboats and rafts were shot up and the blood in the water attracted numerous sharks to make the nightmare all the worse 

surprised with the low altitude technique, and the American crews claimed that close to half of their bombs were hitting the ships. The lowlevel attack denied even the destroyers the time to evade the falling bombs. A few aircraft were troubled by faulty bomb racks that did not release their weapons as they crossed their targets. But they nonetheless sprayed the ships with their .50 calibers causing secondary explosions and deck fires - and then flew around for additional passes until their ammunition was exhausted. The Japanese fire was largely ineffective but it did shoot out the hydraulic system of one B-25, thus reducing it to using emergency procedures to get the landing gear and flaps down and to brake the aircraft after landing. The lieutenant in command took it back across the mountains, and crash landed at 7-mile air strip. Three of the crew members did survive though the top turret gunner did not make it. ${ }^{76}$ Another B-25 crew was luckier when it returned with a dent in its right wing — made by colliding with a ship's mast. As Major Larner himself was leaving the scene, a Zero got on his tail. However, his tail gunner drove off the enemy with his twin .50 caliber guns. Larner and his crew would live to lead a second strike. ${ }^{77}$

Amidst all this, a B-17 piloted by First Lieutenant Woodrow W. Moore was shot down and seven of its crewmembers bailed out. The Zeros followed the parachutes down, and gunned the Americans to death as they descended - all this in the plain sight of many of the Allied airmen. ${ }^{78}$ Many of the
strike aircraft did not go back over the mountains to the home field. Instead, they landed at a couple of new servicing strips around Dobodura. There the $480^{\text {h }}$ Service Squadron was in place to refuel and rearm the force - and did so in time for the second strike takeoff at 1300. Again rendezvousing above Cape Ward Hunt, they were soon again on the scene to finish the job. There were not many Japanese cargo ships left, so the remaining ammunition was expended against the survivors in the water.

Between the first attack and the return engagement the same afternoon, all of the surviving Japanese transports had been hit, and only one was still afloat. Four of the eight escorting destroyers had also been sent to the bottom. ${ }^{79}$ But again, the reports coming back from the heat of battle were confused and exaggerated. As complete as the victory was, Generals MacArthur and Kenney both issued early statements on the damage that were soon shown to be overstated. That was unfortunate because the true results were certainly glorious enough to satisfy everyone.

Aftermath: 4 March and beyond: The last Japanese transport was sent to the bottom that night by a US Navy PT boat. ${ }^{80}$ In the meantime, the whole afternoon of the 3 d had been spent in gunning down the Japanese survivors in the water. Some felt that this was in reaction to the killing of the B-17 parachutists that day, but perhaps it would have happened anyhow. The lifeboats and rafts

B-25 bombers based in New Guinea send a Japanese Freighter to a watery grave, 1943


# Admiral Yamamoto had sent many of his naval aviators who had survived Midway and the Coral Sea to the Solomons and New Guinea (without their carriers). Few of them ever came back 

were shot up and the blood in the water attracted numerous sharks to make the nightmare all the worse. ${ }^{81}$ The massacre was so bloody and complete that some Allied crewmembers later confessed to becoming nauseous during the work. Even the B-17 crews went as low as fifty feet to participate in the strafing of the survivors. But the Allied airmen felt they had to do it as the Allied ground troops were in a tough spot and every enemy that managed to get to shore would only make it more desperate. ${ }^{82}$ In the end, only about 800 of the 6,000 or so people embarked ever made it to Lae. The other survivors were picked up by the remaining destroyers and were all returned to Rabaul leaving their compatriots in New Guinea in a bad way.

## Battle effects and implications

The initial feedback to the commanders came from the air crew reports. Such data is almost always inaccurate, and usually exaggerated. This was all the more so in this case because of the weather, smoke, and many aircraft involved. The Third Bomb Group history of 1945 was clear in asserting that the convoy size was variously reported by its crews as 16,22 or 23 ships - and that all had been annihilated. ${ }^{83}$ Both General MacArthur and General Kenney quickly latched on to the most optimistic reports and issued them to the public. Some of them had placed the count of the ships in the convoy far above what it actually had been, and turned in highly inflated claims of the number sunk and the numbers of casualties put upon the enemy. This was unfortunate for the airmen because accurate feedback was soon had through ULTRA intelligence, and that yielded the true results. ${ }^{54}$ Those were great enough to satisfy anybody, to be sure, but the Southwest Pacific Area leaders having made higher claims went into their defensive modes and refused to adjust them downwards. Partly because of interservice rivalry, those assertions were credibly disparaged and the luster of the achievement was unnecessarily diminished.

Dr Donald M Goldstein, an authority on the Battle of the Bismarck Sea, did a detailed analysis of the outcomes before some of the information about decryption had been declassified. ${ }^{85}$ More recently Kenny biographer Thomas Griffith, writing after the existence of ULTRA had been declassified,
generally concludes along similar lines as follows. The real Japanese losses amounted to an annihilation of all the transport ships in the convoy as well as half of the warships in its escort. Though about half of the people embarked were lost and only 800 made it to Lae, the claims had asserted more than twice as many Japanese were lost than was actually was the case, about 3,000 perished. Some claims rose as high as 22 ships sunk, but the actual total was 12. Soon after the War was over, the information already acquired by ULTRA was confirmed by interviewing the survivors. It was nonetheless a very lopsided victory. The Americans lost a total of five airplanes. One B-17 and three P-38s shot down and one B-25 lost to a landing accident. The wisdom of developing the bases like Dobodura north of the mountains was demonstrated in that several of the B-25s and P-38s damaged in combat, and other aircraft facing the deteriorating weather along the mountains were able to recover there safely. The Australian Air Force came through without any combat losses, but one Beaufighter was destroyed in an accident. ${ }^{86}$

The Japanese had already been checked in the Solomons by having been driven out of Guadalcanal. After that, they had the hope of concentrating the surviving forces in New Guinea and reversing the tide against MacArthur's wing of the drive toward Rabaul. But the destruction of their convoy bound for Lae marked the turning of the tide for good. Potentially, they would have been superior on the ground had they landed. But the experience was more evidence that air superiority was absolutely essential to success on the surface. Worse, the fight completed a process begun at Midway and Guadalcanal. Admiral Yamamoto had sent many of his naval aviators who had survived Midway and the Coral Sea to the Solomons and New Guinea (without their carriers). Few of them ever came back, and the experience level of the Japanese air forces was driven so low that it never had a chance to recover. Air superiority had been permanently yielded to the Allies. ${ }^{87}$

Though the battle was more akin to interdiction than to strategic bombing, it did have some implications for the latter role of airpower. The hard knocks for the strategic bombing campaign air advocates that 'boots on the turf' may not always be necessary to success
in Europe were still in the future. The B-17s and B-24s operating in the South and Southwest Pacific did so with reasonable safety, and did it at a lower altitude than was being used in Europe. It was thus easier to get hits on precision targets and to return with acceptable losses than it was to be in the campaign against Germany. In hindsight, the limited ability to hit small, moving targets from high altitude did have implications for the theories of high-altitude, daylight, precision bombing. But the strategic bombing was just getting rolling out of England, and there was not enough cross-flow of information from the Pacific to yet stimulate serious doubts about the precision part of the theory. In any event, the German ground-based air defenses were so much more formidable than the Japanese to the bitter end that going to low altitudes over Germany was not a practical option until 1945 and even then it was highly dangerous. Thus, there was not yet much to call the basic industrial web theory into question.

Much of what has been written on the campaign in North Africa at the same time implies that the US Army Air Forces were ignorant of effective tactical air doctrine and that they had to be taught the basics by the RAF and the enemy Luftwaffe. The Battle of the Bismarck Sea came just a couple of weeks after the Battle of Kasserine Pass in North Africa. It occurred several months before the 'lessons' of the tactical air campaign in North Africa were codified in Field Manual 100-20. Yet, the campaign as practiced by Kenney and Whitehead certainly was conducted according to the precepts later expressed in 100-20. ${ }^{\text {s8 }}$ The point is that those notions were not at all peculiar to Africa and therefore did not arise during World War II from the RAF or the Luftwaffe. Rather, they were ideas that had been well understood by the Air Service and Air Corps leadership during the interwar period - and none more so than General Kenney who had taught the tactical air part of the curriculum at the Air Corps Tactical School. Clearly, Kenney and most other folks thought that air superiority was paramount and acted accordingly. Back in the 1920s, both Giulio Douhet and General 'Billy' Mitchell thought that air superiority was paramount and a prerequisite for all other operations. They differed in method
though, for Douhet thought that it might be best achieved by killing enemy airpower on the ground. Mitchell and most other Americans of the day felt that it would be best achieved by some combination of an air battle and an attack on enemy airpower assets on the ground. Major General Jarred Crabb who was a unit commander under Kenney during the New Guinea campaign, made it clear that his boss was at one with Mitchell on the notion. Offensive counterair operations against enemy airfields had been a major element in Kenney's campaign - though the leading American air-to-air ace of the entire war, Richard Bong, fought in $5^{\text {th }}$ Air Force P-38s. ${ }^{89}$

The traditional next priority for airmen has been interdiction, and the battle of the Bismarck Sea itself and the favorable postwar judgment of the official Army history of the $5^{\text {th }}$ Air Force's contribution in that regard during the Buna Campaign both support that notion. Finally, the next priority for airmen has usually been close air support, and that is the one area of air operations that the cited Army history found disappointing. ${ }^{90}$ It is certainly true, though, that CAS is inherently more difficult (and less useful) in trackless jungle terrain than in more open areas. But the point remains that neither Kenney nor Whitehead could have learned their trade from the RAF or the Luftwaffe. ${ }^{91}$

Since the end of the Cold War, the USAF especially, has found it necessary to reduce its dependence on forward basing on a semi-permanent basis. Instead, it has implemented a doctrine of the Expeditionary Air Force. That requires a large part of the force to be based centrally in the continental US ready to deploy to whatever troubles arise in unpredictable locations. ${ }^{92}$ The recollections of the aviators in the Southwest Pacific make relevant readings. Most of the practice deployments lately made by the Air Force have been made either to open Middle East locations or to the Korean Peninsula. The problems faced in jungle locations by people like Perry Dahl and Danforth Miller were quite different, and examining them would be a useful practice for the modern air-warrior. Were trouble to arise in a place like New Guinea again, the challenges of the deployment, basing, maintenance of machines and the health of the airmen, sustaining combat
sortie rates in primitive conditions all would be significantly different from those faced by our forces in the Persian Gulf today. ${ }^{93}$

It is probably fair to say that the experience in the Southwest Pacific showed that combined operations could go fairly smoothly as they were less difficult than they were with the British in North Africa. Certainly they were far less difficult than they were between the Germans and the Italians. A common language was certainly a facilitator, and the disparity in numbers and resources among the allies in the Southwest Pacific may have made it easier than it was with the British. Still, there was chagrin between nations, and both Kenney and MacArthur were a little rough with Australian national pride (as had been the British for a long time). ${ }^{\text {a }}$

Very bad relations between the US sea and land forces had characterized the interwar period. In the Southwest Pacific Area MacArthur had his difficulties in this regard as he could not get the degree of support he thought he had coming from the Navy: certainly he did not have the naval resources that Halsey was enjoying in the campaign up the Solomons. ${ }^{95}$ But the distances between objective areas in New Guinea were less and could usually be covered by land-based fighters, which eased the problem some. Too, the Navy had taken some major losses in the Solomons, it did not have abundant resources left, and the situation was ever more perilous for naval forces the further west they traveled. When Admiral Nimitz felt he could not risk the remaining carriers in that region, he did recommend that MacArthur be provided with more land-based aircraft. ${ }^{6}$

Before the War, the Air Service's relationships with the Army ground forces were not as bad as with the Navy, but still were bitter. A major achievement by General Mason Patrick had been to extract a concession from the General Staff that sometimes it might become reasonable to run an independent air campaign before the ground forces had been mobilized and made contact. ${ }^{97}$ A good case could be made that here was an example in both New Guinea and the Solomons of the air being the supported force and the land units being the
supporting. ${ }^{98}$ The Battle of the Bismarck Sea was sure to stimulate ideas among air advocates that 'boots on the turf' may not always be necessary to success. ${ }^{99}$ But it was easy for the bomber airmen to forget that without ground force support (and airlift service) in the capture of bases north of the Owen-Stanley Mountains, the Battle would not have been possible. Too, the smashing victory was to some extent due also to good fortune and Japanese mistakes - like clearing weather at an opportune time, and perhaps the Japanese tarrying during the night of 2-3 March and then being caught in open water rather than in the vicinity of Lae with its ground defenses.

Certainly the Campaign against Rabaul is a prime candidate for illustrating the idea that information superiority can be a decisive factor if not the dominant one. According to Whitehead biographer Donald M Goldstein, the information that MacArthur, Kenney and Whitehead had via decryption was absolutely essential to the lopsided outcome in the Bismarck Sea and indeed that in turn had major strategic effects. ${ }^{100}$ Aerial reconnaissance and coast watching had also been important, but the Allies could not have operated with the vigor and confidence they had without ULTRA. The current interest in Information Warfare has important precedents in the Battle of the Bismarck Sea - and long before that.

A large part of the prewar controversy had been related to the issue of command and control. Were air forces to be subordinate to the ground unit commanders at the corps level and even below, or was the command to be centralized at the theater level reporting only to the theater commander? The success of both the Solomons and New Guinea Campaigns plus the relative authority of the air commanders in both theaters suggests that the current AF doctrine that the air campaign should be centrally controlled at the theater level by an airman has important precedents in these campaigns, among others. Yet, neither Kenney nor the various air commanders in the Solomons had a legal status making them equal to and independent of the land or sea commanders which suggests that unity of effort may sometimes be possible without unity of command - through cooperation. Desperate circumstances seem to be

## conducive to such unity of effort. ${ }^{101}$

The famous American naval theorist, Admiral Alfred Thayer Mahan had long ago preached that command of the sea, once achieved, would enable all other operations. This could be best achieved by a great sea battle between the battle lines of the contending navies. The Battles of both the Coral Sea and Midway had already suggested that such a battle may not be necessary after all - that aircraft might command the surface as well as the air. Both the Solomons and New Guinea Campaigns certainly further suggested that important results can be had without the great sea battle and also that where there are land bases available, command of the sea can be achieved by airpower.

In the end, the effect of personality can be vital. Forceful yet cooperative personalities can operate under austere conditions with inadequate forces, and flawed doctrine and yet prevail. Yet, others much better fixed with the implements of war can fail through personality quirks of many kinds. Kenney was a forceful, intelligent and industrious man. The way in which he stood up to MacArthur's Chief of Staff Major General Richard Sutherland said something about his leadership. Sutherland tried to micromanage the affairs of Fifth Air Force, but Kenney successfully prevented that. Yet he practiced what he preached and trusted Whitehead leaving the latter to make his own decisions. That might not have worked with many other leaders. Kenney and Whitehead both had a deserved reputation for innovation and it served them well in the Southwest Pacific. MacArthur, too, for all his ego, seemed capable of leaving enough authority to Kenney to permit an intelligent campaign to be run. ${ }^{102}$ For all of Halsey's bullish reputation, he found it possible to get along with MacArthur when many others could not and the two cooperated with one another in an important way. In the end the fit was adequate to see the US and her allies through to a substantial victory at the Bismarck Sea that may fairly be seen as a turning point. It was, in fact, so recognized at the time. Piercing the Fog, the new and authoritative history of air intelligence in World War II, records that General Kenney had to take off for a Washington conference the day after the battle ended. The news preceded him to the effect that
both Generals Henry Arnold and George Marshall himself met the air commander at the airfield-a clear recognition that the war in the Southwest Pacific was no longer a backwater. New supplies of aircraft were soon inbound to $5^{\text {th }}$ Air Force's theater. ${ }^{103}$

The fate of the Japanese at Rabaul was sealed. Though there was much hard fighting ahead, the twin thrusts so isolated the fortress that it was unnecessary to capture it. Rather, it was neutralized and in effect became a prison camp for tens of thousands of Japanese who were left to waste away.

## Notes:

${ }^{1}$ This paper is a derivative of my article on the same subject that appeared in the summer 2003 issue of Military History Quarterly. I wish to thank the editor, Colonel Rod Paschall, USA, (Ret.) for his kind permission to use the similar paper at the SMH Conference in advance of its publication. I also owe thanks to my colleagues, Colonel Thomas Griffith, Dr. Richard Andres, Professor Dennis Drew and Dr. Dan Mortensen who reviewed the manuscript and helped me improve it; its remaining faults are my own responsibility.
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${ }^{5}$ On the naval limitations see Ronald H. Spector, Eagle Against the Sun: The American War Against Japan, (NY: Vantage, 1985), 20-21; Spector, At War at Sea, (NY:Penguin, 2001), 1.
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${ }^{12}$ Spector, Eagle Against the Sun, 35.
${ }^{13}$ Charles A. Willoughby and John Chamberlin, MacArthur, 1941-1951, (NY: McGraw-Hill, 1954), 109; Lundstrom, First South Pacific Campaign, 24-5, 40.
${ }^{14}$ Spector, Eagle Against the Sun, 38.
${ }^{15}$ Shaw, Guadalcanal, 21.
${ }^{16}$ Richard L. Watson, Jr., The Fifth Air Force in the Huon Peninsula Campaign, January to October, 1943, Historical Studies, United States Army Air Forces, 1946, Copy in Air University Library, No. M-U, 27218, No. 113, c1, p. 10.
${ }^{17}$ Lundstrom, First South Pacific Campaign, 6.
${ }^{18}$ Henry Sakaida, The Siege of Rabaul, (St Paul, Minnesota: Phalanx, 1996), 8.
${ }^{19}$ Thomas B. Buell, The Quiet Warrior: A Biography of Admiral Raymond A. Spruance, (Annapolis, MD: Naval Institute Press, 1974, 1987), 167-68.
${ }^{20}$ Edward S. Miller, War Plan Orange: The U.S. Strategy to Defeat Japan, 1897-1945, (Annapolis, MD: Naval Institute Press, 1991), entire work; Stephen R. Taaffe, MacArthur's Jungle War: The 1944 New Guinea Campaign, (Lawrence, KS: University Press of Kansas, 1998), 8.
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${ }^{22}$ Taaffe, MacArthur's Jungle War, 10, 17; Manchester, American Caesar, 381; MGEN Donald Wilson, interview by Hugh Ahmann, 10-11 December 1975, HRA Oral History No. K239.0512-878, Maxwell AFB, AL, 204.
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${ }^{24}$ US, Strategic Bombing Survey, Military Analysis Division, The Thirteenth Air Force in the War Against Japan, No. 69, 30 September 1946, 1; Taaffe, MacArthur's Jungle War, 10.
${ }^{25}$ Thomas E. Griffith, Jr., MacArthur's Airman: General George
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${ }^{26}$ US, Strategic Bombing Survey, Military Analysis Division, Air Campaigns of the Pacific War, No. 71, July, 1947, 18, gives the priorities of missions in exactly that order; Angelella, Prototype JFACC, 15, 18; Rust, Fifth Air Force, 8, also cites them in that same priority; Joe Gray Taylor, "American Experience in the Southwest Pacific," in Benjamin Cooling, Case Studies in Close Air Support, (Washington: Office of Air Force History, 1990), 311.
${ }^{27}$ An analogy that likens an enemy state to a spider web. The idea is that if bombers can take out one or a few of the nodal points in the web, then the whole will collapse with much less effort and damage than would be required in a more general attack.
${ }^{28}$ William C. Sherman, Air Warfare, (reprint, Maxwell AFB, AL: Air University, 2002, 1926), [originally published in 1926 by Ronald Press, New York], 118-19.
${ }^{29}$ BGEN William Mitchell, Lecture, 1921, File No. 27-10, Army War College Curricular Files, Military History Institute, Carlisle Barracks, Pa, 1.
${ }^{30}$ Mitchell, Lecture, 20 September 1923, File No. 240-49, Army War College Curricular Files, Military History Institute, Carlisle Barracks, PA, 35, 52.
${ }^{31}$ Sherman, Air Warfare, 118-21.
${ }^{32}$ James T. Murphy, Skip Bombing: The True Story of Stealth Bombing Techniques used in 1942, (Troy, NY: Book Technology, nd), 22; Timothy K. Gann, Fifth Air Force Light and Medium Bomber Operations in 1942 and 1943, (Maxwell AFB, AL: Air University, 1993), 4; Major General Alexander A. Vandegrift, USMC, just before the Battle of the Bismarck Sea was a great fan of air power and the need for air superiority, but asserted most strongly that attacking moving ships from altitude was a futile exercise in the Guadalcanal Campaign just then completed, interview, USAAF, Intelligence Services, 3 February 1943, HRA File Number 142.052, 7-8.
${ }^{33}$ Hollis H. Rushing, interview with W.J. Shinneman, 5 July 1990, Homer, Louisiana, HRA Oral History Number K239.0512-2009, 22.
${ }^{34}$ McAulay, Battle of the Bismarck Sea, 20; Rust, Fifth Air Force, 5; Richard L. Watson, Jr., The Fifth Air Force in the Huon Peninsula

Campaign, January to October, 1943, Historical Studies, United States Army Air Forces, 1946, Copy in Air University Library, No. M-U, 27218, No. 113, c1, p. 8, 84; Watson and Rohfleisch, Crisis, 25; Brigadier General William Hipps, who was an A-24 pilot in the Southwest Pacific refers to the same incident. He thought the Dauntless was a sturdy airplane, but not suited to USAAF work from undeveloped air bases in the Southwest Pacific - it came to New Guinea with hard carrier deck tires that sank into the mud and its bomb shackles would not accommodate the standard lugs on Army bombs! Interview with Daniel Mortensen et al., Bolling AFB, DC, 28 November 1984, HRA Oral History No. 239.0512-1732, 31; the one pilot who survived, Raymond H. Wilkins, later was awarded a posthumous Medal of Honor for a mission over Rabaul where he sank a destroyer and had his right wing shot off, U.S., AF, $5^{\text {th }}$ Air Force, 3d Bomb Group, A Short History of the Third Bombardment Group, HRA File Number GP-3-HI, 1917-1945, 1.
${ }^{35}$ Air Commodore F.M. Bladin, RAAF, interview with Lt. Thurstin, 7 May 1945, HRA File Number 732.620-1, 3, in early 1942 instructed his RAAF P-40 pilots not to engage the Zero in a turning fight, but rather to merely make one high-speed diving pass and to leave the scene. ${ }^{36}$ Herman Wolk, George Kenney: The Great Innovator, Chapter 6, in John L. Frisbee, ed., Makers of the United States Air Force (Washington: Office of Air Force History, 1987), 135; Kenney, Bong, 22-3; Danforth Miller interview, 54-7, Miller flew both P-400s and P-38s out of Henderson Field.
${ }^{37}$ U.S.A.A.F. Resource Group/Heroes of the Air-Richard Ira "Dick" Bong, available on the internet at http:/www. warbirdsresourcegroup.org/URG/bong.html, accessed 15 March 2003; Kenney, Bong, 24; Colonel Perry J. Dahl, interview with Captain Phillip Meilinger et al., Air Force Academy, CO, HRA Oral History Number K239.0512-1222, Dahl repeatedly made the point on with words like " . . if a Zero pilot ever saw you, you'd never shoot him down," 8.
${ }^{38}$ McAulay, Battle of the Bismarck Sea, 29-31.
${ }^{39}$ Gann, Fifth Air Force Medium Bombers, 7.
${ }^{40}$ Major General Jarred V. Crabb interviewed by Thomas Julian and Donald Goldstein, Air Force Academy, Co, 17 \& 28 April 1970, HRA Oral History Number 239.0512-622, Maxwell AFB, AL, 3.
${ }^{41}$ Richard L. Watson, Jr., The Fifth Air Force in the Huon Peninsula Campaign, January to October, 1943, Historical Studies, United States Army Air Forces, 1946, Copy in Air University Library, No. M-U, 27218, No. 113, c1, pp.44-56.
${ }^{42}$ This practice had been started before General Kenney became the commander. He found it as a source of confusion in the cockpit because of language differences and moved to end mixed crews though he kept some Australians on his staff, General George Kenney, interview by Colonel Marvin Stanley, no date, HRA Oral History Number K239-0512-747, 24.
${ }^{43}$ See Griffith, MacArthur's Airman," 211-17; Donald M. Goldstein, Ennis C. Whitehead, Aerospace Commander and Pioneer, (Ph.D

Diss., Denver University, 1970), 103-05; US, Strategic Bombing Survey, The Fifth Air Force in the War Against Japan, 57; Willoughby, MacArthur, 110-11; the great success of these early innovations led to attempts to escalate to forward-firing 75 mm guns on B-25s for the Pacific fighting. However, that gun's size also required the removal of the copilot's position and required a longer stable flight lining up for the final approach to the target. Too, it was possible to fire only a few 75 mm rounds on this final approach and though it was effective on heavier targets it did not suppress the AAA as well as the .50 calibers had and made the aircraft more vulnerable to ground fire. I have flown the B-25 without a copilot but only on short flights and not in combat. The extra four eyes of the missing bombardier and copilot were doubtless important assets in low level flight in combat. General Kenney argued that the use of forward firing rockets on his B-25s and A-20s would be preferable to the 75 mm because they did not require the long, straight-in approach. Information on the 75 mm in Trip to S.W.P. H., Pacific, 1944, CHM Roberts Papers, Archives, US Army Military History Institute, Carlisle Barracks, PA; on the Australian crew members on U.S. airplanes, see McAulay, Battle of the Bismarck Sea, 26.
${ }^{44}$ Murphy, Skip Bombing, 42; actually, something like skip bombing was being tested at Eglin Field, Florida earlier in 1942, U.S., Hq USAAF, A-2, Impact, Vol. 1, No. 2, (May, 1943), 9.
${ }^{45}$ US, Strategic Bombing Survey, Military Analysis Division, Air Campaigns of the Pacific War, No. 71, July 1947, 19; Shaw, Guadalcanal, 7-10.
${ }^{46}$ James A. Winnefeld and Dana J. Johnson, Joint Air Operations: Pursuit of Unity in Command and Control, 1942-1991, (Annapolis, MD: Naval Institute, 1993), 23-38; Spector, At War At Sea, 205; Vandegrift interview, 1-8.
${ }^{47}$ Vandegrift interview, 7-8.
${ }^{48}$ Taaffe, MacArthur's Jungle War, 11,
${ }^{49}$ Griffith, MacArthur's Airman, 209; Douglas MacArthur, Reminiscences, (NY: McGraw-Hill, 1964), 171; Edward J. Drea, MacArthur's ULTRA: Codebreaking in the War Against Japan, 1942-1945, (Lawrence, KS: University Press of Kansas, 1992), 67. ${ }^{50}$ Goldstein, Ennis C. Whitehead, 127; McAulay, Batttle of the Bismarck Sea, 20; Watson, Huon Campaign, 84; 38 th Bomb Group Navigator Hollis Rushing long after recollected that the aircraft was lost when a 100 pound practice bomb skipped up into its wing and caused it to crash into the ship, interview with W.J. Shinneman, Homer, Louisiana, 5 July 1990, HRA File Number 239.0512-2009, 19.
${ }^{51}$ General George C. Kenney, USAAF, General Kenney Reports, (reprint, Washington: Office of Air Force History, 1987), 199; Steve Birdsall, Flying Buccaneers: The Illustrated Story of Kenney's Fifth Air Force, (Garden City, NY: Doubleday, 1977),50; James, The Years of MacArthur, 294; McAulay, Battle of the Bismarck Sea, 22; Kenny-Stanley interview, 33.
${ }^{52}$ Drea, MacArthur's ULTRA, 64; Charles M. Westenhoff, Aggressive Vision, Air Chronicles, available on the internet at http:/ / www.airpower.maxwell.af.mil.airchronicles/apj/ apj89 / westen.html, 7, accessed 13 March 2002.
${ }^{53}$ Michael E Fischer, Mission-Type Orders in Joint Air Operations, The Empowerment of Air Leadership, (Masters Thesis, School of Advanced Airpower Studies, 1995), 19; Salvatore A. Angelella, A Prototype JFACC: General George C. Kenney, unpublished masters thesis, School of Advanced Airpower Studies, 1994, 26-27. ${ }^{54}$ Smith interview, 53-54, at that point, Colonel Smith was Whitehead's Chief of Staff; Whitehead ultimately reached the rank of lieutenant general; BGEN Hugh J. Casey, interview, available on the internet at http:/ /www.USACE.army.mil/inet/ USACE-docs/eng-pamphlets/ep870-1-18/c-19.pdf, 191 accessed 13 March, 2002; Richard L. Watson, Jr., The Fifth Air Force in the Huon Peninsula Campaign, January to October, 1943, Historical Studies, United States Army Air Forces, 1946, Copy in Air University Library, No. M-U, 27218, No. 113, c1, p. 5.
${ }^{55}$ Angelella, Prototype JFACC, 23; Rust, Fifth Air Force, 9. ${ }^{56}$ US, USAAF, 5AF, $308^{\text {th }}$ Bomb Wing, 5 March 1943-20 May 1944, HRA File Number WG-308HI (Bomb), p. 8.
${ }^{57}$ USAAF, $5^{\text {th }}$ Air Force, $308^{\text {th }}$ Bomb Wing, Heavy, 5 March 1943-20 May 1944, HRA File Number, WG-308HI (Bomb).
${ }^{58}$ US, Strategic Bombing Survey, Air Campaigns of the Pacific War, 18; Spector, At Sea At War, 193; Richard L. Watson, Jr., The Fifth Air Force in the Huon Peninsula Campaign, January to October, 1943, Historical Studies, United States Army Air Forces, 1946, Copy in Air University Library, No. M-U, 27218, No. 113, c1, p. 1.
${ }^{59}$ US, Strategic Bombing Survey, Military Analysis Division, The Fifth Air Force in the War Against Japan, July, 1947, 27; Huon Campaign, 5.
${ }^{60}$ Smith interview, 64.
${ }^{61}$ John F. Kreis, ed., Piercing the Fog: Intelligence and Army Air Forces Operations in World War II, (Washington: Air Force History and Museums Program, 1996), 265.
${ }^{62}$ Edward J. Drea, MacArthur's ULTRA: Codebreaking and the War Against Japan, 1942-1945, (Lawrence, KS: University Press of Kansas, 1992), 61, 64-6; Samuel Eliot Morison, History of United States Naval Operations in World War II, VI, Breaking the Bismarcks Barrier, (Boston, MA: Little Brown, 1950), 54-5; John Miller, Jr., The U.S. Army in World War II, The Pacific War, Vol. 8, Cartwheel: The Reduction of Rabaul, (Washington: US Army, 1959), 38-9; Huon Campaign, 73.
${ }^{63}$ Watson, Huon Campaign, 70, 76.
${ }^{64}$ D. Clayton James, The Years of MacArthur, II, 1941-1945, (Boston, MA: Little Brown, 1975), 290; Huon Campaign, 7.
${ }^{65}$ BGEN Hugh J. Casey, interview, available on the internet at http:/ / www.USACE.army.mil/inet/USACE-docs/eng-
pamphlets/ep870-1-18/c-19.pdf, 191 accessed 13 March, 2002; Rust, Fifth Air Force, 7.
${ }^{66}$ Goldstien, Ennis C. Whitehead, 126; James, Years of MacArthur, 292.
${ }^{67}$ McAulay, Battle of the Bismarck Sea, 33 .
${ }^{68}$ Drea, MacArthur's ULTRA, 70.
${ }^{69}$ Manchester, American Caesar, 379; McAulay, Battle of the Bismarck Sea, 44-5; Watson, Huon Campaign, 87.
${ }^{70}$ Alan Stephens, The Australian Centenary History of Defence, Vol II, The Royal Australian Air Force, (South Melbourne, Australia: Oxford University, 2001), 162; Douglas Gillison, Royal Australian Air Force, (Adelaide, Australia: Griffin Press, 1962), 691; McAulay, Battle of the Bismarck Sea, 55-6.
${ }^{71}$ McAulay, Battle of the Bismarck Sea, 59.
${ }^{72}$ McAulay, Battle of the Bismarck Sea, 70.
${ }^{73}$ Stephens, Australian Air Force, 163; Gillison, Royal Australian Air Force, 693; Watson, Huon Campaign, 90; US, Air Force, $5^{\text {th }}$ Air Force, 3d Bomb Group, History, 1919-1944, 39-40.
${ }^{74}$ Drea, MacArthur's ULTRA, 68; Morison, Breaking the Bismarcks Barrier, 59.
${ }^{75}$ Eric M. Bergerud, Fire in the Sky: The Air War in the South Pacific, (Boulder, CO: Westview, 2000), 591.
${ }^{76}$ 3d Bomb Group, History, 1919-1944, 40-42.
${ }^{77} 308^{\text {th }}$ Bomb Wing, History, 1 March 1943-1 March 1944, HRA File Number WG-308-HI, 1 Mar 43-1 Mar 44; 3d Bomb Group, History, 1919-1944, 42-44.
${ }^{78}$ Gillison, Royal Australian Air Force, 693; Watson, Huon Campaign, 93.
${ }^{79}$ McAulay, Battle of the Bismarck Sea, 146, reports that one of the four destroyers was still floating as an abandoned derelict on the fourth, and it was finally sent to the bottom by a Japanese aircraft.
${ }^{80}$ Gillison, Royal Australian Air Force, 694.
${ }^{81}$ McAulay, Battle of the Bismarck Sea, 144 reported in 1991 that all of the shark reports came from the Allied flyers, and none from the Japanese survivors; Colonel Perry Dahl, a P-38 pilot, reported that later in the war the gunning down of parachutists was an accepted practice on both sides, Dahl interview, 29. ${ }^{82}$ Stephens, Australian Air Force, 164; James, The Years of MacArthur, 294; Murphy, Skip Bombing, 117; McAulay, Battle of the Bismarck Sea, 131.
${ }^{83}$ US, AF, $5^{\text {th }}$ AF, 3d Bomb Group, History, Jul 1919-Mar 1944, HRA File Number: GP-3-HI (Bomb), 39.
${ }^{84}$ James, The Years of MacArthur, 298-300; Whitehead's chief of Staff, Colonel Frederick H. Smith, was married to one of Admiral Ernest King's daughters, and Smith remarks that the good Admiral was skeptical that MacArthur's airmen had put down the whole convoy - and that indeed they had not, Smith interview, 67; as late as 1964, MacArthur still wrote that there
had been " . . . from eight to twelve transports . . ." in the convoy and that all of them had been sunk, Macarthur, Reminiscences, 171; as early as 1950, Watson and Rohfleisch had the correct figures in, Crisis, 147-49; MacArthur's intelligence officer, also got the figures approximately right in a book published in 1954, Willoughby, MacArthur, 111
${ }^{85}$ Goldstein, Ennis C. Whitehead, 133-36; Griffith, MacArthur's Airman, 236-41; it was publicly known even in the 1940s that some Japanese codes had been broken, US, Strategic Bombing Survey, Air Campaigns of the Pacific War, July, 1947, 62. ${ }^{86}$ Gillison, Royal Australian Air Force, 695; Wayne P. Rothgeb, New Guinea Skies: A Fighter Pilot's View of World War II, (Ames, Iowa: Iowa State University Press, 1992), 161.
${ }^{87}$ US, Strategic Bombing Survey, Air Campaigns of the Pacific War, 18; the Midway losses of Japanese naval pilots have been widely exaggerated, though the combination of that and the campaigns in the Solomons did attrit the pilot force and drive the experience level down as the American learning curve was rising rapidly and the result was air superiority, Mark R. Peattie, Sunburst: The Rise of Japanese Naval Airpower, 1904-1941, (Annapolis, MD: Naval Institute, 2001), 174-75, 184; Paul S. Dull, A Battle History of the Imperial Japanese Navy, (Annapolis, MD: Naval Institute, 1978), 268.
${ }^{88}$ Griffith shows that the exact priorities cited in the manual had indeed been followed by Kenny and $5^{\text {th }}$ Air Force in their campaigns, MacArthur's Airman, 209; so does Joe Gray Taylor in American Experience in Southwest Pacific.
${ }^{89}$ Crabb-Julian interview, 39.
${ }^{90}$ Milner, Victory in Papua, 375-76.
${ }^{91}$ Kenney had been in France just prior to its fall, but he was teaching the main outlines of classical tactical air doctrine long before at the Air Corps Tactical School.
${ }^{92}$ Daniel R. Mortensen, The Air Expeditionary Force in Perspective, (Maxwell AFB, AL: College of Aerospace Doctrine, Research and Education, 2003), 3-4.
${ }^{93}$ Dahl interview; Danforth Miller interview - a whole different set of health hazards would have to be counteracted; instead of dust, the machinery would have to be better protected against corrosion, and the protection of air fields would be made more difficult by the obscured terrain - for openers.
${ }^{94}$ McAulay, Battle of the Bismarck Sea, 10 (McAulay himself being a retired Australian Army officer.)
${ }^{95}$ Wilson-Ahmann interview, 205.
${ }^{96}$ Richard L. Watson, Jr., The Fifth Air Force in the Huon Peninsula Campaign, January to October, 1943, Historical Studies, United States Army Air Forces, 1946, Copy in Air University Library, No. M-U, 27218, No. 113, c1, p. 22.
${ }^{97}$ Robert P. White, Mason Patrick and the Fight for Air Service Independence, (Washington: Smithsonian, 2001), 66. ${ }^{98}$ William Manchester, one of MacArthur's biographers, doesn't
exactly say that, but comes close to it in a paragraph, American Caesar, 384; Tim Gann is explicit on the point, Fifth Air Force Medium Bombers, 30 .
${ }^{99}$ Lex McAulay, himself a retired Australian soldier, said that Billy Mitchell had been vindicated and that the Battle had been won by airpower alone, Battle of the Bismarck Sea, 170.
${ }^{100}$ Goldstein, Ennis C. Whitehead, 124.
${ }^{101}$ Winnefeld and Johnson, Joint Air Operations, 23-38; Angelella, Prototype JFACC, 22.
${ }^{102}$ Harry A. Gailey, MacArthur Strikes Back: Decision at Buna, New Guinea, 1942-43, (Novato, CA: 2000)190.
${ }^{103}$ Kreis, Piercing the Fog, 267, before the Washington visit was over, Kenney was invited to visit President Roosevelt at the White House and the airman's picture appeared on the cover of Life magazine.




# The Flight Towards Fascism 

The Aviator as Superhero

Past and
Future: Indonesia

# Coming to Terms with the Cultural Revolution 

## The Aviator as Superhero?

# The Individual and The First War In The Air 

The following narrative focuses on the pilots and observers employed on a single squadron (No 9 Army Co-operation Squadron) during the Third Battle of Ypres, July-November 1917. It aims to achieve a better understanding of the personal experience of individual aircrew involved in the First World War and, in particular, the mental and physical aspects of the war in the air. It was stimulated by a recent article in History Today' that examined 'The Aviator as Superhero' in the context of the rise of fascism. The author has suggested that First World War pilots were 'special', pursuing an attractive existence far above the trenches and able to resist the mental traumas that afflicted ordinary soldiers due to their unique control over their fate.

## By Air Cdre Peter Dye

On Monday morning 7 January 1918, Lieutenant Robert Barton Cameron, a 21 year-old observer with No 9 Squadron Royal Flying Corps, flying from an airfield at Proven on the Western Front, was reported as Killed In Action. What the official record does not reveal is that he had deliberately jumped to his death from $1,000 \mathrm{ft}$ over British Lines.

We will never know for certain what motive lay behind the decision to include this particular casualty as one of the 50 aircrew from No 9 Squadron who were reported as Killed In Action during the course of the war - rather than employing the more prosaic 'Killed Accidentally' — but it might be inferred that the Squadron

# A single death, however regrettable, may not seem significant compared to the hundreds of thousands killed in the trenches yet suicide remains a subject little discussed by either surviving participants or subsequent historians 


#### Abstract

Commander, Major James Rodwell, felt Robert Cameron's parents would prefer to believe their son had died in the face of the enemy rather than by his own hand. In so doing, Major Rodwell may also have believed that Robert Cameron was as much a casualty of the fighting as those killed or injured on active operations.


A single death, however regrettable, may not seem significant compared to the hundreds of thousands killed in the trenches yet suicide remains a subject little discussed by either surviving participants or subsequent historians. It was certainly a surprise when I stumbled on an account of the actual circumstances. At the time, I was unaware of any other suicides or self-inflicted injuries within the Royal Flying Corps, although on reflection the manner of Robert Cameron's death was unlikely to have been an isolated occurrence. ${ }^{2}$ It also raised a number of potentially uncomfortable questions. In disguising the events surrounding Robert Cameron's death did the Squadron Commander (and presumably Higher Authority) conform to a wider perhaps unconscious deception that sought to provide an image of war acceptable both to those at home and those at the front? How did his comrades react? And, was it indicative of a wider problem - the exceptional and relentless pressure felt by individuals fighting a lonely, very personal and unprecedented battle in the sky?

While there is a substantial body of work on the suffering of those caught up in the maelstrom that was trench warfare, very little has been written about the effect on the relatively small group of airmen engaged in the war in the air. Yet, it was a struggle that tested men and machines to their very limits, both physical and psychological, although both areas were poorly understood at the time. In fact, much of the contemporary medical literature appears to be directed at the identification of characteristics that make for a good pilot, focussing on temperament as a key factor rather than any deeper or wider analysis. ${ }^{3}$ Moreover, one need only consider the initial
treatment of shell shock to understand how limited was medical knowledge about mental health and the effective treatment of post-traumatic stress disorder. ${ }^{4}$

The following quotation, forming part of a contributing chapter on the medical aspects of aviation published in 1918, appears to reflect the generally held view about pilots suffering from 'nerves'. "It is certain that an aviator's disinclination to fly must have its basis upon some temporary defect of body or mind, and, without being unduly sensitive or timid, he should realize this and overcome the cause rather than tempt Providence by running the danger of overtaxing his power" ${ }^{5}$ In the remaining five pages, the novice aviator is offered advice encompassing visual, auditory, tactile, muscular and balance reflexes as well as the need to avoid drinking and to restrict smoking. The text is a mixture of the sensible, the simplistic and the simply odd, including the following: "The fact that aeroplanes are now so improved and structurally strong that there is little or no danger of anything giving way in the air, should reassure pupils, who sometimes are distressed with this thought whilst in the air"; and, "Most aviators fly with the mouth slightly open. Pupils should see that their teeth and gums are in a healthy state, otherwise any local disease therein is apt to be increased by the cold and rush of air"

To be fair, it is hardly surprising that the medical aspects of aviation were poorly understood. There had been little opportunity for research and little time to build up a body of knowledge. What is more puzzling is that the literary legacy, by and large, does not seek to explore the impact on individuals and the price they paid physically and mentally. In fact, much post-war writing portrays aviators as heroes (the knights of the air) fighting an honourable war (in chivalric combat) far removed from the trauma and squalor of the struggle on the ground. The emphasis on individual fighter aces (who quickly achieved

# Most aviators fly with the mouth slightly open. Pupils should see that their teeth and gums are in a healthy state, otherwise any local disease therein is apt to be increased by the cold and rush of air 

heroic status amongst the public on both sides), the natural pride in technological progress and the apparent freedom of the skies compared to static warfare of the Western Front, have largely masked the darker side of air warfare. ${ }^{6}$

Unfortunately, the ranks of the British Air Services have not produced the equivalent of a Sassoon or Blunden to argue to the contrary. The exception perhaps is Victor Yeates and his novel Winged Victory.

The exact circumstances of Robert Cameron's death might have remained a mystery were it not for the personal diary of his flight commander, Captain BUS Cripps. The entry for 7 January 1918 reads: ". . . I had put Lt Cameron down for a practice contact patrol, as he was in bed at the time, I went and strafed him and sent him up. He committed suicide by jumping out of the machine. I then went up with Lt Robson to do the practice contact. In the afternoon I went up again to take an officer for a joy ride. It snowed in the night".

As insensitive as this passage might read from a distance, it should be put in context. Captain Cripps had joined No 9 Squadron nearly six months previously at the very start of the Third Battle of Ypres, since when he had seen 52 of his colleagues killed or injured out of a total complement of 40 pilots and observers. Death was not a stranger to him or to the other members of the squadron, many of whom he would have known only briefly before they were struck off strength. After such a period of sustained offensive
operations a certain degree of fatalism might be expected. Interestingly, although the pilot involved — Lieutenant Jim Croden, a Canadian — has left an account of his experiences in France he does not mention the incident.?

Robert Cameron was a medical student in his third year at Glasgow University when he joined the Royal Flying Corps in 1917. After initial training he was posted on 10 September 1917 to No 9 Squadron, equipped with the two-seater RE8, as an Observer on Probation (OOP). An OOP was not awarded his observer's badge until he had completed a period of satisfactory performance, nominally after several months (or some 25 hours war flying). In this task he was evidently successful as a group photograph dated to late October 1917 shows a very young looking Robert Cameron in his RFC Maternity Jacket proudly displaying his observer's 'wing'.

No 9 Squadron was an army co-operation squadron and as such worked closely with the front line providing support to infantry attacks, counter-battery fire, artillery registration, photography and reconnaissance. Although the RE8 has subsequently suffered from a mixed reputation, it was generally liked by its crews proving to be a reliable and rugged aircraft. It was certainly not the sitting duck for enemy fighters that popular myth has suggested. There was almost equal danger from ground fire and accidents (Fig 1), including the not infrequent occurrence of being hit in the air by British artillery shells.


Fig 1: No 9 Sqn Aircrew Casualties
(By Cause) - 1917


9 Sqn RE8 damaged by AA fire - Captain Youdale and Lt Ashcroft


9 Sqn RE8 - engine failure during the Third Battle of Ypre


Lt Robert Cameron - standing centre, third from left

The graves of Lts Lewis and Holt, brought down by Allied fire


9 Sqn RE8 - hit by Allied shell fire - Third Battle of Ypres



Crashed 9 Sqn RE8 - on Proven airfield


# It was a rare sight not to see an aeroplane in an unnatural position somewhere on or near the aerodrome 

The squadron record book shows that Robert Cameron crashed twice in September and twice in October (the aircraft being written off on all four occasions). Between 18 October and 12 November he was attacked on three occasions by enemy aircraft, each time driving them off by fire from his Lewis gun. Although such experiences were not exceptional, they were hardly welcome and might well have weighed heavily on the newly arrived observer - all the more so as he appears not to have been crewed with a regular pilot. ${ }^{8}$ The importance of the pilot/ observer team has been commented on by a pilot who also flew RE8s at Proven. More significantly, perhaps, he adds "I was shot at and sometimes hit and I had as my constant companion a large quota of fear, which is I consider inevitable to all normal individuals in one form or another". ${ }^{9}$

The airfield at Proven was certainly difficult to land on as well as providing hazards to aircraft that had to abort their take-off. An observer who served on the squadron earlier in 1917 recalled that "The RE8s were reputed to have a landing speed of about $70-80 \mathrm{mph}$ or they would stall. This was all right on a big aerodrome but . . . Proven was very small and one approach was over a belt of trees. There were very many crashes especially on landing. I was now specialising in 'Contact Patrols' which involved close trench reconnaissance with photographing trenches and gun emplacements and so forth, flying just above the attacking infantry sounding a code on a klaxon at specified times. It meant flying very low in the midst of the artillery barrage. My pilot developed some nervous trouble that affected his landings. We crashed eight times
coming into land and then the next crash was on taking off downwind into a petrol store and onto a hangar where the machine turned upside down and I fell out and then the whole contraption descended on me. Miraculously there was no fire though petrol was spilling all around. My pilot - strapped in - escaped with a scratch to his nose but was much shaken. I was dragged by the wrists from the wreckage. A few days later our MO returned from leave and took me at once to the hospital which discovered that my right arm had a clean fracture above the wrist but the break had been set - presumably by my having been dragged by the wrists from the wreck." ${ }^{10}$

Although a request was made to extend the landing ground and remove some of the more prominent obstacles (such as the surrounding hop poles) no action appears to have been taken. A contemporary of Robert Cameron observed that "During the whole time I was there, it was a rare sight not to see an aeroplane in an unnatural position somewhere on or near the aerodrome". ${ }^{11}$

It is not clear that there was a common or consistent attitude towards aircrew who demonstrated 'nerves'. There appears to have been a degree of tolerance and what data is available suggests that squadron commanders were quick to root out new arrivals who were unsuitable for war flying and equally careful to return to Home Establishment those who had done their 'share' for the war effort. The approach taken on No 9 Squadron might best be described as 'robust sympathy'. It should also be remembered that it was not until late 1916 that a Medical Officer was

Fig 2: Average Tour Lengths for all Aircrew 1915-1918



Fig 3: Postings By Cause (less than one month served)
appointed to each brigade (comprising some five to 10 squadrons) in France. Individual squadrons were provided with a single RAMC Orderly - capable of providing First Aid but not allowed to administer morphia - responsible for taking the patient to the nearest hospital in a tender or a car, depending on whether he was a stretcher case or not. ${ }^{12}$

An analysis of more than 300 aircrew who joined No 9 Squadron during the three years December 1915 to November 1918 reveals that a significant number of pilots and observers only served briefly on the front line. In fact, just over $32 \%$ of all aircrew stayed less than a month with the squadron (Fig 2). Further evidence in support of this picture is provided by a post-war study that also calculated a monthly wastage of $32 \%$ in the number of effective pilots employed on the Western Front. ${ }^{13}$

The causes of wastage on No 9 Squadron were various, the largest single category being combat casualties ( $47 \%$ ) but a significant proportion ( $14 \%$ ) was returned to Home Establishment (Fig 3). Sickness accounted for 9\%: this excludes those hospitalised through accidents ( $11 \%$ ). While confirming the vulnerability of newly arrived and generally inexperienced aircrew, the data also provides some evidence for a conscious weeding out of those considered unsuitable for war flying.

Overall, about $8 \%$ of all aircrew serving with the squadron were returned to the Home

Establishment having served less than three months on the Western Front. An official study carried out in 1918 on 1436 pilots, who were sent to France during the six months July to December 1917, reveals that 7\% of RE8 pilots originally despatched to France were sent home having served less than three months (compared, for example, with $5 \%$ of fighter pilots). ${ }^{14}$

Reflecting on his wartime experiences with No 9 Squadron, Squadron Leader AWF Glenny wrote "I remember one incident (at Proven) when . . . one of my flight crashed (and) the RE8 loaded with bombs and ammunition caught fire and in a few moments the bullets were exploding and the bombs white hot . . . both pilot and observer . . . survived though the pilot's nerves were shaken further by being bombed in hospital in London shortly after he got home and he gave up flying! Nowadays, a crash creates a great deal of stir and alarm, the pilot and observer have to go to a medical inquisition and as often as not are recommended to a short rest if they are not seriously hurt. During the war a different spirit prevailed and I recollect that the principle was to step out of the remains of one aeroplane into a whole and flyable new one. To my mind the war idea is much sounder and I often think that many cases of 'nerves' one meets nowadays among beginners may be down to the present system". ${ }^{15}$

Notwithstanding the problems of landing at Proven, Robert Cameron can be considered to

## Once I was attacked by two enemy scouts and my observer cried like a child and refused to fire, though they fired about 200 rounds at us

have been unlucky in the number of crashes he was involved in - even if he was able to walk away. There is no doubt that he experienced a hectic and very testing first three months at the front. However, like many of his colleagues he was able to take advantage of the opportunity for two weeks leave once the fighting around Passchendaele ended. Returning on 3 December he found the squadron still at Proven but flying a great deal less intensively. ${ }^{16}$ The weather had turned particularly cold - something that was felt greatly by the RE8's observer who was more exposed to the elements than the pilot. Fellowobserver George Fuller, who had joined No 9 Squadron on the same day as Robert Cameron, wrote of a sortie on 3 January 1918. "I never suffered so badly from the cold; one of my cheeks was frozen by the time we landed. I certainly had taken all the measures that I could to combat the weather; heavy woollen underwear, silk socks underneath wool socks, slippers (I think these were of the ladies bedroom variety) with leather soles lined with felt and woollen uppers, overshoes, silk gloves under combination leather gloves with adjustable fur-lined mitt to cover fingers, Sidcot suit, woollen balaclava helmet under my fur-lined helmet, and face mask and goggles, both lined with fur" ${ }^{17}$

Although George Fuller knew Robert Cameron and must have been familiar with the circumstances of his death he makes no mention of it in his reminiscences. However, he concludes his account of his time on No 9 Squadron as follows. "Of the seven of us who had reported for duty just six months before, only two of us were going back. Three had been wounded and sent home and two others were buried in the Military Cemetery at Proven. The casualties sustained including those killed, wounded, or missing, numbered 157 - enough to provide over three squadrons" ${ }^{18}$

There is some evidence that the casualty rate amongst observers was higher than for pilots - the observer was certainly more exposed - although serious injury to the pilot almost invariably meant that the observer became a casualty. Captain 'Rosie' Hilton, in arguing that an artillery pilot's life was not devoid of risk, noted that he had two observers killed in his machine
and two others wounded during the year he was with the squadron. ${ }^{19}$ It took considerable courage to face the attacks of enemy aircraft. "I had several air fights, mostly unsatisfactory. Once I was attacked by two enemy scouts and my observer cried like a child and refused to fire, though they fired about 200 rounds at us. Foolishly I did not report this as I rather pitied his terror, which was akin to my own but more wantonly and stupidly expressed". ${ }^{20}$

The motives that caused Robert Cameron to take his own life can only be guessed at. A Court of Enquiry was convened at Proven on 8 January 1918 to investigate and report on the circumstances of his death. ${ }^{21}$ Having heard evidence from eight witnesses, it felt unable to show how his death had occurred, concluding only that the pilot was in no way responsible and that great credit was due to him for bringing the aircraft down safely. The various statements indicate, however, that the quality of Robert Cameron's work had fallen off considerably in the previous few months, that he was drinking heavily, he had not gone to bed sober the night before and he had seemed pale and confused in the morning.

Conclusive evidence is unlikely to emerge but there is no doubt that Robert Cameron and his fellow aircrew had to function under considerable physical and mental pressure. This is evident in the high attrition amongst newly arrived aircrew and the high level of hospitalisation ( $12 \%$ of all postings). The authorities were certainly aware of the impact of continuous operations on individuals (and on their overall effectiveness) and consciously chose to limit tours (for observers to a maximum of six months). ${ }^{22}$ Combat, the loss of colleagues, the limited ability to relax and the cumulative impact of long hours spent in noisy, open cockpits with no oxygen or heated clothing created an increasing level of fatigue. Indeed, it has been reported that $80 \%$ of aircrew grounded suffered from 'nerves' and that $50 \%$ of pilots developed serious neurosis during operational tours. ${ }^{23}$

Even though the effects of stress were evident, the medical causes remained unclear. This uncertainty was reflected in the wide range of official and unofficial terms employed to describe the symptoms. These 'functional nervous

It may be significant that none of his colleagues chose to refer to his death in their various memoirs. The reason could have been guilt, sympathy, embarrassment or a mixture of all three. We will never know
disorders' comprised hysteria, neurasthenia and psychasthenia, although the terms more commonly employed were 'fatigue', 'flying stress' or 'nerves'. The phrase 'Flying Sickness D' appears to have used on some medical records as a catch-all for any aircrew neurosis arising from anxiety, hysteria, depression or obsession. The relatively few Medical sheets that have been preserved indicate that the terms most commonly used were 'Shell Shock', Neurasthenia, Insomnia and NYD(N) - Not Yet Diagnosed (Neurological). ${ }^{44}$ In fact, it would not be until the early years of the Second World War that the primary causes of nervous disability amongst flying personnel would be fully understood. Under these circumstances, the treatment of individuals was at best haphazard - even though it was subsequently claimed that, of those treated for aircrew neurosis during the First World War, 40\% were returned to full flying duties. ${ }^{25}$

The decision to fix tour lengths (even if they were not formalised) was largely driven by the need to maintain efficiency. In the absence of a resident Medical Officer, the task fell to the squadron commander to determine whether individuals needed a temporary rest or should be returned permanently to Home Establishment. Although the brigade Medical Officer could and did provide an 'expert' opinion the ultimate responsibility was that of the squadron commander.

We now know how important leadership is to the prevention and management of stress on operations. ${ }^{26}$ Strong unit cohesion and high moral can create a high degree of resistance to stress. Of course, good leadership cannot compensate for predisposition or poor training, both of which factors can determine an individual's reaction to stressful circumstances. However, there is ample evidence of the powerful and positive influence exerted by the better squadron commanders. In the case of No 9 Squadron, Major Jack Hunter was greatly respected and much liked commanding officer. He led the squadron for over six months and throughout the Third Battle of Ypres. He was
dined out in some style at Proven on 19 November 1917 but his successor, Major James Rodwell, was less popular. George Fuller for one "was never very much impressed by our new squadron commander, who was much more reserved and who lacked the fine personality of Major Hunter". ${ }^{27}$

The question of whether Robert Cameron should have been hospitalised or transferred to the Home Establishment before his suicide cannot properly be answered. Of course, it is not even certain that he was suffering from stress, although the circumstances are persuasive. It may be significant that none of his colleagues chose to refer to his death in their various memoirs. The reason could have been guilt, sympathy, embarrassment or a mixture of all three. We will never know; although it was clearly a conscious choice on the part of the squadron commander (and Higher Authority) to record his death as Killed in Action.

In some ways the silence surrounding Robert Cameron's death merely reflects the contemporary state of medical knowledge about 'Flying Sickness $\mathrm{D}^{\prime}$. Indeed, a full understanding of the cause of flying-related stress and of appropriate treatments would remain elusive until well into the Second World War - witness the handling of Bomber Command crews suffering from stress and the inference by some that it was simply due to a lack of moral fibre.

Robert Cameron was buried in Medinghem Military Cemetery, a few hundred metres from the airfield at Proven. His grave is surrounded by those of nearly 2,500 other Commonwealth servicemen who died on the Western Front. The headstone simply reads 'In Memory of'.

[^0]${ }^{3}$ A classic example of this genre appeared in the Lancet of 28 September 1918 under the title, The Essential Characteristics of Successful and Unsuccessful Aviators with Special Reference to Temperament. Amongst the riveting insights provided by the authors (Capt TS Rippon \& Lt EG Manuel) is the observation that marriage is a definite handicap to producing a successful pilot owing to the increased sense of responsibility.
${ }^{4}$ Corns \& Hughes-Wilson, Blindfold and Alone, pages 52-59, Cassell \& Co, London 2001, provides a useful summary of attitudes regarding mental health in Britain before the First World War.
${ }^{5}$ McMinnies, Practical Flying, pages 212-216, Temple Press, London, 1918.
${ }^{6}$ The one notable exception is Denis Winter's study of First World War fighter pilots, The First of the Few, Allen Lane, London, 1982. ${ }^{7}$ Some Experiences of Captain James Eric Croden, No 9 Squadron RFC, Canadian Air Historical Society, Vol 2 No 1, Winter 1964. ${ }^{8}$ The 7 sorties were:
11 Sep 17-2/Lt Gardner \& 2/Lt Cameron. Engine failed on take-off and crashed into 2 lorries.
25 Sep 17 - 2/Lt Hackman \& 2/Lt Cameron. Aircraft overran aerodrome and crashed.
18 Oct 17 - 2/Lt Jones \& 2/Lt Cameron. Attacked by EA, driven off by observer.

27 Oct 17 - 2/Lt Cryer \& 2/L Cameron. Aircraft overturned on landing.
31 Oct $17-2 /$ Lt Dixon \& 2/Lt Cameron. Aircraft crashed on landing and ran into ditch.

9 Nov 17 - Lt Walker \& Lt Cameron. Attacked by 3 EA driven off by observer.
12 Nov 17 - Capt Anderson \& Lt Cameron. Attacked by EA, driven off by observer.
${ }^{9}$ Flt Lt P Warburton - Service Experiences, NA(PRO) AIR1/2388.
${ }^{10}$ Liddle Collection, Recollections of 2/Lt MH Harland,
University of Leeds.
${ }^{11}$ Sqn Ldr AWF Glenny - Service Experiences, NA(PRO)
AIR1/2389/228/11/119.
${ }^{12}$ NA(PRO) CAB44/1.
${ }^{13}$ NA(PRO) AIR1/686/21/13/2252.
${ }^{14}$ NA(PRO) AIR1/818/204/4/130 — Report on Average Lifetime of Pilots in France.
${ }^{15}$ Glenny, op cit.
${ }^{16}$ Robert Cameron flew for the first time back from leave on 8 December 1917 and undertook just 12 further sorties in the remaining weeks before his death on 7 January 1918.
${ }^{17}$ Fuller, Reminiscences of Lt GSB Fuller, Cross \& Cockade (USA) Vol 10 No 1, pages 34-54, 1969.
${ }^{18}$ The 7 observers were:
2/Lt T Simmons - Injured Accidentally (aircraft stalled and caught fire on take-off) 14 Sep 17

2/Lt AJ Powney - Died of Wounds (aircraft brought down by EA) 15 Sep 17
2/Lt GD Turner - Wounded in Action (attacked by EA) 20 Sep
17
2/Lt WE Rothwell - Hospital 20 Dec 17
2/Lt RB Cameron - Killed in Action (suicide) 7 Jan 18
2/Lt GSB Fuller - Home Establishment 13 Mar 18
2/Lt NS Robson - Home Establishment 13 Mar $18 \quad 19$
Richard Hilton, Nine Lives, pages 50-53, Hollis \& Carter, Londin, 1955.
${ }^{20}$ EL Williams - Personal Experiences, NA(PRO)
AIR1/2390/228/11/219.
${ }^{21}$ NA(PRO) AIR1/962/204/5/1061.
${ }^{22}$ The average tour length for all aircrew on No 9 Squadron was 4 months. This compares very well with the attrition assumptions employed to determine training requirements in 1917. NA(PRO) AIR1/683/21/13/2234 records the estimated life (in months) of pilots and observers as:

| Squadrons | Pilots | Observers |
| :---: | :---: | :---: |
| Corps | 4 | 4 |
| Night Flying | 4 | 4 |
| Fighter <br> Reconnaissance | 3.5 | 3.5 |
| Bombing | 3.5 | 3.5 |
| Single Seat Fighter | 2.5 | - |

[^1]


## Airrbase defence: the optimum strategy to counter modern threats to joint air operations

"It is far easier and more effective to destroy the enemy's aerial power by destroying his nests and eggs on the ground than to hunt his flying birds in the air". ${ }^{1}$

This oft quoted but appropriate comment dating from 1921 on the fragility of air power while it is stranded on the ground is particularly apposite when discussing airbase defence strategies. Airfields are highly specific areas within the battlespace that require largely static, high technology facilities that are also relatively fragile (certainly on expeditionary operations where hardened facilities are not usually available). Destruction of aircraft or any of their key vital support facilities may severely
degrade or even cease air operations. Put quite simply, without an effective defence that has been carefully planned and executed, the losses to the overall campaign architecture may become so great that commanders progress may be unacceptably delayed or changes to the strategic plan may be required until air power has been fully restored. Friendly casualties are likely to be increased as a consequence of these delays or changes to the plan. Airfield defence forms a key element in the defensive battle for air forces, arguably of similar importance to all of those defensive measures adopted whilst airborne. The aim of this essay is to discuss the optimum air asset defence strategy for expeditionary joint component operations.

## Vital air power and its dramatic effect on the battlefield have been severely reduced where airfields have not been provided with adequate defences



## The need for airbase defence

In all cases, history has shown that attackers will conduct penetrating attacks only where airfield perimeters are weakly defended, preferring otherwise to conduct stand-off attacks. The unavailability of forces, mal-deployment, poor leadership or weak command and control have all been exploited by attackers, resulting in notable successes by units such as those conducted by the SAS in North Africa and German Paratroops on Crete during WW II, and the Viet Cong in Vietnam. More than $60 \%$ of attacks have had the relatively modest aim of destroying vital equipment rather than seizing the airfield and
have resulted in over 2,000 aircraft being destroyed world-wide between1940 and 1992. ${ }^{2}$ The more complex, and difficult, aim of capturing airfields would entail the use of larger formations of troops, whereas relatively small groups of attackers can achieve great effect against poorly defended air assets. Capturing airfields is now often deemed unnecessary in a manoeuvre-battle scenario where the real estate is often of more value to the fixed defender as opposed to the highly mobile attacker who can simply flank the area and move on after rendering it safe by forcing the enemy to cease his air operations. The time and effort required to re-activate severely shelled air bases, and in
particular aircraft operating surfaces, may be too great for the speed of the campaign, and the choice to simply destroy enemy air assets rather than the entire infrastructure will allow rapid reoccupation by friendly forces that can then operate more closely with frontline units in the Offensive Counter Air role.

Vital air power and its dramatic effect on the battlefield have been severely reduced where airfields have not been provided with adequate defences. In certain cases, such as North Africa during Operation TORCH allied attacks against axis airfields greatly affected the precarious balance of air power in the campaign, resulting in a favourable air situation and thus assisting an allied victory. ${ }^{3}$ Modern airbases are necessarily large pieces of real estate, with even modest fixed wing bases requiring lengthy runways and comprehensive servicing facilities. The area covered comprises that inside the wire and a sizeable area of vital ground outside of the perimeter, from which stand-off weapons can be launched and in which the airfield and aircraft on approach or take-off are vulnerable to SAM attack. This results in large areas that need to be covered by observation, fire and patrolling around airfields (approx 100 sq km area for an average airbase ${ }^{4}$ ), highlights the requirement for a well sited observation post screen and a reaction force. In almost all cases where exterior patrolling has not been conduced, defenders have received extremely damaging attacks against their air assets. In the case of the Long Range Desert Group ${ }^{5}$ (LRDG), operating deep in the Libyan Desert during WW II, patrols usually observed the target by day and laid-up in positions adjacent to airfields before attacking at night. It is assessed that had the German defenders conducted patrols, set-up listening posts and observation posts in the limited likely approaches to their airfields the LRDG would have been successfully interdicted and deterred from attacking their intended targets.

## Ground defence

While much of the data applicable to airbase attacks concentrates only on those accurate records obtained from Main Operating Bases (MOBs), there is little doubt that effective attacks
on smaller airstrips, dispersed facilities such as helicopter operating locations and other air asset locations have taken place and been successful. The concept of defence for these dispersed locations can be assumed to have synergy with fixed MOBs to a greater extent: the major issues being simply of scale. Forward operating bases and units placed far forward in the battle space may attract a greater intensity of enemy threat, and the decision to position air elements here must be fully understood and justified by planners. As ever, greater potency is becoming available from weapon systems such as attack helicopters that need to operate in forward areas. The effect of their subsequent loss will be felt more acutely.

Success against aircraft and air operations has been achieved largely on the ground by groups of regular, irregular or specialist forces approaching the airfield on foot and in vehicles in order to conduct a stand-off attack with the aim of destroying aircraft or facilities. ${ }^{6}$ The enemy usually operate in groups of 4 to 30 personnel (the mode being 5 personnel ${ }^{7}$ ) with the aim of destroying or severely degrading materiel, aircraft or the vital support services that are needed to continue air operations. The mere threat, or potential for ground attacks, has caused disruption to allied efforts, and the need for dedicated airbase defence utilising specialist manoeuvre forces has long been recognised by the UK and written in to national doctrine. ${ }^{8}$ Other nations have adopted a static, 'wire-walking' approach, relying on army units or coalition forces to dominate the large areas of interest and vital ground that exist in the vicinity of airfields e.g. French and USAF Security Forces. Recently, more progress had been made within 'wire-walking' protagonists as they realise the needs and benefits of a more holistic approach. Some of the lessons have been learned the hard way, with successful attacks against French and US facilities in North Africa and Vietnam respectively. The US forces in Vietnam discovered the benefits of creating defended zones around their airfields that were usually situated close to built-up areas. In order to avoid rocket or mortar attacks these zones could be as large as 10 km from the airfield perimeter, with the most vulnerable area being that zone between $5,000 \mathrm{~m}$ and $10,000 \mathrm{~m} .{ }^{9}$ Within these

# Vital air power and its dramatic effect on the battlefield have been severely reduced where airfields have not been provided with adequate defences 

huge areas, key terrain must be identified and the most likely weapon launch sites dominated by either view or patrolling in order to make the defender's task manageable. The USAF Security Forces became adept at defending American airbases with the assistance of Vietnamese levies and US ground forces, that operated outside the wire. Unfortunately, no specialised forces were trained or employed and success depended upon the local quality and training of the forces assigned; differences that caused some serious losses of US aircraft and facilities. The employment of levies in both Vietnam by the US Forces and earlier in Trans-Jordan and Iraq by the RAF Regiment has proven the efficacy of their unique local knowledge and understanding of the demography of the area, leading to a far more effective defence in areas where significant cultural, language and political differences exist between defender and the host nation.

Most defence plans have worked from the outside inwards, dealing with the longest range threat first and working inwards towards short-range threats. This approach has the advantage of eliminating the longer range artillery and rocket attacks that proved so destructive in Vietnam, but on the other hand is costly in terms of the manpower and the effort required. Recently, some have postulated the opposite approach and recommended securing the individual assets first and working outwards. This approach favours the internal security concerns initially and allows for lighter forces to be deployed, perhaps as part of an initial package to provide defence. It has particular value in mitigating suicide attacks and improvised explosive devices, but cannot deal with determined stand-off attacks very effectively. Logically, threats must be dealt with as they occur and cannot always be accurately pre-determined. A wide range of deployment options must be available to the defender if he is to defeat all reasonable threats that may range from individual suicide bombers to long range artillery, cruise missiles and mortars. The choice of which stance to adopt may lean towards close-in or ranging out to the most likely stand-off attack areas and will be informed by careful analysis of the most recent intelligence. Additionally, host-nation
constraints may preclude external patrols; instead local security forces may provide sterile areas cleared of local civilians and strict control of entry procedures. Conversely, the area immediately surrounding the air base may be heavily populated (as were those at Da Nang and Tan Son Nhut in Vietnam ${ }^{10}$ ) or transited by the local population. The quality of local forces will range from rudimentary to extremely effective, and coalition partners may choose to defend their geographic boundaries alone. In all of these scenarios, close cooperation between commanders is required to ensure that defensive gaps are not left open and that fratricide is avoided.

Simple plans are always the best, and physical separation of activities between 'inside the wire' and 'outside the wire' provide clearly de-marked areas of operation. Within airfields national sectors are more easily defined by physical features such as runways etc, however the practical problems of managing the defence should not be underestimated, particularly where rules of engagement (and the willingness to use force) differ widely between coalition partners. In addition, the airfield must be considered as an entity by the Joint Force Land Component Commander and his staff. Formation boundaries should not be planned to bisect airfields since defenders will become greatly hindered in their attempts to control their area of responsibility if it is shared between adjacent brigade or other boundaries. This problem is made substantially worse if boundaries of different partner nations bisect airfields. Widely differing approaches to ground defence between coalition nations may cause fratricide if a combined C2 facility is not created. Inevitably, the key airfields will be shared by many partners and cultural differences need to be overcome in order to offer a robust defensive network between national sectors.
"Manoeuvre is the decisive element at all levels in the defence. By combining movement with fire, the defending forces make the best use of the terrain assigned to them in order to inflict high losses on the enemy and at the same time avoid destruction by enemy fire. By manoeuvre, the commander concentrates combat power, permitting him to
create a favourable force ratio in order to defeat the enemy". ${ }^{11}$ Although the RAF Regiment tends to specialise in the area defence of air assets, the concept of manoeuvre warfare remains extant. Post Op MERCURY, the German invasion of Crete in 1941, there has been a recognition in the UK of the need for specialist airbase defence forces. Those forces present on the island at the time were mal-deployed and ill-equipped (in the case of RAF tradesmen both mentally and in equipment terms) to face a determined enemy that attacked from an unexpected direction (by parachute, rather than by amphibious means as expected by the commander, Gen Freyberg, following ULTRA intelligence ${ }^{12}$ ). The following loss of Crete has been attributed largely to a poor understanding of the specific needs of airfield defence, the absolute requirement in this case to prevent the Germans from gaining their foothold at Maleme airfield and the poor use of reserves and tradesmen who were rendered useless due to a lack of available weapons and the will to deploy non-infantry troops in the defence of their own bases.

The need to defend against stand-off and penetrating attacks ${ }^{13}$ provide all-round defence and defence in depth with the limited force sizes available lead naturally towards a manoeuvre strategy. The 'find-fix-strike' principle ${ }^{14}$ results in a requirement to accurately observe and react to targets as they appear. Finding the enemy relies upon adequate 24 -hour observation ability including thermal imagers and battlefield radar coupled with an infantryman's skills in knowing where to look. Once found the enemy must be fixed by holding him in such a position that he cannot become 'un-found' again. This may be done by a mixture of channelling into holding areas where he is no longer such a threat, by harassing fire, patrol activity (in vehicles, on foot or by air) or by illumination at night that will force him to remain where he has been fixed. The need to able to operate 24 hours a day results in a much greater reliance on night vision aids with a consequent training bill and logistics chain. The benefits, however, are a decrease in the number of personnel required to defend a base and the ability to find and fix an enemy without always relying on fire support. Finally, neutralising the threat by
a strike could involve a direct assault, indirect fire or a combination of techniques that will render the enemy threat ineffective. More realistically, during periods of increased tension that fall short of general war, rules of engagement will dictate that the find might take place using sensors, the fix by illumination and the strike by arresting the suspects in co-ordination with host nation law enforcement agencies.

Type designed and equipped ground forces are required to increase the chance of a successful defence, particularly for forward deployed air assets such as helicopters or ground attack aircraft that may operate from bare base locations that do not benefit from any of the static defences usually built at permanent airbases. The use of non-dedicated forces has been largely discredited with army units often being re-assigned to more pressing tasks in forward areas. This development is coupled with the increase in terrorist activity post-9/11 and the subsequent attempts to shoot down aircraft on the approaches to both military and civil airports that have occurred, leading to greater thought being given to the mechanisms required to defeat this pressing threat. Novel approaches, including the use of pan-dimensional defences to reduce collateral damage, the inclusion of civilian agencies and the ever-present communication problems have tested defenders who have to succeed $100 \%$ of the time, whereas an attacker only needs to have one successful attack to achieve significant results. All of the most recent threats have forced defenders to modify their planning to take account of suicide attacks. Where terrorists are prepared to die for their cause routinely, the effects of collateral damage become significant in deciding how and where to neutralise the target. It may be appropriate to allow a 'controlled terrorist success' against a target if that area has been evacuated, rather than risking massive collateral damage in an uncontrolled crash following defensive action.

In the RAF Regiment field squadron the 81 mm mortar flight currently provides Mortar Fire Control parties (MFC) that make excellent use of Intelligence Surveillance Target Acquisition


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and Reconnaissance (ISTAR) assets in the form of MSTAR battlefield radar, thermal imagers and laser range finders linked to Special Purpose GPS Receivers (SPGR). The combination of the ISTAR and heavy degree of firepower available to the field squadron results in a high capability of finding and fixing the enemy while manoeuvre forces strike. Linked with the ability to project indirect fire out to nearly $6,000 \mathrm{~m}$, the mortar flight provides the bulk of the squadron ISTAR capability by operating the sensors and performs the vital communications links between static OPs and manoeuvre elements that ensures the success of any strike. The indirect fire characteristics of the mortar, coupled with its firepower effect
and accuracy when controlled by experienced crews equipped with the latest target finding and plotting aids give a field squadron the decisive edge. Unfortunately, bursting munitions often suffer from restrictive rules of engagement in operations other than war. In particular, high explosive rounds must be specifically requested prior to employment, although illumination and smoke may be authorised for more general use.

Direct fire weapon systems offer utility against point targets in scenarios where rules of engagement insist on discrimination. A variety of machine guns, sniper weapons and grenade launchers have been used to provide the firepower


Finding the enemy relies upon adequate 24-hour observation ability including thermal imagers and battlefield radar coupled with an infantryman's skills in knowing where to look
required. However, despite obvious advantages all point attack weapons lack the area coverage that bursting munitions provide. In addition, the relatively short range and line-of-sight requirements of most machine gun systems means that they must be transported to the firing point. In mobile scenarios, it might be expeditious to mount weapons on light vehicles, although targeting accuracy is generally compromised as a result.

As part of an overall weapon strategy the mixture of direct, indirect, point attack and area coverage systems seems to offer the greatest ability across the defensive scenario. Deconfliction with aircraft movements on approach and departure lanes is required if air ops are to continue. Only with local agreements between air traffic controllers and the deployed field squadron to establish agreed operating procedures can a mutually acceptable defence posture be maintained. Little doctrinal advice currently exists on this subject, but adhoc arrangements have been practised locally that have suited all partners. Issues such as the firing of munitions while aircraft operate locally, night vision blooming caused by infantry mortar
illumination and communications difficulties all require careful planning if the air operations and ground defence are to work in harmony.

The availability of intelligence information is not usually a problem for formations that are co-located with flying units due to their airintelligence gathering and analytical capability. The need for bespoke intelligence analysis in the specific ground role gives the ground commander the planning edge that he needs to deal with threats and mould his forces to meet them. Usually, the electronic access is available to glean local ground intelligence information and requests for information can be issued by collators to ease the flow. However, this task has skill-set and security clearance issues that are inextricably attached to it, and a trained analyst who is attached to the ground defence unit would achieve far greater quality results. This approach requires investment in training and cultural changes to the preconceived notions that dominate the employment potential of properly equipped personnel on frontline units. Use of other security agencies gives access to local knowledge that may not be available otherwise. This local knowledge greatly enhances the ability of the defender to do his job, and is of inestimable value but requires an investment in time, effort and staff work by planners to ensure that systems may be developed quickly once the deployment commences. Time and effort is also required to analyse all the available intelligence, a function that does not always exist at the appropriate level currently within units that are not equipped in terms of manpower or skill-sets to exploit that information which is available to them from both electronic and human sources. Limited size forces must have access to the best information if they are to operate effectively, and in addition to intelligence feeds, much information can be gathered locally from the indigenous population and security services leading to a requirement for attached interpreters. These higher level functions usually exist only at battalion-level and above. Greater flexibility is needed to ensure that the needs of airbase defenders are catered for by attaching personnel with the correct skills to conduct intelligence analysis at unit level. It is simply not adequate enough to plagiarise the

general intelligence summaries that are nearly always far too general or vague.

A level of local input is required from host nation and coalition intelligence/ anti-terrorist organisations in addition to the local information gleaned by patrolling activities. Indeed, the role of interpreters can be expanded to include the production of correspondence in local languages to facilitate force protection initiatives between forces and necessary contract writing. Indigenous employees are usually the ideal group to employ, and with streamlined hiring and security vetting procedures followed by careful management, their role could produce far greater integration between deployed forces and the host nation. This microlevel of detail knits together with pan-dimensional sources to form the tapestry.

## Defensive counter air battle

The immediate destruction of enemy fixedwing air forces during the opening stages of any conflict has reduced the air breathing threat in most scenarios to a minimum. However, as the effectiveness of technology to defeat one threat improves, so does proliferation of states acquiring relatively cheap alternative methods of prosecuting attacks. These new threats have concentrated GBAD thinking recently with an increasing requirement to defeat these challenging targets in restricted airspace scenarios where having to take the first hit may be decisive, particularly if the enemy successfully delivers a Weapon of Mass Destruction/effect (WMD/e) at a strategic point. The enemy can regain some of the balance of air power if he chooses to employ relatively cheap forms of attack vehicle that may be armed with WMD/e in massed attacks that may only be semiguided or unguided, but with potential to cause significant effects, whether real or psychological. Forcing allied forces to don protective clothing constantly throughout an already high heat stress environment will produce worthwhile effects for an enemy intent on delaying or affecting the prosecution of air power in a campaign.

As a key element in the Defensive Counter Air (DCA) battle, GBAD can release air assets further forward, tap into and exploit the Recognised Air


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Picture (RAP) for early warning and situational awareness, and layer with coalition missile systems to provide an umbrella of coverage out to several tens of miles from the defended assets. Most inservice GBAD weapon systems were designed for Cold War operation and optimised against air breathing threats in all but a few cases. Few have an anti-ballistic missile capability. Even the threat of TBM attack may halt an expeditionary operation before it has begun ${ }^{15}$ but this national capability is a subject that is not within the scope of this essay and will not be discussed.

Furthermore, many systems were designed to operate independently, and only recently have been equipped with appliqué data links as a first generation attempt to rectify the significant drawbacks that result from an inability to integrate into the wider airspace battle at an appropriate level. Without a RAP, ability to communicate by voice secure means, positively identify the target and assure the air-commander that fratricide risk has been minimised, GBAD systems remain tied to restrictive positive control methods that greatly reduce their effectiveness against the hard-tohit target set. The simple matter is one of lack of decision-making time. If the target is not positively identified early enough for the GBAD system to react and engage (often with only a single-shot kill probability of 0.5 ), perhaps with two missiles, then the target will often become un-engageable and the attack will probably succeed. Airspace control is the key to effective GBAD, with defenders requiring the technical and cultural ability to fully integrate into the DCA battle. One of the key challenges is to gain the trust of friendly air staffs and operators who will naturally suspect that the major threat to their survival is from fratricide rather than any enemy ground or air fire.

Complementarity is attained where coalition GBAD systems integrate into the defence and the layered concept plugs gaps (releasing airborne DCA assets further forward to deepen the defence) in capability that would otherwise cause concern that specific attack profiles could succeed. Ideally, a medium SAM system is teamed with short range (up to approx 10 km range) air defence platforms and very short range weapons (under 10 km approx)in a near real-time data network that is fed from the overarching radar coverage. Although currently limited, GBAD sensors should also feed back up to the overall RAP wherever possible. The coverage data from ground level to medium level obtained by the specially tuned Doppler
shift radars that equip GBAD units could provide useful gap filling for airborne radars that are often limited by ground clutter. Many radars that equip ground based control and reporting centres are necessarily interrogating only above-height limits, leaving gaps in coverage that an enemy may exploit with a variety of threat vehicles. The need for data transmission capability in a network enabled capability for GBAD is beginning to be addressed in a variety of ways worldwide. The sub-one second latency required for air defence networks is challenging industry to provide adequate deployable communication networks into the field that can connect all sensors together in order to allow commanders to view the full RAP

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and pick-off the appropriate information to suit their essential needs. This capability will unlock the latent potential for in-service weapon systems that are currently hindered through restrictive engagement practices that attempt to avoid fratricide. For the future, new GBAD weapon systems will be designed from the outset to exist within a fully NEC battle space that can fully utilise their capabilities. Certain GBAD systems also offer unparalleled surveillance in the ground role with extremely effective thermal imagers
that, while optimised to provide high resolution definition of air targets, can be programmed to conduct automated ground area searches during periods of lowered enemy air threat as a secondary role. In addition, the often remote nature of GBAD sites that require clear fields of view and fire for their effectiveness results in a defence problem and a solution at the same time. The extra guarding required to defend a remote site may be completed by a co-located active defence grouping.


GBAD can release air assets further forward, tap into and exploit the Recognised Air Picture (RAP) for early warning and situational awareness, and layer with coalition missile systems to provide an umbrella of coverage out to several tens of miles from the defended assets considered key ground, with any losses in scarce air assets likely to greatly affect the campaign outcome

## Commanding the force protection battle

Leaders in airfield defence have recognised the requirement for specialised units, formed from within their own organisations to eliminate their arbitrary re-allocation of forces to more pressing or seductive tasks during operations. Where airbase defenders are cultivated from within air forces there also exists the air force culture and air-mindedness ${ }^{16}$ that assists in integration of C2 and harmony of aims between aircraft operators and defenders. Historically, this aspect of ownership has proved decisive with many airfields being lost to the enemy simply due to the pressure from land commanders to re-deploy infantry formations forward.

Far from being classic rear-area locations, airfields are now considered key ground, with any losses in scarce air assets likely to greatly affect the campaign outcome. The threats are not usually from predictable, regular formations but are likely to encompass specialist units, special forces, terrorist attack and other asymmetric threats. Unless airfields are located within lines of advance on potential battlefields it is unlikely that the defender will face main battle tanks as a threat, but almost all other types of attack are possible from both land and air. Indeed, an occasional airfield attack during WWII featured a submarine approach! ${ }^{17}$ Although this method of insertion is unusual it remains a sobering thought that attackers will exploit any weaknesses in defences and approach by any means. Vehicle and foot insertion methods are the most popular with an initial vehicle approach followed by foot patrol into a stand-off attack area. This method allows for heavy stores to be brought forward efficiently and then carried the final distance for the attack. The weight of mortar rounds and rockets may preclude long insertion marches and terrain will assist any vehicle approach where dead ground or foliage permit camouflage to within striking range. Even in a desert arena attackers may approach airfields with stealth as the Luftwaffe discovered to their cost in North Africa during WW 2. Long Range Desert Group and SAS patrols were able to lay-up in the vicinity of airfields by day using camouflage and attack at night, causing significant destruction for the numbers involved. Careful recce will expose the most likely lines of
infiltration, exfiltration and weapon launch points. Defenders must conduct the same process when planning their defence and dominate the areas of interest by patrolling, observation or harassing fire. Luftwaffe commanders in the Western Libyan Desert did not appreciate the ability of determined troops to patrol for hundreds of miles by vehicle or foot in order to prosecute attacks and the lack of their own patrol activity in the vicinity of their airfields resulted in easily exploitable weaknesses. The SAS were able to infiltrate airfields and place demolition charges, damage or destroy facilities and aircraft and render airfields inactive. An Axis intelligence summary from April 1942 states:
"The LRDG plays an extremely important part in the enemy sabotage organisation. The selection and training of the men, the strength, speed and camouflage of the vehicles for the country in which they have to operate have enabled the group to carry out very effective work, particularly in the destruction of Axis aircraft on the landing grounds at Agedabia and Tamet". ${ }^{18}$

Clearly, the special forces-style attacks, begun by the LRDG and then bolstered by the SAS post-1942, caused the enemy much frustration and loss of vital equipment. With this requirement to defend large areas against a range of attacks, airbase defence has developed into a specialised business. Regular infantry formations are not equipped to provide the firepower, mobility or surveillance in sufficient numbers required to succeed. Therefore, a type-designed unit has been built within the RAF Regiment in order to provide the balance of skills, equipment and standard operating procedures that have been proven to be battle-winning against the range of threats. These may range from high tempo, challenging adversaries to asymmetric attacks by local levies or other irregular forces. The RAF Regiment Field Force units are equipped with a high degree of firepower that includes support weapons ( 81 mm mortar and Sustained Fire General Purpose Machine Gun, GPMG), snipers, and numerous GPMGs to replace the less powerful light support weapon (LSW). For illustrative purposes a field squadron deploys approximately the same firepower as a regular Army battalion and its size is akin to a Company Group, but this is where the similarities end. Each fire team
(four men) is equipped with mobility (Landrover, fitted-for-radio) and each man carries a weaponmounted night fighting aid. Squadron surveillance comprises battlefield radar, thermal imagers and a suite of passive night aids. Recently, the addition of Landrover gunships has increased both firepower and the physical presence of patrols. In total, the force package can find the enemy effectively, fix him with support weapons and strike using highly mobile teams.

A C2 system that is expeditionary, equipped with air-minded and experienced personnel, placed near to the centre of the deployed hierarchy, who can plan and execute the defensive plan is required. Specialist teams are needed from the planning stages in order to ensure that air power may deploy and operate effectively. Moreover, the number of agencies involved (ranging from medics and policemen to logistics and engineering groups) mitigates an adhoc approach. Leadership is required in order to manage the disparate interests of operator versus support agencies. Once a steady state has been achieved, the tactical element of the C2 network may be withdrawn and replaced by a roulement in most circumstances, leading to a smaller number of deployable teams. In addition, training as a formed team is the best method of ensuring that force protection is guaranteed from the outset. Finding the time and suitable locations for training has challenged exercise planners, but over time a culture of expeditionary preparedness can be established if the key groups of leaders are developed. Annual training in basic skills can be topped up with individual and team exercises, but this approach relies upon a common set of operating procedures and some external validation if the final team exercise is to have the required beneficial effects. Time to complete this training during a build-up phase cannot be guaranteed, although the value of training while deployed in assembly areas cannot be overemphasised due to the acclimatisation benefits and relative lack of distractions when compared to the predeployment phase. In the ideal world trained teams would be held at short-notice standby and require only acclimatisation training once deployed.

The actual equipment required for C 2 will depend on the type of location to be enabled, but as a general rule, should be lightweight, dismountable and weather-proof. Communications is one of the most challenging aspects initially and the ability to communicate to all sub-units and upward report by secure voice and data are essential. In addition, the ability to manage the local battle may result in requirements as diverse as local public address systems to management radios, mobile telephones and tactical radios. Public broadcast systems have great utility on fixed bases since they can give warnings of attack, all-clear information and better prepare personnel to survive myriad potential attacks.

Field defences on airbases often cause consternation due to the network of underground cable runs and pipelines that usually comprise the infrastructure. Building-up rather than digging positions may give the double benefit of increasing weapon and surveillance arcs over relatively flat ground. Tall buildings may limit arcs of view and fire but may be used to site positions on in order to turn their height to an observation advantage. Lightweight control of entry methods such as caltrops across entry points might be preferred to cumbersome barriers in an expeditionary scenario. Usually, novel approaches will enable reductions in the initial freight bill and greatly enhance deployability at a time where logistics planners scrutinise every item to reduce the overall freight costs. In the same vein, protected mobility might be essential in a high mine or sniper threat environment, but the weight of the vehicles, their lack of cross country mobility, in most cases, and the specialised servicing requirements often leads to them being excluded.

## Summary

The need for air asset defence has been proven historically and the techniques required to ensure a successful defence have evolved rapidly in the past decade since expeditionary air operations have become increasingly common. The fundamental changes in philosophy that have been required by all personnel involved in air operations when they have suddenly been required to move away from fixed, often hardened Cold War main base locations

# The fundamental changes in philosophy that have been required by all personnel involved in air operations when they have suddenly been required to move away from fixed, often hardened Cold Warmain base locations to austere locations must not be underestimated 

to austere locations must not be underestimated. In many cases the resourceful leader has been a vital commodity. Able to build and operate high-technology equipment from harsh climatic conditions worldwide, is no longer considered difficult by leading players, particularly in the War Against Terrorism. Instead, rapidly deployable air power is relied upon in order to prosecute rapidly moving multi-dimensional conflicts. Concurrently, the threat environment has widened with air bases being generally further forward, and the rear areas threatened by terrorist action with the potential for WMD/e weapons to be employed anywhere.

Command and Control structures are key to winning the force protection battle, with the need for centralised command and decentralised control within a network enabled communication system that includes both encrypted voice and data transmission at latencies that allow near-real time updates to provide the required situational awareness. Specifically, within GBAD C2 nearreal time means sub-one second latencies - a significant challenge to in-service networks, and an absolute necessity when defeating hard-to-hit targets. Future capabilities promise the kind of electronic ability and computing power that will be able to provide the speed necessary to command the battle at the pace that will destroy the enemy's ability to affect the decision cycle. With networked C2 systems and sensors greater synergy between air and ground platforms is created when all sensors feed into a RAP. Dynamic control becomes realistic and fratricide risk greatly reduced. In addition, the deployment of assets further forward will deepen air defences and reduce and effect of attacks. The relatively impermanent nature of air patrolling can be replaced to some degree by GBAD systems that have more permanence and cost less in general to provide.

Ground forces need to remain type-designed as light, deployable, and heavily armed with high
numbers of night vision aids and ISTAR assets in order to achieve the ever-shortening time-scales required for deployments world-wide. A flexible approach will allow access to mission-centric equipment such as protected mobility. Linkages with host-nation and coalition forces need to be robust to avoid fratricide; ideally within joint operations rooms. Furthermore, boundaries must be agreed and deconflicted at the outset. Skills required on expeditionary operations include the need for accurate intelligence in order to inform the choice of defensive posture. Employment of locals to decipher local customs, translate documents, produce letters etc, and assist in patrolling activities will enable a much better local tapestry to be produced when all sources are merged. Training unit personnel in low-level intelligence skills might seem expensive but pays dividends quickly on operations.

Operations in the littoral are set to increase in frequency, as deployments require landing areas, beachheads and ports in order to deliver equipment. Vulnerabilities increase where assets are bunched and the operating procedures for defenders are complicated greatly due to the wide range of differing units involved, single-service interests and lack of universal communications. In future, more universality should decrease communication issues, but the battle space will remain challenging for all sensors due to the terrain nature of the littoral where optimisation for land or sea use become an Achilles heel.

The increase in terrorist and asymmetric threats will probably result in a continued requirement for 'professionalisation' within air asset defence. If lessons are to be learned, leaving this vital area in the hands of enthusiastic amateurs usually results in vital equipment being destroyed or rendered ineffective.

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## Notes:

${ }^{1}$ Gen Giulio Douhet 1921
${ }^{2}$ Snakes in the Eagles Nest, p xiv.
${ }^{3}$ Snakes in the Eagles Nest pp 40-44.
${ }^{4}$ RAF Regt Tactical Doctrine para 0324.
${ }^{5}$ LRDG, pp164-165.
${ }^{6}$ Snakes in the Eagles Nest p xvi.
${ }^{7}$ Snakes in the Eagles Nest p 58.
${ }^{8}$ Formation of the RAF Regiment on 1 Feb 1942.
${ }^{9}$ USAF, Attack on Udorn (26 Jul 68): Project
CHECO Southeast Asia Report, 17 Dec 68.
${ }^{10}$ Snakes in the Eagles Nest, p 98. Da Nang and Tan Son Nhut were located adjacent to metropolitan Da Nang and Saigon respectively.
${ }^{11}$ ATP 35 (B) Para 0409.
${ }^{12}$ Crete, The Battle and the Resistance pp 156-7.
${ }^{13}$ RAF Regt Tactical Doctrine Para 0328 and 0329.
${ }^{14}$ RAF Regt Tactical Doctrine Para 0233.
${ }^{15}$ air power and Expeditionary Warfare, Goulter in air power 21. ${ }^{16}$ Flexibility of air-minded troops during WW II, Air Ministry Report, 1945.
${ }^{17}$ Snakes in the Eagles Nest- SBS raid on Kastelli Pediados, Crete 1942. P 118.
${ }^{18}$ LRDG, p 164.


## How critical was air power in the foullume of operotion Market Garden?

## By Wg Cdr Dave Winstanley

"Market Garden, a plan based on air power, was the only battle of the entire campaign in North-West Europe fought with Allied air inferiority, a large part of it self-inflicted." ${ }^{1}$

Operation Market Garden, like so many other Operations during the Second World War, was supposed to shorten the course of the war and bring our boys home for Christmas. Without doubt Market Garden was one of the most daring, ambitious and ultimately controversial Operations of the Second World War. The volume of books, articles and research surrounding Market Garden is vast and numerous authors
have endeavoured to capture the arguments as to why this allied Operation failed. When evaluating the factors that contributed to the failure of the Operation, the majority of authors appear to have concentrated on factors such as the single-lane carriageway, the poor selection of landing zones (LZs) by the British 1st Airborne, incompetent interpretation of intelligence and communications failure. However, few seemed to have concentrated specifically on air power and it's use during the Operation. Stephen Badsey's quote above provides a hint to the importance of air power and imparts an ideal spring board for this article.

# General Dwight D Eisenhower, the Supreme Commander Allied Forces in Europe, was faced with the unusual problem that the Germans were retreating faster than the Allies could advance 

"All the accumulated evidence confirms that, like Gallipoli, this was a British disaster where naked courage lacked the bodyguard of competent planning, competent intelligence, and competent technology. Yet war's object is victory, not Victoria Cross, and it was shameful that by the autumn of 1944 we could still be so amateur." ${ }^{2}$

The aim of this article is to assess how critical air power was in the failure of Operation Market Garden and to examine if a more effective application of air power could have resulted in Allied victory. This article will clearly view Market Garden as a failed operation and will not enter the debate as to the extent of its failure. Firstly, it is essential to put Market Garden into the historical context of 1944 to assess why it was undertaken before examining the fundamentals of Airborne Warfare, as they were perceived in 1944. With this foundation established, the article will outline the plan for Market Garden before concentrating on seven key areas within which air power's contribution to the operation can be examined in detail. The article will concentrate on the execution phase of the operation and will assess the following seven key areas of air power influence: control of the air; the selection of LZs; information exploitation; initial bombing campaign; troop transport aircraft; close air support; and sustainment.

The article will examine the employment of air power and, accepting the advantages of hindsight, will attempt to proffer alternative outcomes that could have resulted from a different application of air power. It will examine the conduct of senior air force officers during the planning stages and assess to what extent the operation was doomed to failure before the first aircraft had taken off. Key air power factors such as the shortage of transport aircraft, the role the RAF played in the selection of LZs and the lack of close air support, will be critically examined. The article will endeavour to highlight that the whole operation rested on foundations built from air power and, critically, that some of these foundations were fundamentally flawed. The article will not ignore many of the other factors that contributed to the failure of Operation Market Garden but it will critically assess if the application of available air power compounded rather than alleviated the problems. The article would not be
complete if it did not examine the operation from the German perspective and their relative inability to combat Allied air power.

## Historical context

"One powerful full-blooded thrust across the Rhine and into the heart of Germany, backed by the whole of the resources of the Allied Armies, would be likely to achieve decisive results."
(Field-Marshal Sir Bernard Montgomery ${ }^{3}$ )
It is essential to put Market Garden into its historical context within the European Theatre of 1944 to truly appreciate why it was considered as an appropriate course of action and why, if successful, it could have significantly shorted the war. The historical context is vital with regard to two critical factors: firstly, the conduct of the war in 1944 and the unexpected Allied progress, and, secondly, the creation of the 1st Allied Airborne Army and it's commanders desire to prove the organisation in battle.

The Second World War was in its fifth year and, after years of planning, the Allies eventually established a battlefront in North West Europe with the D-Day landings in Normandy. The speed of the eventual allied advance out of Normandy and the collapse of the German armies had taken both the allies and the Germans by surprise. General Dwight D Eisenhower, the Supreme Commander Allied Forces in Europe, was faced with the unusual problem that the Germans were retreating faster than the Allies could advance. The failure to secure a major port meant that supplies had to be transported by road from Normandy and the supply lines were becoming dangerously stretched. ${ }^{4}$ By August 1944, there were 36 Allied divisions in France, together with 450,000 trucks, but fewer than 15,000 of these were long-distance load carriers. ${ }^{5}$ The re-supply problem hindered Eisenhower's plan to advance on Berlin on a broad front, with the British 21st Army Group under General Bernard Montgomery on the left and the US 12th Army Group under General Omar Bradley on the right. ${ }^{6}$ Montgomery fundamentally disagreed with Eisenhower's broad front concept and believed that there were not enough supplies to sustain both the British 21st Army Group and the US 12th Army Group. Montgomery believed
that the Germans were a spent force and all that was required was one decisive push to drive the enemy back and capture Berlin ${ }^{7}$. He believed the Germans had been shattered by the defeat in France and that, having lost most of its army in the West, was vulnerable to a knock out blow. ${ }^{8}$ Montgomery was extremely forceful in his belief and pressed Eisenhower hard to afford him priority with regards to re-supply. Whether Montgomery believed the Germans were a spent force or whether he was driven by his desire to beat Patton to Berlin is open to conjecture. However, Alanbrooke was in no doubt and later observed that Montgomery was mistaken and gullible in believing that the Germans were finished. ${ }^{9}$

At first glance, the importance of the creation of $1^{\text {st }}$ Allied Airborne Army and its commander's desire to prove the organisation in battle may not appear that relevant. The $1^{\text {st }}$ Allied Airborne

Army was formed in June 1944, under the command of Lieutenant General Lewis H Brereton and effectively unified all Allied Airborne forces. However, in the weeks that followed the Normandy landings, while the new command was forming, no fewer than 16 airborne operations were planned and subsequently cancelled. ${ }^{10}$ Critically, most of these operations involved the British 1st Airborne Division, who were the strategic reserve during the Normandy landings, and were keen to see action before the end of the war. This feeling was admirably summed up by the words of its commander, Major General Roy Urquhart: ${ }^{11}$
"By September 1944 my division was battle-hungry to a degree which only those who have commanded large forces of trained soldiers can fully comprehend. In fact, there were already signs of that dangerous mixture of boredom and cynicism creeping into our daily lives. We were ready for anything . . ."

> The Wehrmacht were quick to see the advantages of surprise and shock effect, the importance of close air support to offset the lack of heary artillery and the ability of well-placed reserves to clazw victory from defeat

German paratroops land in the Netherlands


This article is not suggesting that Urquhart was so keen to see his soldiers committed to battle that he was prepared to undertake any risk to prove their worth, on the contrary, his request for additional reconnaissance sorties suggest his enthusiasm was far from clouding his judgement. However, the general desire to see battle may have increased pressure, certainly on Browning and other decision makers, and created an environment where fundamental principles were ignored and critical errors were made.

Eventually, Montgomery and Eisenhower met in Brussels on 10 September 1944 when Montgomery finally persuaded Eisenhower to allow him to implement a narrow thrust into Holland to Arnhem. ${ }^{12}$ Eisenhower agreed to afford Montgomery priority of re-supply and from this, combined with the approval to drive north as a prelude to an attack eastwards into the heart of Germany, ${ }^{13}$ the origins of Operation Market Garden were born. The strategic objective of Market Garden was to capitalise upon the German defeat in Normandy and bring the war to a close by the end of $1944 .{ }^{14}$ However, before highlighting the essential elements of the plan for Market Garden, it is important to grasp the fundamentals of air warfare, as they were perceived in 1944.

## Nature of airborne warfare

"An operation involving the movement of combat forces and their logistic support into an objective area by air. ${ }^{15}$

Before the start of the Second World War, both the USSR and Germany had experimented with the concept of military parachutists and Germany in particular had put considerable effort into developing gliders for use in airborne warfare. ${ }^{16}$ It is the Russians who are credited with originating the concept and the Germans who are credited with developing its combat effectiveness. ${ }^{17}$ However, it can be argued that AW was really a child of the Second World War ${ }^{18}$ and like any child it needed to learn, grow, develop and, most importantly, it needed to mature. There were early examples of success, notably by the Wehrmacht in Norway, Holland and Crete that demonstrated fundamental principles that the planners of Market Garden would have done well to heed. With regard to airborne warfare, the Wehrmacht were
quick to see the advantages of surprise and shock effect, the importance of close air support to offset the lack of heavy artillery and the ability of wellplaced reserves to claw victory from defeat. ${ }^{19}$
"Little things going wrong can cause a great deal of confusion in combat, and a certain amount must be accepted as normal, but if 'little things' go wrong in an airborne operation, you really have confusion." (Major General James Gavin²0)

The lessons of 1940/41 were clear enough ${ }^{21}$ and it is surprising that some of the fundamentals of airborne warfare were ignored during the planning and implementation of Market Garden. The tactics of Airborne Warfare were neither complicated nor complex. However, success depended upon the exploitation of surprise, on close co-operation with air force components, the ability of the commander to influence the battle by the use of reserves and the fighting abilities of the troops committed. ${ }^{22}$ Critically, given the nature of airborne warfare, when airborne troops come up against a determined enemy, in terrain where he could deploy tanks, the whole concept of Airborne Warfare becomes extremely hazardous. ${ }^{23}$ The inherent weaknesses of airborne operations were apparent early in its development, the most fundamental of which was that transport aircraft were vulnerable and could be restricted by weather. ${ }^{24}$ Furthermore, after landing, airborne forces have limited mobility, firepower and combat support, which made them vulnerable to a prolonged counter attack by the enemy. ${ }^{25}$ Because airborne forces are lightly equipped, reinforcement and re-supply are critical and, given the fact that re-supply via air can be disrupted, a successful operation must include a link up with ground forces or an extraction. ${ }^{26}$

The fundamental aspect of airborne warfare in relation to air power does not stop simply with close air support and co-ordination between land and air forces. The relationship is far more fundamental as it can be argued that without every capability of air power you cannot conduct airborne warfare. As argued later in this article, the critical role played by AP during Market Garden, involved every core capability from information exploitation to strategic airlift. So, having
examined the principles, as understood in 1944, of airborne warfare, it is interesting to see if any of these were followed during the planning of Market Garden.

'Operation 'Market Garden' - The Plan ${ }^{32 a}$

## The plan

"It was a bad plan and so the failure of 'Market Garden' must be seen as a failure of the air forces."
(RAF Commander ${ }^{27}$ )
The plan was a high-risk venture, which, if it had paid off, might have shortened the war by several months. ${ }^{28}$ Operation Market Garden constituted the largest airborne Operation ever mounted and significantly it was mounted as a daylight operation. There were to be over 35,000 men committed to the airborne element of the plan, nearly twice as many as had been involved in the airborne operations during the D-Day landings. ${ }^{29}$ The plan called for First Allied Airborne Army, under the command of Lieutenant General Lewis Brereton, to assist the Second British Army, under the command of Lieutenant General Miles Dempsey, in a rapid advance into Holland and eventually the Ruhr Valley. ${ }^{30}$ Market Garden had two main objectives: firstly, to secure a crossing point over the Rhine, and secondly, to capture or neutralise Germany's industrial heartland, the Ruhr Valley. ${ }^{31}$ The importance of the role air power was to play in Market Garden was evident from its very conception. The amount of airlift alone, required to fly over 35,000 Allied airborne troops to Holland was staggering.

The 'Market' element consisted of three Allied Airborne Divisions dropped behind enemy lines in Holland to capture bridges over the major rivers and canals on a single carriageway stretching from Eindhoven, through Nijmegen and eventually Arnhem. The 101st US Airborne Division under the command of Major General Maxwell Taylor was to secure bridges from Eindhoven to Veghel; the $82^{\text {nd }}$ US Airborne Division under the command of Major General Jim Gavin was to secure bridges from Grave to Nijmegen; and the $1^{\text {st }}$ British Airborne Division under the command Major General Roy Urquhart was to secure all the bridges at Arnhem. ${ }^{32}$ The $1^{\text {st }}$ Polish Independent Parachute Brigade, under the command of Major General Stanislaw Sosabowski would be dropped with the $1^{\text {st }}$ British Airborne Division at Arnhem.

The 'Market' element was under the command of Brereton's deputy Lieutenant General F A M Browning, commander of the British Airborne Corps.

The 'Garden' element consisted of the Second British Army, specifically XXX Corps under the command of Lieutenant General Brian Horrocks, punching a hole in the German lines and driving the 64 miles to Arnhem, linking up with each Allied Airborne Division. The plan was based on the assumption that XXX Corps could travel the 64 miles to Arnhem in two to five days. This was a considerable drive behind enemy lines; however, this was not expected to be beyond the capabilities of XXX Corps, which had already proved capable of covering 50 miles in a day. ${ }^{33}$ Once the bridgehead at Arnhem was secured, then XXX Corps would turn southeast and enter the Ruhr.

Success depended upon an absence of serious enemy resistance in the Arnhem area: the capture of the bridge before the Germans had time to blow it up or bring up reinforcements; successive waves of airborne reinforcements from England to back up the initial drop; and finally, the arrival at Arnhem of XXX Corps within 48 hrs of the drop. ${ }^{34}$ This solely addresses success from the ground perspective but this was an operation based on air power and what bears examination is the criteria for success of Market Garden in the air.

## Control of the air

"If we lose the war in the air, we lose the war and we lose it very quickly."
(Field Marshal Sir Bernard Montgomery ${ }^{35}$ )
Historical experience has proved that a degree of control of the air is crucially important not only to air operations but also to virtually all types of military operations. ${ }^{36} \mathrm{~A}$ lesson that Montgomery learnt himself during the North African Campaign from whence the above quote originated. Control of the air cannot be achieved without dedicated operations to limit an enemy's ability to employ its air power and the degree of control will depend upon the operation being undertaken. ${ }^{37}$ Control of the air allows friendly air assets to operate without serious interference from an enemies air assets and, even in a generally hostile air situation, it is usually possible to achieve a degree of air control. ${ }^{38}$ One of the core capabilities of air power; therefore, is to achieve and maintain a degree of control of the air required to achieve mission success.

With regard to Market Garden, it is an indisputable fact, that without at least local air superiority, the Allies could not have even envisaged conducting a

British 1st Airborne Division — Landing Zones ${ }^{38 a}$

large-scale daylight airborne operation. air superiority is defined as that degree of dominance in the air battle of one force over another which permits the conduct of operations by the former and its related land, sea and air forces at a given time and place without prohibitive interference by the opposing force. ${ }^{39}$ It could also be argued that this is somewhat of a moot point considering that the Allied landings at Normandy would not have been conducted without localised air superiority. However, it is debatable whether the Allies actually made best use of the air superiority they had achieved and, notwithstanding the limits of 1940s communications, whether their co-ordination of air assets was as effective as it could have been. The simple fact is that the Luftwaffe was able to interfere with the Allied operation but to what extent that interference was prohibitive, is hard to access. As Stephen Badsey hinted when suggesting that the allies fought Market Garden with air inferiority, which was self-induced, the Allies should have enjoyed the luxury of air superiority for Market Garden, but to a degree they failed to capitalise on the advantage. The weather did play its part in limiting the degree of dominance the Allied air forces enjoyed over the Luftwaffe; however, there were fundamental
errors made with regard to liaison and coordination, discussed later in this article, that were to prove critical to the failure of Market Garden. That said, the Allied air forces claimed 160 enemy aircraft shot down, and rescued 205 men from the North Sea during the operation. ${ }^{40}$

From the German ground perspective, the Allied airborne landings at Arnhem, Nijmegen and Eindhoven initially provided further evidence of their growing awareness of Allied air superiority. ${ }^{41}$ Reichsmarshall Hermann Goering had already lost credibility in 1940 having declared, "if ever an enemy plane flies over German soil, I shall henceforth be known by the name Hermann Meier" and the vast Allied airborne armadas of Market Garden only reinforced this. ${ }^{42}$ The perception of the German soldiers was, with the exception of a number of close-air support sorties, that the Luftwaffe was impotent and grounded due to a lack of fuel and destroyed aircraft. ${ }^{43}$ Evidence provided later in this article proves that this was not the case. Some Luftwaffe sorties were successful. However, this success was only apparent to the Allies. ${ }^{44}$ In respect to the protection afforded to the Allied air armadas, air power did

Operation Market Garden - Air Routes ${ }^{\text {44a }}$
 responsibility for this fundamental error of judgement
fulfil its critical role of securing a degree of control of the air that enabled over 35,000 airborne troops to be dropped into Holland with relatively low casualties.

Impact of AP on selection of British LZs and DZs
"Your hardest fighting, and heaviest casualties, will not be in defending Arnhem from the North, but in trying to get there."
(Brigadier Sir John Hackett ${ }^{45}$ )
The selection of LZs at Arnhem has been directly blamed for the failure of $1^{\text {st }}$ British Airborne to secure both ends of Arnhem Bridge and their ability to defend the selected sites. The role of air power, or the role played by senior Allied air force officers in the selection of these sites is often overlooked. After the Sicily landings a joint War Office Air Ministry memorandum had decreed that "airborne operations are air operations and should be entirely controlled by the Air Commander-in-Chief ${ }^{\prime \prime}{ }^{46}$. Thus, senior air force officers, free from the responsibility for the outcome of the ground campaign, could decide upon the air movement and marshalling plans. Whereas, Senior Officers of the parachute brigade, coming in on the second day, were well aware that to advance against opposition who were already aroused, to objectives eight miles from the DZ as the plan demanded, was quite impracticable. ${ }^{47}$ So, if this were the case, why were these LZs selected, or is it more appropriate to ask, why were they suggested in the first place?

The responsibility to devise the airborne plan for the $1^{\text {st }}$ Airborne Division, rested with its commanding officer Major General Roy Urquhart and his RAF opposite number, Air Vice-Marshal 'Holly' Hollinghurst who commanded the RAF troop carriers of 38 Group. Urquhart and Hollinghurst disagreed over the selection of LZs and the place of delivery, ${ }^{48}$ which should have been driven by Urquhart's ground plan. Urquhart wanted to land his main force near the bridge, with the intention of emulating the successful capture of Pegasus Bridge over the Orne Canal, during the Normandy landings, and in accordance with best practice regarding airborne operations. ${ }^{49}$ However, Urquhart's desire to select LZs close to his main objective were over ruled by Hollinghurst's insistence that the bridge was too well defended by heavy anti-aircraft guns and that RAF tug aircraft
would be too vulnerable. Numerous authors point towards the pressure applied by Air Force commanders, concerned about the shortages of strategic airlift, who wanted LZs that afforded the best protection for their aircraft, once their drop was completed. Clearly, their main concern was the shortage of troop carrier aircraft for subsequent lifts and as a result, they were driven by the need to reduce the threat posed by flak. This fear of flak was totally understandable as the RAF was well aware of what German flak could do. ${ }^{50}$ Large aircraft formations at 100-150 mph, at heights between 500 and $2,500 \mathrm{ft}$, in daylight, with no armour plating or self-sealing fuel tanks, seemed to the air force planners to represent an easy target for German flak. ${ }^{51}$ That said, as General Sir John Hackett argues in his forward to Tugwell's book, Arnhem - A Case Study, Air Force commanders should have been prepared to accept a higher degree of risk from anti-aircraft defences in the vicinity of Arnhem and those protecting Deelen airfield, which turned out in the event, to be less formidable than was feared. ${ }^{52}$ Deelen airfield had been extensively bombed during the build-up to Market Garden and it rightfully should be argued that the importance of securing both ends of Arnhem bridge, should have out weighed concerns over enemy anti-aircraft defences. Urquhart's plan had the support of the Commander Glider Pilots, Colonel George Chatterton, who recalled some years later: ${ }^{53}$
> "I went to see General Browning and suggested to him that we were landing too far away but he said that it was out of our hands. It was an RAF decision . . . I nevertheless suggested that my pilots could land near the bridge and although there would be more casualties due to the size and unevenness of the enclosures, it would surely be preferable to landing miles away. When General Browning said that no doubt there would be more tugs shot down this way, I suggested that this could be avoided by a remote release, so allowing the tugs to turn back for home well before the bridge."

The reference made by Chatterton to 'the size and unevenness of the enclosures' was based on information received by both the Dutch Resistance and RAF intelligence that the LZs south of the bridge were unsuitable for either parachutists or gliders. ${ }^{54}$ The ground consisted of low-lying
swampy 'polderland' interlaced with dykes, which it was assessed would significantly increase the chances of casualties during the initial drop. Ironically, the RAF agreed to drop the Polish Division south of the bridge during the third lift, because they assumed that the anti-aircraft guns would have been captured or neutralised by then. ${ }^{55}$ Chatterton's point is crucial, surely the risk of flak should be weighed against the risk of landing eight miles from an objective, which if secured would ensure the success of the whole operation and possibly reduce the length of the war.

Urquhart was forced to select alternative LZs that were considerably further away from his main objective than he had wished. The selected LZs were just over eight miles away from Arnhem Bridge and consisted of large open expanses of heathland and farmland. The selection of LZs eight miles to the west of Arnhem bridge meant that Urquhart had to leave a significant element of his force, the Airlanding Brigade to protect the western LZs for the subsequent drops the following day. This was particularly significant as it left Urquhart with only the 1st Parachute Brigade, a quarter of his total force, to achieve the divisional objective on foot during the first 24 hrs . ${ }^{56}$ In an attempt to address this, Urquhart planned for the 1st Airborne Reconnaissance Squadron, under the command of Major Freddie Gough, to race to the bridge in specially adapted jeeps to attempt a coup-de-main. Critically, this prevented the Reconnaissance Squadron from undertaking their primary role of probing enemy defences, a role which could have identified that the river-road provided access to reinforce the few troops that eventually reached Arnhem Bridge. ${ }^{57}$ However, Kershaw in his book It Never Snows in September argues to the contrary and suggests that the disposition of II SS Corps around Arnhem would have negated any advantage in landing closer to the bridge. ${ }^{58}$

The selection of LZs eight miles away form the main objective was in total contradiction to the fundamentals of airborne warfare and flew in the face of all airborne experience to date. It was a clear example of how concern over limited airlift and enemy flak had constrained Market Garden before its first aircraft had taken off. There has been much conjecture about who should bear the responsibility for this fundamental error of judgement; however, the compelling evidence would suggest that the RAF's reluctance to accept risk, in what was already a very ambitious and risky operation, was extremely significant. It can be argued, that should the RAF have accepted the risks and if Browning had forced the issue with regard to LZs closer to the main objective, then a coup-de-main assault could have been undertaken to secure both ends of Arnhem Bridge. It is accepted that this would not have resulted in XXX Corps reaching Arnhem any earlier but it would have facilitated an easier link-up with the Polish Division landing in the third wave south of Arnhem Bridge. With both ends of Arnhem Bridge secure and with reinforcements in the form of the Polish Division, then there is a better chance that a link-up with XXX Corps would have taken place. The shortage of troop-carrying aircraft and the risk of heavy losses due to German flak had effectively resulted in a decision that ignored the shortage of one of the most important factors in airborne operations, namely to land close to the main objective.

## Information exploitation/air reconnaissance

"Intelligence told us we had nothing to worry about. There was no armour in the area and only second-rate line-of-communications troops and Luftwaffe personnel - a piece of cake in fact."
(Private James Sims, $2^{\text {nd }}$ Para Battalion ${ }^{59}$ )
If modern warfare has taught military tacticians anything, it is that information exploitation is

> The shortage of troop-carrying aircraft and the risk of heavy losses due to German flak had effectively resulted in a decision that ignored one of the most important factors in airborne operations, namely to land close to the main objective


> More than 1,400 Allied bombers were used during the initial stages of the Operation and carried out raids on flak defences, troop positions and barracks within the three main airborne objective areas
everything. The modern commander, who can utilise intelligence assets to form and maintain an accurate picture of the battle space, secures a tremendous advantage over his adversary. The same could be argued during 1944, when air reconnaissance played a vital role in Market Garden and provided compelling evidence that, if interpreted correctly, should have resulted in at worst an amended plan and at best a cancelled operation. The advantages of air reconnaissance were well acknowledged and the RAF had significant air assets, even modified Spitfires, assigned to the reconnaissance role. Reconnaissance flights were able to obtain information regarding enemy dispositions, strengths, weaknesses and even geographical characteristics of a given area. Given that the Air Reconnaissance assets were available, in the form of 83 Group's 39 (Royal Canadian Air Force) Reconnaissance Wing, why was intelligence indicating the presence of at least the cadres of two

Panzer Divisions in the Arnhem area ignored? ${ }^{60}$ There is no doubt, that both General Browning and staff within the Headquarters of the $21^{\text {st }}$ Army Group, had received air reconnaissance evidence of the presence of German armour in the Arnhem area. One such source was, Major Brian Urquhart (no relation to Roy Urquhart the commanding officer of the $1^{\text {st }}$ British Airborne Division) who was the GSO 2 (intelligence) within Browning's headquarters. Brian Urquhart, concerned over reports from Dutch Resistance of German Armour in the Arnhem area, had requested additional low-level photographic reconnaissance missions. ${ }^{61}$ One particular sortie, flown by the RAF on 12 September provided clear evidence of the presence of German armour near Arnhem. ${ }^{62}$ On receiving the results some three days later, Urquhart showed the pictures to Browning who dismissed them as not being significant. ${ }^{63}$ Urquhart recalled some 50 years after the Operation: ${ }^{64}$
> "The photographs would already also have been sent to the higher headquarters, so I merely showed them to General Browning. As I recall it, General Browning's response was to show interest but generally to downplay the importance of the information. My job was to provide intelligence for my own commander, General Browning, whose responsibility it would be to pass on conclusions and any change in orders to $1^{\text {st }}$ Airborne Division."

Critically, the air reconnaissance pictures not only showed the presence of German armour but also indications that the Germans were far more organised than had been expected. Furthermore, correct interpretation of air reconnaissance pictures would have provided sufficient battle damage assessment to permit an accurate picture of anti-aircraft capability at German airfields, specifically Deelen. That said, the speed at which this data could be interpreted in 1944 and be used to inform the decision-making process was limited. However, it would have provided a clear indication that the weight of effort devoted specifically to the destruction of German flak had been successful. The vital point to consider is that the intelligence data was unquestioningly available to all the critical decision makers within Market Garden and they were well aware of the capabilities provided by air reconnaissance. air power had fulfilled another core capability, which unfortunately had been woefully ignored. Air Reconnaissance had played a significant role; however, the intelligence provided is only of use if it is interpreted as being significant. As Cornelius Ryan argues in his book A Bridge too Far, all down the allied line of command the evaluation of intelligence on the Panzers in the Arnhem area was magnificently bungled. ${ }^{65}$ If the Allies had interpreted the battle damage data and geographical information provided by the air reconnaissance sorties to their full extent, then they could have had a profound effect on the selection of LZs at Arnhem.

## Initial bombing campaign

"Heavy softening-up attacks were carried out by the Allied air forces prior to the airborne operation." ${ }^{66}$

Air power played a significant role in shaping the battle space in terms of creating localised air superiority and the undertaking of, in modern
terminology, an offensive counter air campaign to suppress the German air defence system. German airfields and German anti-aircraft positions, both along XXX Corps intended route and around key objectives, were targeted for maximum effect. Brereton's intention was to deliver ground troops safely to their objectives by suppressing the German defences. ${ }^{67}$ The extent of the bombing campaign was significant given that the operation was planned at short notice and that allied bombers were busy elsewhere. ${ }^{68}$ More than 1,400 Allied bombers were used during the initial stages of the operation and carried out raids on flak defences, troop positions and barracks within the three main airborne objective areas. ${ }^{69}$

The specific preparation of the battle space commenced during the night of 16-17 September when more than 200 Lancasters and 23 Mosquitos of RAF Bomber Command dropped 890 tons of bombs on four German fighter airfields, one of which was a Messerschmitt 262 jet fighter base. ${ }^{70}$ The suppression of the German defences did not stop with the bombing of German airfields. Over the following 24 hours 1,395 bomber sorties were flown, which concentrated on the destruction of German light and heavy anti-aircraft guns. ${ }^{11}$ Concurrently, more than 800 Flying Fortresses of the $8^{\text {th }}$ US Air Force bombed a total of 117 German anti-aircraft positions along the Market Garden route, dropping in excess of 3,139 tons of bombs. ${ }^{72}$ In addition to the anti-aircraft positions that were attacked, the US Flying Fortresses bombed airfields at Eindhoven, Deelen and Ede. Deelen was significant because, the LZs used by the British $1^{\text {st }}$ Airborne were selected to avoid tug aircraft from having to overfly anti-aircraft batteries at this airfield. These raids were followed by 54 Lancasters and five Mosquitos, while another 85 Lancasters and 15 Mosquitos attacked anti-aircraft positions on Welcheren island. ${ }^{73}$ Importantly, the allies enjoyed air superiority to the extent that these attacks scarcely registered as unusual with the Germans and, as a result, did not provide a clear indication of what was to come. ${ }^{74}$ The suppression of German defences was not left purely to the bombers of RAF Bomber Command and the US $8^{\text {th }}$ Air Force. Throughout the early stages of the operation, anti-aircraft positions along the Market Garden route were bombed and strafed
 airfield
by 212 Thunderbolts of $9{ }^{\text {th }}$ US Air Force, while 50 Mosquitos, 48 Mitchells and 24 Bostons of RAF 2 Group bombed barracks and airfields at Nijmegen, Deelen, Ede and Kleve ${ }^{75}$.

It is difficult to assess accurately the effectiveness of individual raids within the Allied Bombing campaign. However, the vital role the raids played in preparing the battle space along XXX Corps route and around the three main airborne objectives, cannot be discounted. Interestingly, there is some discrepancy as to the effectiveness
of the Allied bombing when related to aircraft loses because it is difficult to the determine the specific cause of why an aircraft was lost. The success of the bombing against the anti aircraft positions is equally difficult to assess. On the one hand, only one Dakota was lost during the arrival of the second wave of the $1^{\text {st }}$ British Airborne Division at Arnhem, whereas, the $101^{\text {st }}$ Airborne lost 33 Dakotas around the Eindhoven area where German anti aircraft positions appeared least damaged. ${ }^{76}$ Throughout the period 17-25 September, Allied Air Forces were to lose around


The sky trains were immense, both stretching for 94 miles in length and three miles in breadth

164 aircraft and 132 gliders, which accounted for 454 casualties from USAAF IX Troop Carrier Command and a further 294 casualties from RAF 38 and 46 Groups. ${ }^{77}$ There is no doubt that these figures would have been significantly higher had the Allies not conducted the extensive bombing campaign in preparation and throughout the operation. Given the technology and aircraft available at the time, air power did all it could to achieve Brereton's plan to deliver the ground troops safely to their objectives.

## Airlift: Troop carriers

"Oh, how I wish that I had ever had such powerful means at my disposal."
(Colonel-General Kurt Student, Commander
German $1^{\text {st }}$ Parachute Army ${ }^{78}$ )
The airlift of troops was conducted in two streams, with 101st Airborne Division on the southern route into Holland, and both the $82^{\text {nd }}$ Airborne Division and $1^{\text {st }}$ British Airborne Division on the northern route ${ }^{79}$. The sky trains were immense, both
stretching for 94 miles in length and three miles in breadth. ${ }^{\text {s0 }}$. The $101^{\text {st }}$ Airborne was carried by 424 Dakotas and 70 glider/tug combinations and, on the northern route; the $82^{\text {nd }}$ airborne travelled in 482 Dakotas and 50 glider/tug combinations and were followed by the 38 glider/tugs of I Airborne Corps Headquarters. ${ }^{81}$ Significantly, the 38 glider/ tugs used to drop Browning's HQ could, and arguably should, have been used to carry an entire infantry battalion. ${ }^{82}$ The $1^{\text {st }}$ Airborne travelled in a total of 1,051 troop carrier aircraft and 516 glider/ tugs, which made the total number of troop carrier
aircraft 2,083. Critically, there was insufficient airlift for the British $1^{\text {st }}$ Airborne to be dropped in a single wave and consequently, the drop would have to be spread over three days. Of all the three Divisions, arguably the British $1^{\text {st }}$ Airborne was the most dangerously exposed and had good claims to priority in airlift resources. ${ }^{83}$ However, much of the troop transport aircraft supplied belonged to the US and it was argued that it was a priority to secure the bridges around Eindhoven and Nijmegen, without which XXX Corps would never reach Arnhem.

> The air power contribution to Market Garden in terms of troop carrying capability was truly staggering. Throughout the course of the Operation, Allied Air Forces had dispatched 4,852 troop carrying aircraft
> "If the weather had been good the operation would have been 100 per cent successful instead of 90 per cent." (Field Marshal Sir Bernard Montgomery ${ }^{\text {si }}$ )

The weather undoubtedly played its part in adversely affecting the delivery of reserve elements during the 18 September. The second airborne wave, due to depart at dawn, was delayed due to heavy fog in England but eventually got airborne at 10:00 hours. The wave consisted of 1,200 troop carrier aircraft escorted by 867 fighters and followed the same northern route flown the day before. ${ }^{55}$ On Tuesday 19 September the weather continued to play a significant role as the fog again delayed the departure of the third wave of allied troops. The third wave eventually took off at 13:00 hours when the last battalion of $327^{\star}$ Glider Infantry and $101^{*}$ Airborne's artillery travelled in 385 gliders, of which 189 were lost or turned back. ${ }^{86}$ However, that was the good news, for the 428 gliders carrying $82^{n d}$ Airborne's reinforcement and the 114 Dakotas of the $1^{*}$ Polish Parachute Brigade, remained grounded all day. ${ }^{87}$

During the planning Urquhart was keen that there should be two lifts of troops into Arnhem on the first day of the operation.ss Critically, Brereton listened to General Paul Williams, who was in overall command of the US and British Transport aircraft, which had insisted on a single drop per day.s. Williams was concerned that to attempt two drops in daylight would leave insufficient time for proper maintenance and that crew fatigue might lead to an increase in accidents. ${ }^{0}$ To counter this, the RAF suggested that the first lift could be flown prior to dawn. However, the standard of night flying and navigation amongst the US crews was inadequate for such a task. ${ }^{9}$ There is no doubt that the dissolution of the delivery of the British $1^{\text {st }}$ Airborne, with the subsequent loss of surprise, was a major factor in the whole operation's failure. ${ }^{9}$ However, the fascinating issue centres on what might have happened if a second wave had been undertaken on the first day of Market Garden. If a second wave had been conducted and if troop carrier assets had been re-assigned from carrying $1^{\text {t }}$ Airborne's HQ element to carry an infantry brigade, then there is a distinct possibility that both ends of the Arnhem Bridge could have been secured during the first day of the operation.

Urquhart had planned for the $1^{\text {st }}$ Parachute Brigade to hold the bridge at Arnhem and for the $4^{\text {th }}$ Parachute Brigade to hold the high ground to the north of Arnhem. This left the $1^{\text {st }}$ Airlanding Brigade to secure the western approaches and the Polish Parachute Brigade to take up positions to the East. A second wave in the first 24 hours and the re-allocation of Browning's $1^{\text {st }}$ Airborne HQ gliders to carry a brigade of infantry, would have provided Urquhart with the four Brigades he required for his plan. Urquhart's basic plan was fundamentally sound and there is sufficient evidence to suggest that had the force delivery been undertaken during 17 September, then British $1^{\text {st }}$ Airborne could well have been successful at Arnhem. It can be argued, that the decision by Brereton to veto the second wave during the first 24 hours, effectively doomed Urquhart's plan to failure before he had left England.

The air power contribution to Market Garden in terms of troop carrying capability was truly staggering. Throughout the course of the operation, Allied Air Forces had dispatched 4,852 troop carrying aircraft to their destinations, of which 1,293 delivered paratroops and a further 2,277 towed gliders. ${ }^{93}$ Some 39,620 troops were delivered by air to their targets $(21,074$ by parachute and 18,546 by glider) with 4,595 tons of stores. ${ }^{94}$ Purely in terms of the number of troops dispatched, it was a remarkable achievement and an unquestionable success. However, as previously argued, this needs to be balanced against the critical impact of Brereton's decision to veto a second British wave on the first day of the operation.

## Close air support

"Although I was naturally disturbed by the non-arrival of Horrocks's Corps, I was much more annoyed at the disappointingly meagre offensive air support we were receiving. The re-supply boys' gallantry had been magnificent, but the fighters were rare friends." (Maj Gen R Urquhart ${ }^{\text {s5 }}$ )

Urquhart's criticism regarding the lack of close air support has a familiar ring to it compared to the criticism levelled at the RAF during the early stages of the North African campaign. It would be unfair to draw too many parallels between Market Garden and North Africa because the nature of providing close air support to airborne troops
presents some unique problems. This argument is not offered as a defence of the air force elements during Market Garden but is merely used to help put the close air support aspect into context. Unlike conventional close air support operations, airborne troops usually operate behind enemy lines and, as a result, it is extremely difficult for pilots to distinguish between their own and enemy troops operating beyond established front lines. ${ }^{96}$ The only way to combat this was for the airborne troops to indicate their position by the use of pre-arranged signals or by radio, both of which were dangerous as they were open to enemy interference. ${ }^{97}$ Furthermore, it was difficult, if not impossible, to provide airborne troops with air support when they were at their most vulnerable while dropping into their LZs. ${ }^{98}$ The provision of close air support to advancing armour and ground troops was well practised by 1944 which makes the lack of effective and coordinated close air support during Market Garden worthy of debate.

Notwithstanding the difficulties of providing close air support for airborne troops, the arrangements for close air support during Market Garden were woefully inadequate. ${ }^{99}$ No proper liaison was established with RAF 83 Group, air control teams were few, poorly trained, and equipped with radios that never worked. Furthermore, Browning acquiesced to an Air Force ruling which barred 83 Group from supporting his Corps whenever troop carriers and their escorts were due overhead the battle area. ${ }^{100}$ This decision is understandable given the difficulties of de-conflicting the operations of two different air forces within the same airspace and the risks of errors in identification. ${ }^{101}$ Notwithstanding the difficulties in predicting the movement of fog and the limited communications in 1944, the failure in communication and coordination proved critical when delays in the second wave on the 19 September were not passed to $2^{\text {nd }}$ Tactical Air Force, which continued to fly support according to the original timetable. ${ }^{102}$ The consequences were severe as the airborne troops in Holland received no close air support compared to 125 Luftwaffe fighter sorties. ${ }^{103}$ The situation was further compounded by the fact that the $2^{\text {nd }}$ Tactical Air Force turned down nearly $50 \%$ of close air support requests from the Airborne Corps. This refusal was based on insufficient
target information to mount proper attacks and on experiences in Normandy where friendly troops had been bombed by Allied aircraft. ${ }^{104}$ It could be argued that this was an over cautious approach, given the fact that the $1^{\text {st }}$ Airborne were so desperate for support that they called down artillery support onto their own positions. ${ }^{105}$ The poor target information could have been as a result of Browning's failure to arrange RAF and USAAF liaison officers with his own troops and to support the small number of air control teams. As Urquhart recalls, even when air support did arrive it was not effective: ${ }^{106}$
"At this time I called for offensive air support and Typhoons rocketed German positions; but there were not many of them and the volume of fire from enemy mortars was not noticeably affected. I wondered then why so few fighters came to our aid."

Urquhart's criticism must be balanced against the difficulties of providing close air support in urban areas. The $1^{\text {st }}$ Airborne were involved in a bitter urban engagement, in which the identification of German positions from the air would have been extremely difficult. ${ }^{107}$ This may well account for the limited impact upon German mortar positions.

Complaints regarding a lack of close air support were not the sole prerogative of the airborne element. With regard to XXX Corps, persistent haze and low cloud prevented aircraft from identifying and attacking targets on several days and this was compounded by the difficulties in establishing a satisfactory bomb line. ${ }^{108}$ This is perfectly understandable given the situation where British tanks may be further north than German ones, and the latter may be heading southwards and the former north or eastwards. ${ }^{109}$ Notwithstanding this, the progression of XXX Corps north of Nijmegen was hampered by a lack of air support as Lieutenant Colonel J O E Vanderleur of the Irish Guards recalled after the operation: ${ }^{110}$
"Our bitterest regret was that the air tentacle was not working, for with even moderate support from the Tiffies (Typhoons) we might have broken through to Elst, if not further".

The lack of provision of close air support can also be attributed to the weather and specifically
the fog. The fog effectively grounded the Allied aircraft in Belgium and northern France for the morning of the 18 September, which meant that only a few close air support sorties could be flown. However, for the Germans it was a different picture, as the fog cleared early enough for the Luftwaffe to launch their main effort. ${ }^{111}$ As a result, the $82^{\text {nd }}$ Airborne received only 97 close air support sorties from RAF 83 Group, and the $1^{\text {st }}$ British Airborne received none, this was compared with the 190 Luftwaffe fighters committed to the area. ${ }^{112}$

In addition to the vast number of troop carrier and re-supply sorties flown during Market Garden, more than 6,172 air support sorties were flown, more than half of them by $8^{\text {th }}$ Air Force, for the loss of 125 aircraft. ${ }^{113}$ Significantly, the $2^{\text {nd }}$ Tactical Air Force and $9^{\text {th }}$ Air Force only flew 743 of the 6,172 air support sorties: this is no doubt a result of their refusal of 46 out of 95 requests for air support from I Airborne Headquarters. ${ }^{114}$ The Allied troops should have enjoyed the protection afforded by air superiority. However, as in the early part of the North African campaign, the ground troops fighting in Arnhem and along XXX Corps approach route, were left wondering as to the whereabouts of their promised air cover. The lessons regarding close air support had been hard learnt in previous campaigns and, although a large number of sorties were flown in support of Market Garden, they were poorly coordinated and lacked impact. The airborne troops were lightly equipped, facing German Armour, and XXX Corps route was along a raised causeway affording little protection. Therefore, the importance of well-focused and coordinated air support could not have been more vital. It is pure conjecture with the benefit of hindsight, that suggests that, should XXX Corps have been provided with adequate air support north of Nijmegen, then they could have made the final push towards Arnhem. Furthermore, it could be argued that had the $1^{\text {st }}$ British Airborne Division have received the close air support that they had the right to expect, they could have punched through the German lines and reinforced the northern end of Arnhem Bridge.

## The fight to sustain

"The sight of the Stirlings and Dakotas flying
unhesitatingly into the German barrage where sometimes, although hit and on fire, they continued to circle above the German lines while the RASC Dispatchers threw out the supplies before the aircraft crashed into the earth, was so moving that for many of those who witnessed it no more poignant memory of Arnhem remains." ${ }^{115}$

Because of the nature of Airborne Warfare and the necessity for troops to be dropped behind enemy lines, the issue of re-supply is always a critical one. Airborne troops, by necessity, are limited by the amounts of ammunition and supplies they can take into battle and re-supply by air is limited by the amount of aircraft available. Furthermore, transport aircraft are extremely vulnerable and a degree of control of the air is an essential element if re-supply by air is to be sustained or undertaken on a large scale. Other than for airborne operations, supply and maintenance by air, within the European Theatre, was planned only as emergency measure rather than as a routine part of normal operations. ${ }^{116}$

The extent of the airlift required for Market Garden was truly immense and although re-supply could be achieved via road once XXX Corps had linked up with each Airborne Division, the initial 24-48 hours of the airborne operation would have to be sustained via the air. In the case of the $1^{\text {st }}$ British Airborne Division, this sustainment was to extend well beyond 48 hours. The concept of airborne logistics, as undertaken during Market Garden was fundamentally sound and its broad principles have survived to the present day. ${ }^{117}$ The crews, both RAF and the air dispatchers, were highly motivated, well trained and, as the previous quote highlights, unquestioned in their bravery. As Frank Steer argues in his book, Arnhem - The fight to Sustain, there was nothing wrong with the overall concept for airborne logistic support or with the plan for logistic support at Arnhem. ${ }^{118}$ So, if this were the case, then why during only the second day of the operation were the $1^{\text {st }}$ British Airborne short of vital supplies and why were so many transport aircraft being lost? For example, on the 18 September 145 Stirlings and Dakotas of RAF 38 and 46 Group dropped re-supplies to $1^{\text {st }}$ British Airborne Division, but unfortunately, of the 87 tons dropped only 12 tons reached the British troops
at a cost of 13 aircraft. ${ }^{19}$ The Americans fared only marginally better when 135 Liberators of $8^{\text {th }}$ Air force dropped re-supply to $82^{\text {nd }}$ Airborne ( $80 \%$ of which was recovered) and a further 117 Liberators dropped re-supply to $101^{\text {st }}$ Airborne ( $50 \%$ of which was recovered), losing 11 aircraft. ${ }^{120}$

The key factor that prevented what was an excellent logistical plan being executed to the same degree was the breakdown in communications and the inability of the Allies to adapt their plan when things went wrong. The German reaction to the Allied assault was both more capable and faster than the Allies had predicted and will be examined in detail in the following section. The implication for the fight to sustain the British troops at Arnhem was that the Germans quickly over ran their re-supply drop zones and the badly needed supplies fell into German hands. This alone was not the critical factor, what rendered this problem difficult to resolve was the poor communications between the $1^{\text {st }}$ British Airborne and any unit outside Arnhem. Urquhart made every attempt to inform aircrews that the re-supply drop zones had been overrun via a BBC war correspondent's radio set and a Second Army 'Phantom' set linked to headquarters in Belgium. ${ }^{121}$ Unfortunately, these messages were never passed on and pilots continued to make drops to scheduled drop zones because contingency zones had not been identified and they had been instructed to ignore signals from the ground. All these factors combined to effectively negate the extraordinary bravery and courage displayed by the Allied aircrews. Should supplies have reached the $1^{\text {st }}$ Airborne according to the logistical plan, there is the distinct possibility that they could have sustained their fight for longer.

## The German perspective

"But the Germans, General, the Germans."
(Major General Stanislaw Sosabowski ${ }^{122}$ )
Although aspects of the German reaction have been included in previous sections of this article, no research into Operation Market Garden would be complete without a specific examination from the German perspective. Much is made of the fact that the $1^{\text {st }}$ British Airborne Division landed on top of two German Panzer Divisions and the misconception that the German forces were made up of old men and boys. However, whenever

Market Garden is studied in detail, the emphasis always appears to concentrate on Allied mistakes in planning and execution rather than, with the possible exclusion of Kershaw's 'It never snows in September', the effective counter-measures employed by the Germans. ${ }^{123}$ Kershaw provides compelling evidence of the speed of the German reaction and the success of the Wehmacht's adhoc army divisions. General Wilhelm Bittrich, the Commander of IISS Panzer Corps, took only 10 minutes to issue his first warning orders after receiving reports of the Allied landings, despatching 9SS Division to Arnhem and 10SS Division towards Nijmegen. ${ }^{124}$

Both Bittrich and later Field Marshall Walther Model, Commander Army Group B, were quick to realise the operational importance of Nijmegen and Arnhem and focused their counter measures on these 2 key objectives. ${ }^{125}$ To what degree Model's actions were governed by captured orders or by his talents as a commander are open to some debate. What is not open to debate is the extent to which the German forces were well-organised, well lead and fierce combatants. Although it is only right to acknowledge the counter measures undertaken by German ground forces, this article's focus is on air power and the Germans' efforts to combat Allied air power is a key factor.

The Allies should have enjoyed the luxury of Air Superiority; however, the air-to-air combat during Market Garden was not always as one sided as the Allies might have expected. Far from being a spent force, the Luftwaffe reacted as quickly and were particularly adept at drawing on fighters as far afield as Dortmund, Guetersloh and Werl, all well within the Reich. ${ }^{126}$ That said, these fighters were operating from airfields some distance from the conflict, which will have had an adverse effect on their sortie generation rate. Nevertheless, 300 fighters from the 'Reich' Jagdflieger (Fighter) Division 1, released from Wehrmacht Headquarters West, played a critical role in hampering Allied operations over Arnhem and accounted for 40 transport aircraft and 112 gliders. ${ }^{127}$ The Luftwaffe response was far from being either negligible or uncoordinated. The Jagdflieger division was directed by $95 S$ headquarters using newly established communications, which permitted the

# The Allies should have enjoyed the luxury of Air Superiority; however, some transport aircraft flew over Arnhem without fighter protection and paid a heavy price 

headquarters to direct the division in the air. The success of the Luftwaffe is not easy to quantify. Allied aircraft were encountering enemy fighters and suffering losses that could not be sustained indefinitely. An RAF 38 Group report later recalled: ${ }^{128}$
"The result is reflected in the casualties. For the first time enemy fighters were in full evidence, and 10 Focke-Wulf 190s, in particular, took heavy toll, shooting down 7 out of 10 aircraft from one squadron in the third wave. A total of 23 aircraft ( $20 \%$ of the force) are unaccounted for; a further 7 were damaged by fighters and 31 by flak, which was more intense than ever along the route and in the target area. A total of $52 \%$ of the force was lost or damaged . . ."

The Luftwaffe only formed one part of the German air defences and the role of the antiaircraft batteries, despite heavy allied bombing, cannot be ignored. Particularly around Arnhem, air defences were well coordinated and were reinforced by Lieutenant Colonel Swoboda's flak brigade. The brigade consisted of five battalionsize detachments of 88 m flak and heavy artillery, which the Germans claim accounted for more than 13 transport aircraft shot down and at least 97 damaged. ${ }^{129}$ Further flak assets were redeployed from the Ruhr industrial basin and, when all flak in the Arnhem area was placed under the control of Swoboda's brigade Headquarters, they helped to form an effective air-defence umbrella around Arnhem. The reorganisation of Luftwaffe and anti aircraft defences was both rapid and effective and both played a significant role in combating Allied air power.

## Conclusion

"Heavy risks were taken in the battle of Arnhem, but they were justified by the great prize so nearly within our grasp."
(Sir Winston Churchill ${ }^{130}$ )
History has ably demonstrated that the conduct of any successful airborne operation is dependant upon a number of factors but one of the most critical is close co-operation between the land and air components. In this respect, probably more than any other, there was a fundamental breakdown, which resulted in an inefficient use of a significant amount of Allied air power capability. The Allies should have enjoyed the luxury of Air

Superiority; however, some transport aircraft flew over Arnhem without fighter protection and paid a heavy price. The price paid was in terms of both aircraft lost and the adverse effect on the morale of Allied troops on the ground.

Much is made of the selection of LZs for the $1^{\text {st }}$ British Airborne Division at Arnhem and this article is no exception. The reluctance of Air Force commanders to accept risk, in what was already a very risky operation, resulted in the selection of inappropriate LZs that contradicted the fundamentals of successful Airborne Warfare. Furthermore, a more accurate interpretation of air reconnaissance data should have resulted in more informed decisions regarding the selection of LZs, the extent of German flak and the relative capabilities of German ground forces.

Probably the single most significant decision was Brereton's veto of a second British wave on the first day of the operation. Notwithstanding the selection of LZs eight miles west of Arnhem Bridge, a second wave would have provided Urquhart with all four of his Divisions and no requirement to leave the $1^{\text {st }}$ Air Landing Brigade protecting LZs. There is a significant possibility that such a force would have succeeded in reaching Arnhem via the river road and secure both ends of the Bridge. This alone could have changed the course of the whole operation.

Given the lessons learnt much earlier in North Africa, the failure of Allied Air Forces to provide adequate levels of close air support, through poor communications and coordination, was particularly damaging to both the operation and Allied morale. The problems regarding the coordination of close air support sorties, target identification, position of own forces and the nature of the ground battle are acknowledged. However, should XXX Corps have received even moderate close air support when north of Nijmegen, then they could have pushed through Elst and may have even reached Arnhem.

The extraordinary bravery and courage displayed by Allied aircrews in the fight to sustain the battle at Arnhem deserves acknowledgement but was negated by the breakdown in communications and
inability of the Allies to adapt their plan. Had the supplies reached the $1^{\text {st }}$ Airborne then they would have had sufficient ammunition, food and water, to maintain their defence against an enemy that was growing stronger by the day. Such supplies could have been sufficient for the British troops to hang on long enough for XXX Corps to have made the final push through Elst to Arnhem.

The Luftwaffe and German flak played a significant role in hampering Allied air power. That said, despite the flexibility shown in coordinating an effective air defence system around Arnhem and the ability of the Luftwaffe to draw upon additional resources, the Allies should have been able to employ sufficient air power to combat the German counter measures. As Stephen Badsey accurately assessed, Allied air inferiority was in a large part self-inflicted.

As with any historical study, hindsight and conjecture play their roles in formulating conclusions. However, there is clear evidence to suggest that air power played a critical role in contributing to the failure of Operation Market Garden and that a more effective use of air power would have resulted in a historically significant Allied victory. More importantly, Market Garden was not just a failure of air power, it was a failure of joint planning and execution.

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${ }^{3}$ Hibbert (1998), p. 3
${ }^{4}$ Longson and Taylor (1991), p. 13
${ }^{5}$ Jackson (1994), p. 2
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${ }^{15}$ Land Component Handbook (2001), p.B-1-9
${ }^{16}$ Gavin (1947), p.viii
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${ }^{35}$ AP3000 (1999), p.2.5.1
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${ }^{40}$ Badsey (1993), p. 84
${ }^{41}$ Kershaw (1990), p. 153
${ }^{42}$ id.
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${ }^{44}$ Kershaw (1990), p. 153
${ }^{44 a}$ Powell (2001), p. 50

${ }^{108}$ id.
${ }^{109}$ id.
${ }^{110}$ ibid, p. 127
${ }^{111}$ ibid, p. 45
${ }^{112}$ id.
${ }^{113}$ ibid, p. 84
${ }^{114}$ id.
${ }^{115}$ Steer (2000), p. 164
${ }^{116}$ ibid, p. 33
${ }^{117}$ Steer (2000), p. 153
${ }^{118}$ id
${ }^{119}$ Badsey (1993), p. 54
${ }^{120} \mathrm{id}$.
${ }^{121}$ ibid, p. 122
${ }^{122}$ Hibbert (1998), p. 34
${ }^{123}$ Baynes (1993), p. 162
${ }^{124}$ Kershaw (1990), p. 73
${ }^{125}$ ibid, p. 76
${ }^{126}$ Kershaw (1990), p. 230
${ }^{127}$ ibid, p. 229
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${ }^{129}$ Kershaw (1990), p. 229
${ }^{130}$ Hibbert (1998), p. 183

# Plotting a True Course: 

Reflections on USAF Strategic Attack Theory and Doctrine, the Post-World War II Experience

## Edited by David R Mets and William P Head

Westport, Connecticut
Praeger, 2003
ISBN 0-275-97717-X

## Illustrations, notes, bibliography, Index. 351 pages

Price \$US74.95

## Reviewed by Mark K Wells

Scholarly volumes dealing with the topic of air power, and, most particularly any historical analysis of air power doctrine and theory, increasingly follow the format of this useful book. Rather than the reflections of a single author, these studies - now numbering more than a score - have generally presented the collective wisdom of several notable scholars. This approach certainly tells us much about the increasing complexity of contemporary thought on the subject, but also suggests that the fundamental debates about the role, impact, and ultimate influence of air power in modern war may never be finally resolved. In short, when the subject is air power, it seems clear that we cannot arrive at any consensus. Rather, it is by way of our continuing struggle to understand the issue that progress is made.
This book clearly adds to the body of argument and is fun to read. Like many of the earlier volumes, it presents a series of conference papers edited to develop a coherent primer on post-war airpower theory. The majority of these papers, originally presented in 1997 at the Air Force History and Museum Program of the Air Force Symposium, are authored by an impressive line-up. Dave Mets and William Head have put together four solid chapters bracketed by a thoughtful introduction on the dawn of the nuclear age and an insightful conclusion covering the last 50 years of air power.
To the extent that a single theme ties the essays of this book together, it is the question of whether or not technological change drives doctrine, or the other way around. Mets opens the debate in a review of General Carl Spaatz's legacy and determines that bureaucratic
negotiation and compromise were as much a factor in the organizational changes of the post-World War II US Air Force as were technology and doctrine. William Head contributes a well-written chapter on the use, or, more properly, misuse of B-52s during the Vietnam War. Avoiding any tendency to argue whether or not the air war there might have been 'won', he nevertheless accurately suggests that airmen came away from the experience convinced that airmen, and airmen alone, must fully control air power assets in any future conflict. Moreover, with the stakes so high in other areas of the world, most of them preferred to avoid struggling with the air power issues raised by limited conflict. Mark Conversino's chapter on deterrence nicely summarizes 50 years of American nuclear policy. He makes the point quite clearly that the Air Force's response to the ongoing development of nuclear weapons in the late 1940s drew heavily from air doctrine and theory developed during the Second World War. Moreover, contemporary notions of strategic targeting, parallel warfare, and potential escalation - perhaps with modern precision weapons - continue to rely on widely accepted airpower theories tracing back to the Cold War. Colonel P Mason Carpenter's essay on strategic air attack in Gulf War I accurately reviews the planning and conduct of that campaign. Carpenter suggests, with strong justification, that new technologies, particularly stealth and precision, have "staggering implications" for air power doctrine and future employment. Even so, arguing that airpower is the sole solution for military conflict is to set it up for failure. Head weighs in again with an astute analysis of the 1999 Kosovo air campaign. Noting the increasing requirement for the mobility and responsiveness of airpower, Head suggests that Kosovo seemed to demonstrate to air power advocates that, at least in some situations, air power could carry the day.

Addressing this fundamental assertion may be the ultimate value of this book. Despite its rather steep price, it should appeal to the growing coterie of scholars interested in the debate. Can airpower, however transformed by technology and applied by up-to-date doctrine, truly be decisive? Mets' and Head's book suggests that the answer to this contentious question is less important than the intellectual investigation itself.

## Notices

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B-25 Mitchell medium bomber of the type flown during the Battle of the Bismark Sea
The B-25 was one of America's most famous aircraft of WWII.
Eric Dumigan photograpy


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

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

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## FOREWORD

The leading article in this edition of Air Power Review is by the Commander-in-Chief Strike Command, Air Chief Marshal Sir Brian Burridge. The article is taken from his closing presentation to this year's Air Power Conference on the air war over Iraq 2003, held at the RAF Museum this May. The Conference covered the war from both historical and thematic angles with speakers ranging through senior Allied officers involved in the planning and conduct of the war to a broad spectrum of leading academics. The CinC's presentation, which was prepared as the Conference progressed, is a tour de force in its depth and breadth, addressing air power issues of the moment and the future. The article is published here in advance of the Conference proceedings to give it greater exposure; it is highly recommended reading for all RAF personnel.

Dr Seb Ritchie's article on the use of Allied air power on Burma from 1943 to 1945 is an excellent overview of that little-known campaign. As with all these studies, lessons emerge and re-emerge. For example, ASOCs are nothing new and the need to follow-up heavy bombing attacks with tactical aircraft during the assault was clearly not passed on to the European Theatre. But the key lesson is that properly integrated air/land operations work.

Dr Paul Rexton Kan is an academic at the USAF's Air Command and Staff College at Maxwell AFB. His article analyses the "new" theory of axiological targeting propounded by Lt Col Peter Wijninga (RNLAF) and Richard Szafranski. Kan makes the point that axiological targeting is not really new, but belongs to the "soft" school of coercive thought, exemplified by Col John Warden rather than the "hard" school (in terms of what they consider are the ideal targets to achieve strategic coercion) of Robert Pape. However, its utility is in challenging us to think more deeply about how we can apply air power in the diverse conflicts of the modern world.

Dr David Mets, from the School of Advanced Air and Space Studies, also at Maxwell AFB, is a regular contributor to this Journal. His article on the Battle of
the Bismark Sea is, as befits a paper that was initially published in the Journal of Military History, a detailed and extensively researched examination of the subject. The article makes an interesting point concerning how previous appointments can influence a commander's actions: General George Kenney, Commander 5th Air Force having been on the staff of the Air Corps Tactical School in the 1920s. In addition to providing a good overview of the Pacific War at this stage the article also serves to highlight the "effects" that can be achieved by air power in a joint context.

By way of a change, Air Cdr Peter Dye's article examines the experiences of pilots and observers at the 3rd Battle of Ypres in 1918. The author starts by detailing the suicide of Lt Robert Cameron RFC who was officially reported as "killed in action". He then examines the issue of combat stress of the aircrew, but within the context of the limited medical understanding of the subject and the societal pressures within the services as WWI drew to a close. However, his comments on the value of leadership and crew (or unit) cohesion as bulwarks against combat stress are equally valid today.

Finally Wg Cdr David Winstanley's article on Air Power in Operation MARKET GARDEN is taken from his Defence Research Paper written whilst on ACSC6. Whilst the broad lessons of the Arnhem landings are well known, the author examines the operation by asking the question " could a more effective application of air power have resulted in Allied victory ?" He rightly castigates the Allied commanders for failing to exploit the air superiority that existed over the Continent after D-Day and for being "risk averse" in the selection of the Arnhem drop zones. However, he concludes that whilst Operation MARKET GARDEN was an air power failure it was also - and the Editor would suggest far more importantly - a failure of overall joint planning and execution.

The penultimate article, which was submitted by Sqn Ldr Dave Watkins as a candidate for the Gordon Shepherd Memorial Prize, looks at the issue of how
to deal with the contemporary threats to Deployed Operating Bases. Although since the article was written the decision has been taken to concentrate all UK GBAD within the Royal Artillery, under a joint command structure, the points made about GBAD are still pertinent. Whilst primarily tactical in its approach, the article gives a good description of the problems involved in the active ground defence of a DOB, but only makes passing mention of the NBC threat and how that is dealt with. However, the sections on command and control of the force protection battle are informative reading for those about to go on deployed operations.

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## IRAQ 2003 - <br> AIR POWER POINIERS FOR THE FLIUURE CLOSING ADDRESS

## By Air Chief Marshal Sir Brian Burridge <br> Commander in Chief, Headquarters Strike Command

The aim of this year's Air Power Conference at Hendon was to stimulate debate on the air power aspects of Iraq 2003. This was planned to embrace both the military and the academic communities. We were asked to look at the Combined aspects of the air campaign from both the US and the UK perspectives and analyse the role of air power as a manoeuvre force; this we have done. But the reality of yesterday is worth little unless we can draw out the salient pointers for the future, and that is my job now.

Iraq 2003 represents a good case study for two reasons. It was the first war of its type but, I submit, it is also the last war of its type. It was the first war because it was the first time that we could take a true effects-based approach, enabled by precision, enabled by greater granularity of information, enabled by the ability to move that information across networks (at least to a limited extent) and thus develop at least some degree of common situational awareness. That awareness allowed us to generate very high tempo.

The 5 Corps advance on Baghdad is probably the highest tempo piece of armoured warfare that we have ever seen. Next, information operations mattered. It was an operation fought in the glare of the international community fed by their respective media. It was also a war fought in an ambiguous and non-linear battlespace. So, the first war of its type. Conversely, Iraq 2003 could be regarded as the last war of its type as we are pretty much running out of rogue states The notion of what it means to be a rogue state is now taking root.

Our aim for this Conference was to make you think, because I need people who can think. I cannot run a headquarters with people who will
not think because I cannot empower them as decision makers. I have a prejudice. My prejudice is that airmen do not like thinking. Airmen are obsessed with bombs, fuses, cockpits and screens and are actually rather uncomfortable exploring the underpinning logic and doctrine. So producing a thinking air force is a strategic requirement for me, and I am absolutely passionate about that.

However, before I summarise the Conference, I wish to say a few words of thanks. Thank you to the co-sponsors, firstly, the RAF Museum. This is an impressive museum and I commend it to those of you on stations grappling with your leadership programmes and the generation of ethos amongst your people. This museum is one of the best visual

## Iraq 2003 could be regarded as the last war of its type as we are pretty much running out of rogue states

An RAF Tornado departing on a mission



> In Iraq we could see that, within a very small piece of the battlespace, we would have: high-intensity armoured warfare, with a lot of 'shot-and-shell'

aids you can have. Secondly, the Air Historical Branch, it too provides a rich seam of material that you should be using. Finally, to the Director of Defence Studies (RAF), and to his staff, not only for sponsoring it but for organising the Conference.

In summarising the proceedings, I will examine those aspects that I feel to be important pointers for the future using the components of fighting power as the template. I will start by looking at the context in which the future pointers are going to be important to us. The context itself is significant because we have to ensure that Air Power is relevant in the future. Air Power comes with a good brand. Ministers and others in this country have, historically, regarded air power as being an effective and efficient tool in international relations. It provides us with the ability to exhibit and project the will of our nation. That is deep rooted. However, these things do not come free and they have to prove themselves over and over again. So, what does Iraq represent as a first example of post-modern warfare? What was the type of battlespace in which we were engaged and could be engaged in the future? I said it is ambiguous and non-linear, but what does that mean? As a starting point, we can go back to what General Krulak used to say about three-block warfare.

In Iraq we could see that, within a very small piece of the battlespace, we would have: highintensity armoured warfare, with a lot of 'shot-and-shell'; we would have standard framework type operations conducting peace support and then we would have peacekeeping in terms of distributing humanitarian aid. Sometimes the traditionally linear became non-linear because we had long lines of communications with the front end of them punching through with armour and the back end of them delivering humanitarian aid as they went forward. But the difference between the reality and what General Krulak saw was that he understated the dynamics. The dynamics of Iraq was that these three blocks kept changing in location and varying in intensity, such that yesterday's humanitarian aid distribution point became the scene of tomorrow's firefight. And that is an aspect that makes command, planning and execution very difficult. Add to that urban Close Air Support and you start to get a feel for just how complicated these dynamics can be.

The second point about the nature of this battlespace is that we were fighting amongst the indigenous people. That was certainly the case in

Kuwait in 1991 and it was also the case in Kosovo and Bosnia. So a significant change since the Cold War in that our military activity, the application of military violence in the battlespace, is now being undertaken amongst the people. That is significant because, in any operation, there is always going to be a Phase 4 . The degree to which you win or lose the hearts-and-minds of the indigenous population will be predicated on your conduct in battle. The degree of violence, and the way in which that violence is applied, will influence the indigenous people and will undoubtedly affect their ability to accept you when you get into a nation-building
phase. Nation-building is also about infrastructure and much of our conduct in battle has to have an eye on preserving the infrastructure as much as possible. When we did the targeting for Iraq, it started very much as a multi-missioned, 'breakeverything', target list. But, by the time we had applied strategy to it, we were quite clear about what aspects we needed to attack and what aspects we should avoid. Of course, all of this was being done in the glare of the international media. We cannot ignore the media. The power of the digital image is here to stay. The pictures of alleged abuse of Iraqi prisoners that were spread

> The degree of violence, and the way in which that violence is applied, will influence the indigenous people and will undoubtedly affect their ability to accept you when you get into a nation-building phase



An F3 on patrol as the sun rises

## In this post-modern world, we now see more and more the need to get to problems early, and to get to problems nearer their source. You can either pay now or you can pay later but pay you will

over our national newspapers earlier this year provided stark images to the public. Whether they were real images or whether they were fakes is almost immaterial, because the impact they had, particularly in the Gulf region, was enormous. So, given this complexity, why would we ever want to get involved in something similar in the future. From the UK Government's point of view, there are probably three threats that should worry us most.

Firstly, the proliferation of weapons of mass destruction is a real and present danger. It is not one to be underestimated and not one that we should ignore simply because our assumptions over Iraq may have been wrong. Secondly, international terrorism has taken root and we therefore have to consider the degree to which we
can deal with such terrorism close to its source. It was clearly a very important aspect in Afghanistan and we still have much more to do. And, thirdly, there is the impact of failing states that can, and do, cross the spectrum of security challenges. There is much discussion going on now about the difficulties generated by failing states, the circumstances in which we would be prepared to use military force, and the international political constructs that we would need to support our actions. There are three cases for military action. The first is self-defence. Article 51 of the UN Charter is black-and-white, and is about the inherent right of self-defence of against armed attack. But what about the need to defend national interests? In a globalised world, how do you define vital national interests? Do you define them by geographic borders, do you define them in

> Support for TELIC rose to $85 \%$ by the time we got to the start line and in the first few days of fighting. However, it subsided to 50\% even before we had finished fighting and has dropped considerably below $50 \%$ since then
economic terms, do you define them in human terms, or indeed any other terms? Self-defence in a globalised world is not as clear as it was in 1949 when the Charter was written. Secondly, there is humanitarian intervention. In Kosovo in 1999, the Government attached much importance to what, at that stage, was termed an ethical foreign policy, founded and formulated around humanitarian intervention. That well-publicised policy conjured up in the minds of the British public a rather warm feeling of benign intent, of a 'force-for-good'. The third case is the really difficult one: The threat to international peace and regional security. It
is difficult because it is likely to be collective in nature and it is likely to affect an entire region, just as Iraq was an issue for all the Gulf States. It is also likely to affect a number of major international players, clearly the US in the case of Iraq, but also European nations. Action is allowable under Chapter 7 of the UN Charter, but it is hugely difficult to gain an international consensus on what needs to be done. In this post-modern world, we now see more and more the need to get to problems early, and to get to problems nearer their source. You can either pay now or you can pay later but pay you will.


An Argentine Navy Super Etendard during the Falklands campaign

## The last time we had to fight for control of the air was during the Falklands Campaign and that was a very close-run thing

Much of what we do in the future will be in coalition with the US. We therefore need to understand their doctrine on intervention. It is already developing along the lines of 'anticipatory intervention', in other words intervention when you think something might just get out of hand, which may result in a serious situation developing. 'Pre-emptive intervention' could be deemed to be required where things could well get out of hand, whilst preventative intervention is where there are definitely the ingredients for things to get out of hand, but they have not done so just yet. Making judgements on intervention is hugely difficult. The reason that they are difficult is because they have to be based on the interpretation of intelligence which itself can be both fragmented and highly nuanced. The way in which we now need to generate and use intelligence in this post-modern world is important to help us make those very difficult decisions.

Interestingly, we do not hear so much now of the 'something-must-be-done' school of international interventionists. I wonder whether we are
seeing a re-run of the effect of the Black Week of 1899, the first week of the Boer War. The nature of the campaign in Iraq and its aftermath is going to shape public opinion about the way in which military force might be used in the future. There is now this dichotomy between some nations, particularly the US and potentially the UK, wanting to be forward learning in solving problems, against a potential lack of appetite amongst their electorates. But whatever action is taken, there will be an aftermath, and we must recognise and understand how to apply what we, as airmen, can do in future Phase 4s. As I said earlier, there will always be Phase 4s. Afghanistan for example has been in Phase 4 for 2 years. It is important that we understand that only states can legitimately apply military violence. Therefore, it is important to recognise the need for public support, which drives political will. We also need to recognise that public support has to remain in place all the way through the campaign, right to the end of Phase 4. We deployed on Op TELIC with $32 \%$ of public support. That is about the level that existed in 1956 when we deployed in the Suez

# Mission command is the way we should all lead on a day-to-day basis in peace and in war 

Campaign. Support for TELIC rose to $85 \%$ by the time we got to the start line and in the first few days of fighting. However, it subsided to $50 \%$ even before we had finished fighting and has dropped considerably below $50 \%$ since then.

When we are fighting in coalition, the plethora of potential problems is undoubtedly magnified. What will be the long-term impact on public support of the allegations of torture of Iraqi prisoners? More broadly, we can anticipate that International law will have to develop further in order to be able to relate to the conduct of the combat phase and this may be something of a wake-up call to many within the international community. International lawyers have to continue trying to understand how to regulate military violence in these sorts of environments and to keep up with the developments in how we conduct our operations. I also see politicians facing a fine balance the risk to which we are willing to expose our forces versus the prospect that things will actually change for the better.

Let us look at the components of fighting power and see what we can draw out as pointers for the future? Right at the top is control of the air, because if you do not have control of the air you can achieve nothing. But we did not have to fight for control of the air in Iraq to carry out our effects-based campaign. Nor did we in Kosovo, nor did we in Bosnia. Nor did we really in Iraq in 1991. The last time we had to fight for control of the air was during the Falklands Campaign and that was a very close-run thing. But in this post-modern battlespace, some people's mindsets have now been inculcated with the notion that you do not have to fight for control of the air. That is very dangerous. What about the S400 era? The point at which surface-to-air missiles have a range in excess of 300 km is fast approaching. What happens if missile range is developed to balance exactly the laws of physics, in other words if you can target it with your radar, you are necessarily within the range of long-range surface-to-air missiles defending that target. That would completely change our approach to air warfare and would be a major challenge.

We have heard much about centralised command and decentralised execution. It is changing, and it needs to change further to account for a networked
environment and to allow us to capitalise on those networks. We need to understand, and we have never yet fully understood this, the boundary between where centralised command stops and decentralised execution starts. I suggest we need to separate those boundaries so that there is a fluid middle ground, which I will call 'adaptive control'. There are circumstances in which, on one day, I may need to command certain assets centrally, and, on another day, I may not. And there are some strategically important assets which I shall always want to control in an adaptive sense. Amongst those, I would certainly include UAVs and UCAVs. The difficulty of prosecuting Time Sensitive Targets, against complex rules of engagement and difficult calculations over collateral damage, will also mean that a lot of TST clearance will be done in a centralised way.

The centre of gravity in Iraq was Saddam Hussein's regime. Their critical vulnerability was their ability to exercise command and control, and General Franks' intent was along to produce multiple problems in time and space along a number of axes such that the Iraqi regime would be unable to understand them and therefore be unable to react. The degree to which Air Power has to be employed in a manoeuvrist way, taking us away from traditional attrition into more subtle methods of delivering violence, is already mapped out for us. It is the effects-based approach, and that is why it is so fundamental to the development of our doctrine. Mission command is similarly important in enabling us to generate overwhelming tempo. Mission command has to be a contract of trust which takes place within defined boundaries. It is not something you can turn on and off when you go into operations. Mission command is the way we should all lead on a day-to-day basis in peace and in war.

There has been much debate about high-intensity and low-intensity warfare. It was particularly germane during the period of the Strategic Defence Review. The most likely and the most numerous operations call for low-intensity warfare, yet we were quite clear that only by training and equipping for the most demanding high-intensity task could we easily switch to low-intensity and then switch back again as the occasion demanded.

# So we bombed it again, although there was very little collateral damage, the building was wrecked and yet the telephone lines still worked. The Iraqis were just laying telephone lines around the exchange and putting sandbags over them. We simply did not know enough about how to do effects-based assessments 

The regulation of tempo is similar. You will always need the ability to generate high tempo, and you need that for two reasons. Firstly, in adopting a manoeuvrist approach, particularly when you are dealing with regimes and their command and control: overwhelming the enemy with problems is all about generating tempo. The second point is about risk. You have a choice when planning a campaign because you can decide where you are going to take your risks and for how long. Generating a high tempo is a highrisk business initially, but you will be facing that risk for a shorter period of time. Alternatively, you can decide to take a moderate amount of risk knowing that it is going to endure. The British have a propensity in warfare to take a lot of risk up-front in the knowledge that it will subside later. It gives you the choice of going fast or slow. We studied this intently in the Iraq campaign and did a fair amount of adjustment to the plan based on the results of Exercise INTERNAL LOOK, a computer-assisted wargame. Although our goal was to generate early regime collapse, it was vital that the regime actually recognised their collapse as it was happening. So, regulating your approach so that there is time for the enemy leadership to recognise at least something of what is happening to them is an important aspect of managing tempo.

Moving on to doctrine, we have heard much about the effects-based approach. The effects-based approach is necessary for a number of reasons. The first one is efficiency. To give an example, the telephone exchange in downtown Baghdad was a high-value target. However, there were five big office blocks and a highway bridge over the river close by so there was potential for significant levels of collateral damage. We wanted to attack the target early to disrupt the telephone lines. Our BDA, however, was not particularly good and the telephone lines were still operating. So we bombed it again, and within 24 hours those telephone lines were still operating. So we bombed it again, although there was very little collateral damage, the building was wrecked
and yet the telephone lines still worked. The Iraqis were just laying telephone lines around the exchange and putting sandbags over them. We simply did not know enough about how to do effects-based assessments.

There are legal and political attractions to the effects-based approach. It is reassuring for politicians and lawyers that we are able to take them through the audit trail of what it is we are trying to achieve and how we are trying to achieve it. They find that very comfortable. Also, it is important to explain to regional powers in a potential area of conflict how you are conducting the campaign, what you are going to try to achieve, and what it is going to look like. It is a very important try to maintain support in the region concerned. Like generating domestic public support, the maintenance of support from the regional powers is a significant diplomatic challenge. If you can convince regional governments of your intent to achieve an end-state by doing no more than the minimum required, then you stand a much greater chance of maintaining their support.

Moving on to information operations, I believe it to be an unhelpful term. I prefer to think about it as a subset of an Effects-Based (EB) approach. As an EB subset, you would be caused to consider the required effects together with how you might achieve them, either kinetically or nonkinetically. But I would also wish to ensure that we consider the information campaign in just the same way that we think of a diplomatic campaign or an economic campaign or, indeed, a military campaign. These, of course, are the levers of national power. The strategic level information campaign throughout IRAQI FREEDOM was not well handled. The messages coming out of London and Washington were being read differently by the regional states, were being read very differently by European states and being read very differently by the internal audience in both the US and the UK. If we had regarded information as a strategic lever of coalition power then I do not


A-10 aircraft provided close air support

# Bizarrely though, there were occasions when fierce fighting was in progress with the addition of close air support, yet one block away there was a market with people selling fruit and vegetables 

believe that this difference would have occurred. As for the battlespace itself, we now need to strive for the generation of high tempo by integrating air power with land manoeuvre. But it has to be efficient and it has to be done effectively; we were not that good at it in Iraq. Returning from CAS missions still with weapons onboard was particularly frustrating. There were also difficulties of simultaneity. Tasks that would have traditionally been seen as sequential, such as establishing air superiority, became simultaneous with the beginning of land manoeuvre. Five air tasks were conducted simultaneously; counter-air, for which the UK Commander was the supported commander; the counter-TBM operation in the Western Desert - and again the Air Commander was the Supported Commander with a discreet AOR. Then there was counter-land, immediate strikes and attacks on fixed pre-planned targets. Of the five different elements of air operations,
$75 \%$ of the total effort went into counter-land. Therefore, it is imperative that we understand how to integrate air power and land manoeuvre effectively in order to generate tempo so as to make best use of this significant effort. We also needed to get our air support measures right. The move of the FSCL out to 200 km one night caused a significant delay in dealing with the Republican Guard south of Baghdad. There was a reason for that; 5 Corps was an analogue Corps and slow to in controlling kill boxes, unlike the Marine Corps which was networked digitally and thus much quicker.

I have already mentioned the politics of generating regional support, particularly where host nation support is concerned. But we have also got to understand the political doctrine of escalation. It was something that we well understood during the Cold War from exercises such as WINTEX.

However, that was a different era and we had to re-create the understanding of escalation and escalation dominance during the Iraq campaign: Our post Cold War experience has generated the belief that we can flick a switch and go from low tempo, highly controlled environments like NORTHERN and SOUTHERN WATCH into the dynamic high tempo, many-moving-parts situation that we had in TELIC.

We also need to understand a little more about the differences in appetites for risk across a coalition. We need to recognise that, in the US, the Powell doctrine is all about the use of overwhelming force to reduce risk. For us, we are more willing to face high risk up-front on the understanding that we will endure that risk for a short period of time. Other nations have different views and so it is very important that we understand how different nations approach risk. One small subset of risk is fratricide. We need to develop further our doctrine on combat ID. But, it is not simplistic and people will erroneously assume that technology will bring us the answer. At the same time that we are applying technology to our combat ID, that same technology is allowing developments that see us driving up the tempo, driving up our ability to move faster and more furiously, and thereby increasing the risk of fratricide. So technology on its own is not the answer.

There were also some gaps in our conceptual thinking. Information management is the first of them. We are not good at information management in the military. We have to improve because, unless we can sort out our approach to information management, we will waste much of the effort and resources that are being expended on Network Enabled Capability. Ultimately, NEC is everyone's responsibility because everyone owns a little bit of information, and everyone has got to understand how to manage that information for the benefit of all. That is what NEC is all about. So, conceptual thinking on information management and applications is hugely important.

Next, urban close air support presents us with a particular dilemma. For fixed targets on the Master Air Attack Plan, we take huge amounts of time making collateral damage assessments
and judging the legality of any particular target. But, in the faster-paced environment of an urban engagement with troops in close contact, this burden falls directly on the pilot. Bizarrely though, there were occasions when fierce fighting was in progress with the addition of close air support, yet one block away there was a market with people selling fruit and vegetables. The integration of urban close air support is thus an area requiring deep conceptual thought.

At the strategic level, we need to understand more about the Effects Based Approach. Recent thinking suggests that the enemy centre of gravity is a governing regime itself. In most cases since the end of the Cold War, the effect we have tried to achieve is to disconnect regimes from their people. It is arguable that had we focussed on Milosevic on Day 1 of the Balkans Campaign, we may have reached the end-state rather sooner. But in the longer term, we would not have gained the political advantage that result from the fact that it was Milosevic's own people who ultimately dealt with him. But making judgements in these areas requires accurate, factual intelligence, which can lead to robust assessments. Even then, there are complex legal issues involved. So, yet more conceptual thinking is required. One significant question in all of this is what can air power do in this asymmetric world? Certainly, air power can solve many of the information problems. Through ISTAR we can, with sufficient granularity, tell you what is happening. The next step is to turn an asymmetric target into a symmetric target for a fleeting moment in time. It is these capabilities that will make air power relevant in the strategic environment of tomorrow.

So therefore some difficult issues to solve but what are the specific challenges for air forces. Firstly, let us consider the physical component of fighting power; our manpower and our expeditionary ethos. In a $360^{\circ}$ battlespace there is no longer an ability to differentiate easily between what is a front-line, what is a rear area, and where people might be shooting at you next. That has considerable implications for training and is what is behind my mantra of "warfighter first, specialist second." The number of Air C2 trained augmentees that we need to make our

# So when it comes to making a contribution to coalitions there is a degree to which we need to think of burden-sharing in terms of risk. This puts a different emphasis on the hackneyed phrase, "coalitions of the willing" 

headquarters work in operational environments is very significant. We do not currently have enough. And accurate intelligence, down to the most granular piece of detail that the mission commander needs, has to be relayed quickly and effectively; that also takes people to sift analyse and assess. So we have to adjust our priorities and organise for war and adapt for peace is a good starting point.

Our aircraft must be multi-role, offer true precision, with datalinks, and have the ability to talk to the weapons so that we can use them effectively. The nature of defence procurement tends to give us a rearward view of technology. New acquisitions tend to end up in the paradigm of 'yesterday's technology tomorrow'. There is a systemic weakness in our military acquisition that is founded in history. Some of it is about the nature of airmen and their souls. Back in 1914, the Royal Naval Air Service and the Royal Flying Corps existed in less than harmonious co-existence. They were two very different characters, defined by their different approaches to technology. The Royal Naval Air Service aircraft had radios in them, they had drift-compensated bomb-sights and they also had a compass. The Royal Flying Corps' answer to that was to ask for the names of the railway stations to be painted on their roofs and to give every pilot a copy of Bradshaw's Railway Guide!

When it comes to the amount of equipment or the numbers of platforms we need, we tend to think in terms of being able to provide a certain percentage to a coalition. That may represent a pragmatic starting point, but it is not actually what coalition warfare is about. It is actually about sharing the risks. Our land component provided $25 \%$ of the armoured combat power in Southern Iraq. 1(UK) Armoured Division is a very powerful armoured division, but they did not take $25 \%$ of the risks. That is not to belittle the efforts of the British Army, it is just a fact based on the nature of the battlespace and the way in which we were employed. So when it comes to making
a contribution to coalitions there is a degree to which we need to think of burden-sharing in terms of risk. This puts a different emphasis on the hackneyed phrase, "coalitions of the willing".

Whilst considering equipment, let me just mention something on networks. It links to my point on the intangible aspect of NEC in that centralisation of information costs communications capability; communications cost bandwidth; and bandwidth is what we are short of. Bandwidth is what we will always be short of and so we need to think carefully about the degree to which we centralise knowledge and the ability of warfighters out in theatre to engage in information pull. That was an issue that we had hardly considered at all before IRAQI FREEDOM in terms of the way in which we train our warfighting commanders.

Also on equipment, we see a direct linkage between effects-based warfare and precision weapons. But what do we really know about the stockpiles requirements of precision weapons? What do we know about realistic usage rates in varying numbers of campaigns? What do we know about how much that will cost? That is something we have to understand.

Training for a complex battlespace requires complex collective training in realistic scenarios. This is how we approached the counter-TBM operation in Iraq's Western Desert. In these cases there is a clear need to exercise command and control from end to end adding all the friction that exists when the need exists to deal quickly with very granular information. The only way that we are going to do that in future is to embrace synthetic environments as part of our training regimes. We will have to bolt synthetic environments onto real environments so that we have real action and virtual action running simultaneously so as to test our ability to exercise command and control. One of the things that concerns me is that airmen tend to get comfortable when they are back at their well-found main operating bases. That is not what the future


J-UCAS-X-47B unmanned fighter (Andrew Hull, MoD)

## The notion of using UCAVs controlled from 10 time zones away to prosecute a battle is not something international law of the future will regard as acceptable

is about. For air power to be relevant, all our people have to have an expeditionary mindset. That is why collective training is very important in maintaining their warfighting edge, to make them realise that they are warfighters first and specialists second. Conducting such training in representative theatres at strategic range is expensive. SAIF SAREEA held in Oman in 2002 is just such an example but it was money very well spent. It generated confidence and understanding based on experience in real conditions.

Sustainability is another issue. General Moseley talked to you about fuel. What he did not say, was that this air campaign was fuel-limited. There was no other way we could get more aircraft in the air because we just did not have the fuel flows into the air bases. You saw those 4.8 miles of $8,500-$ gallon fuel trucks queuing outside PSAB. PSAB
was pumping 4.5 million gallons of aviation fuel per day into aircraft. There just was not any more fuel anywhere. A huge challenge in a large-scale operation.

The final part of my summation concerns the moral component of fighting power. When we go into combat, we have got to be sure that what we are doing is both legal and moral. I do not believe that, in future, even though technology will allow it, we will be allowed to indulge in robotic warfare. I simply do not see the international community regarding that as an appropriate way to fight. The notion of using UCAVs controlled from 10 time zones away to prosecute a battle is not something international law of the future will regard as acceptable. I think the notion of a person in the loop, the notion of positive ID, the notion of someone feeling the texture of what is going on
in the battlespace, is going to be more and more prevalent. The same aspects also mean that we will be asking more of our crews. Overall, I think robotic warfare drives you away from what I term as emotional connectivity with the battlespace. My view is that winning the hearts-and-minds battle with the indigenous population requires this emotional connectivity.

The media will be influential in the outcome of this debate. They are hugely powerful in terms of both generating and depleting public support. I worry over the degree to which the media now drives public opinion in every aspect of public life. An aspect of this is the degree to which this nation will always be a warrior nation. I wonder whether societal change will take us in a different direction. I wonder about the degree to which the role and rights of the individual are now so dominant in what is a consumerist society that we cannot, and will not, see the same sense of understanding and support for military action that we have always taken for granted. It is certainly the case that, as a society, we are developing in a way that would seemingly tend to drive us away from the understanding of what warfare is; that warfare is a dirty, disgusting and dangerous business. The mindset of the media leading up to the Iraq campaign was focused more on trivial stories rather than grand strategy; they simply did not understand what warfare was about. It is interesting to think that the military heroes of today, the Jessica Lynches, are actually the victims. Does this mean that society has turned round what they regard as suitable role models in a military context?

We see more jointery but what does that do for our motivation? Let me say something about the importance of single Service roots in a joint context. I describe this as the ' 3 Ps '. The first is professionalism, because it is your basic military credibility that comes from your single Service roots, your single Service ability to discharge your bit of the military campaign. That is where your professionalism comes from. The second is parenting. It is the esprit de corps, it is ethos, it is what you use as a touchstone in steep and scary places. It is tradition, it is about history, badges, squadron standards and identity: a sense
of where we have come from, it is all that is about your single Service parentage. It is that which motivates you to fight; it is that which motivates you to potentially put your life on the line. And thirdly, there is passion. If you are not passionate about what you do in a single Service context, you will never make the jump from single Service into joint command. So professionalism, parenting and passion are actually fundamental to motivation in the moral component of warfare.

Finally, let me move on to leadership. It is not something you can switch on when the moment comes. Part of leadership is trust and mission command is based on trust. The generation of trust, both in a command chain and in a coalition, is simply about doing what you say you will do. It is simply about being honest about what is in the art of the possible. There is also the need for robustness and particularly the need for robustness in the face of shocks. We know we are going to lose people, we know we are going to lose aircraft, that is what war fighting is about. But developing robustness and making sure that you have answered all the 'what-if' questions are vital aspects of leadership.

Good planning is also part of good leadership. In warfare there are a huge number of moving parts. The detail really matters and when some of those moving parts come from coalition partners then the requirement for good planning is even greater. Campaign planning is a relatively recent innovation to Royal Air Force officers, whereas it should be our stock-in-trade. It has to be that way otherwise, as a commander, you will not be in a position to guarantee that most of these moving parts will mesh. That brings me to the really important issue of operational art. "Technology cannot revive the genius" was never a truer quote. You do need to think of command, of leadership and of war fighting as an art that is founded on a science. But it is not a science; it is distinctly right brain not left brain. The only way you will find yourself able to confront that is through education and through training.

So, what are the main points? Air power can get you control of the air and it can get you the information you need to unravel an asymmetric
world. We are aiming at the ability to achieve precise campaign effects, at range, in time. We know that the 'time' part of it is the difficult one. We know we need to be warfighters first and specialists second. By doing so, we will make air power relevant because we can turn asymmetric targets into symmetric targets for a fleeting moment in time, but we must be able to do it again, and again, and again. That is what
persistence is all about. We know that this is a deeply human endeavour. It is not possible to delegate much of this to technology. We now need flexible platforms and agile people whereas in the past we needed agile platforms and flexible people. We need really agile people and the only way we can have that agility is for you to take it upon yourselves to educate yourselves and think deeply and conceptually about the issues we face.

## Air power can get you control of the air and it can get you the information you need to unravel an asymmetric world

RAF C-130J Hercules at an Allied base during Op TELIC



# Rising from the Ashes <br> Allied Air Power and Air Support for 14th Army in Burma, 1943-1945 

## By Dr Sebastian Ritchie

On the afternoon of 2 May 1945 the Officer Commanding 110 Squadron, Wing Commander AE Saunders, piloting a de Havilland Mosquito, was making a reconnaissance of Rangoon airfield when he observed a large white marking, as though a cloth had been laid out in surrender. He decided to land. Finding no Japanese at the airfield he proceeded to the city gaol, where some 1,400 Allied POWs had been incarcerated. There he was received by the senior officer, Wing Commander LV Hudson, Royal Australian Air Force, who
confirmed that the enemy had abandoned Rangoon a few days earlier. ${ }^{1}$

It was entirely appropriate that Rangoon should have been liberated, symbolically at least, by the Royal Air Force. For the advance that brought General Slim's 14th Army from northern Burma to within 50 miles the capital in just six months, after more than two years of stalemate, would have been impossible without air power. During the campaign, transport aircraft of the Combat

There was . . so little intelligence on the Japanese that the RAF did not know of the existence of the Zero fighter

Cargo Task Force supplied an army of more than 300,000 ground troops; without their efforts, Slim's operations would have been logistically unsustainable. Close air support aircraft were guided onto ground targets by forward air control teams, helping to punch through Japanese opposition wherever it was encountered. Medium and heavy bombers cleared particularly difficult obstacles in so-called 'earthquake' operations. In January 1945 an especially well prepared enemy defensive complex at Gangaw blocking Slim's crucial right hook to the west of Mandalay was the target of one such attack; afterwards it was captured at a cost of only two infantrymen wounded. Allied fighters also shielded Slim's advance from Japanese reconnaissance aircraft, ensuring that their high command remained oblivious to the developing threat on their flank until it was too late; at the same time Allied aerial reconnaissance provided an abundance of vitally important targeting intelligence and battle damage assessment information. And as the ground troops moved southwards, so too did Allied air power: by the early months of 1945 former enemy airfields
were being brought into operational use within days of their capture by Slim's forces. This both ensured the maintenance of airborne supplies, and enabled close air support and fighter aircraft to be positioned near to the battlefront.

On the eve of hostilities with the Japanese, Allied air power in South-East Asia was virtually nonexistent; in 1940 the Royal Air Force possessed only a handful of largely obsolete aircraft in theatre. ${ }^{2}$ According to one leading historian:
"There were few airfields, a small maintenance unit on Singapore, few spare parts and supplies, few trained pilots and so little intelligence on the Japanese that the RAF did not know of the existence of the Zero fighter." ${ }^{3}$

Yet in 1944 the British Empire and American air forces in Burma participated in one of the war's most outstanding feats of air support for a land campaign. Moreover, they did so in a theatre where climatic and topographical conditions combined to produce one of the most hazardous flying environments in the world. The full range of land-based air operations which underpinned 14th Army's victory

## During the early stages of the war with Japan, Allied air forces in South-East Asia found themselves heavily outnumbered and outclassed by their adversaries

Japanese Ki-43 Oscar aircraft prepare for take-off

included air defence, offensive counter-air, close air support, air interdiction, strategic bombing, photographic reconnaissance, tactical air transport, airborne operations, glider operations, special operations and maritime air reconnaissance. A truly dramatic transformation had occurred.

Histories of the air war in Burma have predominantly offered narrative accounts of the growth of Allied air power from its inauspicious beginnings through to the victories of 1944 and 1945, culminating in the liberation of Rangoon. The aim of this paper is to provide a more analytical approach to the problem. By focusing here on air superiority, air transport, and close air support operations, the objective is to demonstrate how and why air power came to play such a crucial role in the Allied victory.

Inevitably, the specific issue of army-air cooperation, whether through airborne supply or close air support, has featured very prominently in the historiography of Allied operations in Burma. Yet it is important to remember that none of the air operations in support of 14th Army would have been possible without one fundamental precondition - air superiority: the air-air battle had to be won before the air-land battle could be won. During the early stages of the war with Japan, Allied air forces in South-East Asia found themselves heavily outnumbered and outclassed by their adversaries. On 7 December 1941 the RAF
possessed just 181 serviceable aircraft in theatre, and their principal fighter, the American-built Buffalo, quickly proved to be no match for modern Japanese fighters like the Zero and the Oscar. Although reinforced by small numbers of British Hurricanes and American P-40s, the squadrons committed to the defence of Burma fell victim to determined counter-air operations by large formations of Japanese aircraft early in 1942, and were soon wiped out. ${ }^{4}$

The task of rebuilding Allied air power in Burma afterwards passed to the British and American commands in India. It was a painfully slow process. The 'Germany first' strategy pursued by the Allies ensured that South-East Asia was invariably accorded lowest importance in the allocation of resources and although more aircraft began to reach India during 1943, the most modern fighters and bombers were held in Europe. The first Spitfire fighters only arrived in October 1943.5

But such aircraft would in any case have been difficult to employ to optimum effect without the necessary supporting infrastructure, which had to be created almost from scratch. This inevitably took time, but it enabled air power to be far more decisively projected later on. The various infrastructure projects included a massive airfield construction programme, the multiplication of supply and maintenance depots, the improvement of communications, and the establishment of a radar chain (augmented by ground observers), and

> Over Burma, by January 1944, the Allies possessed an advantage of almost 5:1 in fighters over Japan


Spitfire VIIIs belonging to No 607 Squadron RAF; this squadron flew fighter and ground attack sorties in support of the Allied armies in Burma. A US Army Air Force B-25 Mitchell prepares to take off in the background

# By January 1945, after the diversion of some of their forces to the Philippines, the Japanese could field only 126 frontline aircraft in South-East Asia, while Air Command South-East Asia numbered more than 1,500 aircraft 

fighter control facilities. ${ }^{6}$ No less important was the creation, in the final months of 1943, of a properly unified and integrated command and control structure, Air Command South-East Asia, covering all British and American air forces in India and Burma. ${ }^{7}$

While these preparations were under way, Allied air strength was being steadily augmented. Compelled to spread their air forces across several theatres, and unable to produce sufficient numbers of aircraft or pilots, the Japanese lost the numerical superiority that they had enjoyed in 1942. Over Burma, by January 1944, the Allies possessed an advantage of almost 5:1 in fighters over Japan; moreover, by then fighter squadrons were being re-equipped with aircraft like the Spitfire, soon followed by American P-38s, P-47s and P-51s, which proved more than a match for the best Japanese fighters. Japanese air operations over Allied territory began to incur unsustainable attrition rates. ${ }^{8}$ In the second Arakan campaign in February, 1944, Japanese air attacks on the so-called 'Admin Box' were beaten off, and the Japanese Army Air Force proved unable to stop airborne supplies from reaching the surrounded Indian ground troops; 65 Japanese aircraft were destroyed or damaged, for the loss of only three Spitfires. The same pattern was to be repeated in the battles of Kohima and Imphal. ${ }^{\text {. }}$

At the same time Allied long-range fighters and bombers embarked on an offensive counter-air campaign against the principal Japanese airfields in Burma, destroying numerous aircraft on the ground and in air combat. The Japanese were compelled to operate from distant bases; some of their sorties over Imphal were flown from airfields 600 miles from the front. ${ }^{10}$ Concurrently, Allied air strikes against Japanese supply lines left numerous aircraft at forward airfields grounded by shortages of spare parts. ${ }^{11}$ Replacement aircraft, pilots, and spares were also stopped en route to Burma after details of their movement were intercepted by

Allied signals intelligence. ${ }^{12}$ The final tally of Japanese aircraft destroyed or damaged between December 1943 and May 1944 was $760 .{ }^{13}$ By mid1944 the Allies were able to conduct air operations virtually unchallenged; air superiority was won over Burma at approximately the same time as it was established over Western Europe. By January 1945, after the diversion of some of their forces to the Philippines, the Japanese could field only 126 frontline aircraft in South-East Asia, while Air Command South-East Asia numbered more than 1,500 aircraft. ${ }^{14}$

The advantages which air superiority conferred on the Allies were nowhere more in evidence than in the air transport operations mounted in support of 14th Army between 1943 and 1945. Logistics lay at the very heart of the British Army's inability to confront the Japanese in 1942. Throughout the Burma campaign the Japanese had consistently mounted flanking movements through the jungle around road-bound British columns. While engaging British forces frontally, they sent mobile units on foot to strike the vulnerable British lines of communication. To protect them, the British then withdraw troops from the front line, only for the Japanese to increase the intensity of their frontal assault. The British were repeatedly left with no alternative but to retreat.

The potential for the Japanese themselves to be outmanoeuvred through the application of air power only gradually became clear. In the late 1930s the RAF had largely been constructed around Bomber Command and Fighter Command, and when Burma fell in 1942 an air transport force was still in the early stages of development. ${ }^{15}$ But air transport occupied a far more prominent position in USAAF doctrine, and the United States possessed significantly larger numbers of transport aircraft. ${ }^{16}$ Air transport was employed effectively but on a limited scale by both air forces during the retreat from Burma in 1942 to bring emergency supplies to ground troops and to evacuate personnel. It subsequently became

central to American efforts to support China from India, and to the supply of isolated garrisons such as Fort Hertz, and ground troops cut off from surface transport by the monsoon. ${ }^{17}$ Elsewhere in the Far East, such as Papua, transport aircraft were successfully used to supply American and Australian ground forces. ${ }^{18}$

But the real turning point in Burma was the first of Wingate's long-range penetration expeditions in February 1943. Although the direct military impact of his expedition was limited, Wingate demonstrated beyond doubt the feasibility and military economy of air supply of ground troops in jungle combat. Each of his columns had its own RAF liaison officer, responsible for relaying supply
requirements to the supply base at Assam, and for organising drop zones. ${ }^{19}$ In all, some 178 sorties were flown by RAF transport aircraft in support of Wingate's forces, the so-called 'Chindits', dropping 303 tons of supplies. ${ }^{20}$ Thereafter, the potential for supplying ground forces by air would always be considered by Allied commanders.

The second Arakan campaign began in November 1943. For the first time, Allied planning now presupposed total dependence on airborne supply for at least one of the divisions involved, 81 West African Division, on the eastern flank. After early progress, the Allied advance was itself confronted by a Japanese offensive in February 1944 which was conducted on exactly the same tactical

## The second Arakan demonstrated that through the use of airborne supply, Japanese jungle tactics could be defeated

principles that had proved so successful in the past. The difference was that Messervy's 7 Indian Division did not respond to the Japanese flanking manoeuvres by retreating: instead they were ordered to stand and fight, and to rely on airborne supply.

Concentrated around the Admin Box, they heroically repelled the Japanese onslaught in some of the bloodiest fighting of the war in Burma, while a steady stream of Dakotas sustained them with rations, weapons and ammunition. These missions were executed in very close proximity to the enemy, and many aircraft were damaged by small-arms fire from the ground; nevertheless, 700 supply sorties were flown to the Admin Box, while in total Allied transport aircraft flew more than 3,000 sorties to convey 10,000 short tons of supplies to the divisions involved in the Arakan campaign in the crucial month of February 1944. By mid-February the forward Japanese units were themselves running out of supplies, and by the last week of the month they were in full retreat. The second Arakan demonstrated that through the use of airborne supply, Japanese jungle tactics could be defeated. ${ }^{11}$

The experience was to be repeated on a larger scale at the battles of Kohima and Imphal in March 1944, but not before a further radical development in the employment of air transport in Burma. This was the movement of an entire division, 5 Indian Division, from the Arakan front to shore up the defences around Imphal, which was threatened by the second stage of the Japanese offensive; the division's redeployment required about 750 transport sorties, in addition to those needed to airlift reinforcements from India into the area. The ground forces at Kohima were subsequently maintained in a tiny garrison area by transport aircraft flying in daylight at an altitude of only 200-300 ft, invariably under small-arms fire from the Japanese. At Imphal a force of 150,000 troops in contact with the enemy and 138 miles from the nearest railhead had to be sustained entirely from the air. Their requirement of more than 400 tons of stores per day had to be flown into a valley ringed by Japanese guns. In total, Allied transport aircraft brought more than 32,000 tons of stores into the Imphal-Kohima area during April, May and June

1944, moved nearly 59,000 personnel into or out of the battle area, and evacuated 15,000 casualties. By the end of June it was once again the Japanese who were compelled to withdraw.

At Second Arakan, Kohima and Imphal, 14th Army had drawn decisively on air transport, but had largely done so spontaneously, as a desperate measure to stave off defeat. However, the potential for building air transport into many different stages of operational planning was in the meantime illustrated by the second of Wingate's long-range penetration expeditions. The first Chindits had their powers of endurance stretched to the very limit by their infiltration through the Burmese jungle on foot; they only depended on the air for supplies. But Wingate's second, far larger, operation relied on air transport for deployment, supply, casualty evacuation, and in part for extraction. The initial deployment, undertaken by transport aircraft and gliders, conveyed 12,500 troops into the field along with full field equipment, pack animals, bulldozers, jeeps, tractors, armoured cars, ammunition, rations, anti-aircraft guns and artillery; this force was then sustained by 2,000 tons of airborne supplies per month. Light L-1 and L-5 aircraft evacuated more than 1,300 casualties, and RAF Sunderland flying boats brought out a further 500 wounded by landing on Lake Indawgyi, after forward air strips had been flooded by the monsoon. ${ }^{22}$

In summary, between the beginning of 1943 and mid-1944, air transport operations in Burma established a range of precedents, which came to exert a decisive influence on Allied planning and tactics. The first Wingate expedition introduced the principle of airborne supply for fielded forces in Burma. The second Arakan campaign witnessed the deployment of a regular division dependent on air supply, and the first defeat of a Japanese offensive in Burma, partly through airborne supply. The second Wingate expedition saw the deployment of a major ground force by air, and also the partial extraction of that force by air. Imphal demonstrated the Allies' capability to use air transport to switch an entire division from one front to another, and to sustain an entire corps by air. Hence, given the availability of sufficient transport aircraft, air power could demonstrably


air support (CAS). The RAF's limited tactical capability during the early years of the war is well known and requires no further comment here. In fact it could be argued that the doctrinal obstacles to effective CAS which had so influenced the RAF in the late 1930s had largely been swept away by the time hostilities commenced with the Japanese, as a result of experience gained in northwest Europe and North Africa. Again, however, resource constraints impeded the development of CAS in Burma in 1942 and the first half of 1943.

During the first Arakan campaign in late 1942 and early 1943 the only bombers available for CAS were three squadrons of Blenheims, which proved quite unsuited to the task. Fighters also provided direct support, but were more successful strafing enemy lines of communication. Enemy targets in jungle locations were often impossible to identify from the air, so instead they were indicated to pilots by pinpoint positions or by smoke shells
fired by the artillery. The effectiveness of such methods was often hard to gauge, however, and there was a chronic shortage of accurate battledamage assessment information. On the ground, Army units at first supplied wildly over-optimistic reports on their effectiveness; many Japanese bunkers and foxholes in fact emerged unscathed from bombing attacks. It also proved difficult to co-ordinate air and ground operations effectively; assault troops were assembled too far from the Japanese lines, and the defenders usually recovered from the effects of bombing before the ground attack started. ${ }^{24}$

During the operation 224 Group, based at Chittagong, had overall responsibility for providing air support, while an organisation called the Army Air Support Control operated alongside 14 Division's headquarters to control tactical aircraft engaged in CAS. Air Support Controls were linked to Brigade and RAF Wing headquarters. They first appeared in the Western


Desert in 1942. The Army Air Support Control seemed to function well enough, but the small scale of operations probably meant that it was not very rigorously tested. ${ }^{25}$ Wingate's first expedition likewise provided few opportunities for developing CAS tactics or organisation. ${ }^{26}$ The decisive impetus would only come at the end of 1943 and in early 1944.

By the second Arakan campaign, Allied air forces were numerically stronger and more capable, but could hardly be considered modern by the standards of the air forces in northwest Europe. The aircraft available for direct support included Hurricane fighter-bombers and Vengeance dive-bombers, and American B-25s and British Wellingtons from the Strategic Air Force also participated. But the results were far from satisfactory and were in many respects similar to those observed in the earlier campaign. Accurate targeting again proved exceptionally difficult in the jungle terrain; Japanese defences were deep, strongly protected, well camouflaged, and hence very resilient. The heavier bombers could only periodically be diverted from other operations
to assist the offensive, and any advantage which they conferred on the attacking forces from the impact of their bombing was invariably offset by their greater margin of error, which compelled Allied ground troops to begin their assault too far away from their ultimate objective. The problem of co-ordination was exacerbated by the fact that the larger bombers were based hundreds of miles behind the battlefront.

Operational control of CAS aircraft engaged in Second Arakan was again vested in 224 Group, but the Group headquarters was separated from 15 Corps headquarters by a distance of about 100 miles. During the second Arakan campaign, CAS was therefore once again directed through the medium of an Army Air Support Control located with 15 Corps. Difficulties arose because, while 15 Corps was entirely committed to the Arakan offensive, 224 Group was engaged in a variety of other operations, including long-range attacks on enemy lines of communication and fighter escort duties. In these circumstances there was inevitably strong competition for resources between the two headquarters, and it proved difficult to strike a
mutually acceptable balance. ${ }^{27}$
The second Arakan offensive nevertheless witnessed two tactical developments of considerable long-term significance. First, in the later stages of the campaign, ground forces communicated directly by radio with tactical aircraft to guide them towards their targets - a technique then also emerging in Italy and (under American sponsorship) in northern Burma. Second, a system was introduced whereby heavier bombing attacks were swiftly followed up by precision attacks by tactical aircraft, designed to keep enemy forces pinned down until ground troops had closed on their positions. Properly practised and refined, these tactics would in time provide the solution to co-ordinating air and ground attacks in the Burmese theatre. ${ }^{28}$

Ground operations in the spring of 1944 provided a further stimulus to the development of CAS organisation and tactics. The tactical aircraft of 221 Group flew more than 25,000 sorties from March to July in support of ground forces at Kohima and Imphal. Slim later acknowledged that "without the victory of the air forces there could have been no victory for the Army". The battle raised many of the same tactical issues that had arisen on the Arakan front, but inter-service co-operation improved considerably, not least because 221 Group headquarters was located forward on Imphal plain, along with some of the squadrons actually engaged in CAS. This greatly facilitated army-air liaison. ${ }^{29}$ Closer co-operation was reflected in more effective targeting and co-ordination between air and ground forces; during the battle assault troops were brought to within 200 yards of enemy targets being attacked by tactical aircraft. ${ }^{30}$

In the same period Wingate's second expedition witnessed the more systematic employment of ground-to-air radio to direct tactical aircraft on to their targets. In a sense there was no alternative, because Wingate's forces were operating hundreds of miles from Allied air bases; the situation on the ground was liable to change between the time that air support was requested and the arrival of the aircraft in the target area. So RAF sections - the RAF Component Special Force - deployed with Wingate's six brigades. During tactical air operations
they worked as forward air controllers, guiding aircraft towards enemy forces, which were also illuminated by smoke shells from mortars or artillery.

The supporting aircraft were themselves assigned to a special unit named the Air Commando Force, a controversial measure but one that worked in the specific circumstances of the expedition. Tactical air operations during the expedition provided ample opportunity for comparing attacks by aircraft with and without radio contact with the ground, and it was found that CAS was far more effective when ground-to-air radio was employed. The difficulty of targeting enemy forces in the jungle environment also encouraged efforts to exploit photographic reconnaissance more effectively. Altogether, some 382 tactical operations were conducted during the campaign involving 1,900 sorties. ${ }^{31}$

In the first half of 1944, 14th Army's campaigns contained numerous lessons on CAS. They demonstrated that operations would benefit from closer army-air co-operation at headquarters level, that tactical air control could be improved by the more widespread use of ground-to-air radio and photographic reconnaissance, and that air and ground attacks could be better synchronised without undue risk to ground troops. During the second half of the year these issues were studied intensively, together with developments in the application of CAS in Europe. The result was a series of organisational changes, which drew on European experience while at the same time making allowances for differences between the two theatres. These included the far greater distances between deployed formations and units that were often a feature of operations in Burma, and the relatively poor standard of communications there. ${ }^{32}$

First, the decision was taken to co-locate the headquarters of 14th Army with the headquarters of 221 Group, which was to be responsible for controlling all CAS aircraft engaged in the forthcoming campaign in central and southern Burma. ${ }^{33}$ When the speed of 14th Army's southward advance threatened to open too great a gulf between the headquarters and units near the battlefront, it was decided to form what was known as a Group Control Centre, which would

# The 'earthquake' operations that resulted were designed to exploit the psychological effect of bombing on the enemy and not simply the material damage inflicted 

move as far forward as possible with the most advanced Wing headquarters to take control of all CAS operations. ${ }^{34}$ Secondly, once the controlling function of the Air Support Controls had passed to the Army / Air headquarters, they were replaced by Air Support Signals Units. Their role was to operate a dedicated signals network solely for the purpose of air support, functioning at corps, division and brigade level and at group and wing headquarters: these units had first been created in Europe earlier in $1944 .{ }^{35}$

At the battlefront itself the basic organisational unit, underpinning the entire system, was the Visual Control Post. Visual Control Posts were joint mobile Army / RAF teams functioning at brigade level and equipped with ground-to-air radios. As the name suggests, they controlled tactical aircraft visually from a position on the ground commanding a view of the battle area. Specifically, they were tasked to:

1. Assist aircraft to identify their targets, or to adjust them.
2. Cancel or delay operations if necessary
3. Direct aircraft to secondary targets.
4. Direct aircraft from a 'cab rank' (orbiting patrol).
5. Co-ordinate and control heavy bomber operations in support of ground forces. ${ }^{36}$

Alongside this new organisation, important tactical changes were introduced to maximise the impact of Allied air support. There were particularly marked improvements in the exploitation of heavy and medium bombers immediately preceding the assault of enemy strong points by the Army. The tentative experiments witnessed during the second Arakan campaign were rationalised and refined; there were extensive exercises and rehearsals. The 'earthquake' operations that resulted were designed to exploit the psychological effect of bombing on the enemy and not simply the material damage inflicted. According to one contemporary document:
"Air bombardment can NOT completely neutralise an area . . . At Cassino and Caen . . . reports show that the numbers actually killed were small but that there was a most marked stunning effect for a period of time . . . Our infantry and armour must take immediate advantage of this period of stunned uncertainty. ${ }^{37}$

Earthquake operations scheduled an initial strike by heavy or medium bombers, followed by fighter-bomber attacks that receded as the ground troops advanced, and finished with dummy attacks. Ground troops were brought to within 700-800 yards of their objectives during the heavier bombardment, and closed to 200-300 yards while the fighter bombers were in action. By launching their final assault so close to the Japanese positions, they were able to exploit the demoralisation and disorientation which bombing invariably generated among enemy forces to overwhelm their defences. ${ }^{38}$

In 14th Army's southern offensive to liberate Burma in 1945 all the basic components of Allied air support for ground operations described in this paper can be identified. When operations commenced, Allied air superiority protected Slim's troops from all but the most limited and ineffective attacks by the Japanese Army Air Force. It also ensured unhindered air transport and CAS in support of ground forces; air transport provided the army's logistical chain, while CAS played a crucial part in destroying Japanese resistance. As soon as territory had been seized, captured airstrips were re-opened, bringing air superiority fighters and ground support aircraft close to the front, and allowing supplies and reinforcements to be flown in; this in turn provided the impetus behind further advances on the ground. The application of these tactics had almost brought 14th Army to the gates of Rangoon when the monsoon started at the end of April 1945. By that time the Japanese had fled the city.

The process by which air power was developed to support Allied ground forces in Burma can only be described as incremental - the absorption of lessons from previous operations and from other theatres, and their application to future campaigns.


A C-46 Commando aircraft airlifts supplies and troops in to the battle-

By 1944, it was air power that gave the Allies a means of defeating the Japanese army, particularly (although by no means exclusively) through the systematic exploitation of airborne movement and logistics, and close air support

After the initial defeats of 1942, Allied air power was gradually rebuilt, like the proverbial phoenix rising from the ashes. Air superiority - the key to full exploitation of the air medium - had been won by mid-1944. The scope for using air transport to solve the army's fundamental problems of movement and logistics became clear partly from unplanned measures of last resort implemented to avoid defeat, and partly from the inventive and far-sighted initiatives of Wingate's expeditions. In Wingate's second operation it was for the very first time planned that virtually all long-range movement and logistical arrangements should depend on air transport. The same basic approach, vastly extended, was then employed by 14th Army during the re-conquest of central and southern Burma. The evolution of CAS was similarly incremental, the exigencies of battle producing organisational and tactical changes which were then studied, refined, rehearsed, and adapted in the light of European experience. After a great deal of trial and error, the Allies had by the later months of 1944 established a formidable CAS capability, which was applied with devastating effect in the final Burmese campaigns.

An explanation of air power's triumph in Burma in 1945 must begin with the disastrous defeats of 1942 and early 1943. These early campaigns showed that the Japanese were better prepared for jungle warfare than the Allies in almost every respect experience, doctrine, training, equipment, tactics and logistics. In a straightforward confrontation
between Allied and Japanese ground forces, the Japanese clearly held too many advantages; the task of evicting them from Burma using ground forces alone would have proved enormously difficult, drawn-out and costly. By 1944, it was air power that gave the Allies a means of defeating the Japanese army, particularly (although by no means exclusively) through the systematic exploitation of airborne movement and logistics, and close air support. At the same time these vital capabilities were denied to the Japanese, so that their ground forces were placed at a decisive disadvantage. Behind these developments lay the Allies' pursuit of a general air strategy, and their willingness to allocate material and human resources to air power on a scale that dwarfed the combined efforts of the Axis powers, who tended to view air warfare merely as an adjunct to land or naval warfare. ${ }^{39}$

The final word may be left to Slim himself: "The Allied air forces ranged all over Burma as far south as Rangoon, on a plan designed almost entirely to help 14th Army. Enemy fighter squadrons were driven farther and farther back, his communications harried all round the clock, his movement by day made perilous and by night delayed. Our attacks were preceded by devastating 'earthquake' bombardments; our bridgeheads as we clung to them screened from fire by the air. Never, I believe, was air co-operation closer, quicker or more effective; never was it more gratefully appreciated than by 14th Army and its commander." ${ }^{40}$

## Notes:

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${ }^{2}$ RJ Overy, The Air War, 1939-1945 (New York: Stein and Day, 1981), 114.
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${ }^{4}$ Air Commodore Henry Probert, The Forgotten Air Force: The Royal Air Force in the War Against Japan, 1941-1945 (London: Brasseys, 1995), 84-6, 93-4; British Intelligence Objectives SubCommittee report, BIOS/JAP/PR1987, Air Operations in China, Burma, India, World War II, 11-12, copy held at Air Historical Branch.
${ }^{5}$ Hilary St George Saunders, Royal Air Force, 1939-45, Vol. 3, The Fight is Won (London: HMSO, 1975), 299. Photo-Reconnaissance Spitfires had arrived earlier, however.
${ }^{6}$ Saunders, The Fight is Won, 299, 307-8.
${ }^{7}$ BIOS/JAP/PR1987, Air Operations in China, Burma, India, World War II, 7-8.
${ }^{8}$ Ibid., 14.
${ }^{9}$ Probert, Forgotten Air Force, 168, 192.
${ }^{10}$ Saunders, The Fight is Won, 331.
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${ }^{12}$ Alan Stripp, 'Japanese Army Air Force codes at Bletchley Park and Delhi', EH Hinsley and Alan Stripp (eds.), Codebreakers: The Inside Story of Bletchley Park (Oxford: Oxford University Press, 1993), 292.
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${ }^{15}$ Humphrey Wynn, Forged in War: A History of Royal Air Force Transport Command, 1943-1967 (London: The Stationary Office, 1996), 6.
${ }^{16}$ Arthur Pearcy Jr., The Dakota (London: Ian Allan, 1972), 13-20. ${ }^{17}$ BIOS/JAP / PR1987, Air Operations in China, Burma, India, World War II, 27; Air Command South East Asia, Air Transport Operations on the Burma Front (unpublished official account, 1944), 8, copy held at Air Historical Branch.
${ }^{18}$ JG Taylor, Air Supply in the Burma Campaigns (Air University USAF Historical Division Study, 1957), 12, copy held at Air Historical Branch.
${ }^{19}$ Taylor, Air Supply in the Burma Campaigns, 14-15.
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${ }^{21}$ Probert, Forgotten Air Force, 169-70; Air Command South East Asia, Air Transport Operations on the Burma Front, 14.
${ }^{22}$ BIOS/JAP/PR1987, Air Operations in China, Burma, India, World War II, 31.
${ }^{23}$ Air Chief Marshal Sir Keith Park, Despatch on Air Operations, from 1 Jt June 1944 to the Occupation of Rangoon, October 1945, 20, copy held at Air Historical Branch.
${ }^{24}$ The Campaigns in the Far East, Vol. 3, India Command, September 1939-November 1943 (unpublished official narrative, undated), 82-7, copy held at Air Historical Branch.
${ }^{25}$ AP3235, Air Support (unpublished official monograph, 1955),
126-7, 139, copy held at Air Historical Branch.
${ }^{26}$ Probert, Forgotten Air Force, 136.
${ }^{27}$ The Campaigns in the Far East, Vol.4, South East Asia, November 1943 to August 1945, (unpublished official narrative, 1952), 56-8, copy held at Air Historical Branch.
${ }^{28}$ Ibid., 56-7, 369.
${ }^{29}$ Probert, Forgotten Air Force, 188-92.
${ }^{30}$ The Campaigns in the Far East, Vol. 4, 125.
${ }^{31}$ Ibid., 184; Probert, Forgotten Air Force, 174-9; AP3235, Air Support, 139.
${ }^{32}$ Air Marshal WA Coryton, Despatch covering operations of Third Tactical Air Force from 1 June 1944 to 4 December 1944, December 1944, 8, 41, copy held at Air Historical Branch. ${ }^{33}$ AP3235, Air Support, 134.
${ }^{34}$ The Campaigns in the Far East, Vol. 4, 377-8; Air Headquarters Burma, The Reconquest of Burma: A History of the Air Support Rendered to Ground Forces, 14 Army, by No. 221 Group, RAF, January 1945-September 1945 (unpublished official narrative, 1945), 88, copy held at Air Historical Branch.
${ }^{35}$ AP3235, Air Support, 118, 134; Ian Gooderson, air power at the Battlefront: Allied Close Air Support in Europe, 1943-1945 (London: Frank Cass, 1998), 26-7.
${ }^{36}$ AP3235, Air Support, 135.
${ }^{37}$ Air Marshal WA Coryton, Despatch covering operations of Third Tactical Air Force from 1 June 1944 to 4 December 1944, December 1944, 8, 43-4.
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${ }^{39}$ Overy, The Air War, 262.
${ }^{40}$ Probert, Forgotten Air Force, 264.


# What Should We Bomld? Axiological Targeting and the Abiding Limits of Airpower Theory 

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## By Dr Paul Rexton Kan

"Airpower is an unusually seductive form of military strength because, like modern courtship, it appears to offer gratification without commitment." (Eliot A Cohen)

In the 100 years since the advent of airpower and its subsequent use in warfare, airmen and strategists still debate the appropriate targets for aerial bombing that will ensure victory. Early airpower advocates promised quick and decisive victory in modern war by selecting and striking targets critical to an enemy's war efforts. They reasoned that by depriving modern nation-states of their ability to use certain key features of their societies,
airpower would prevent the horror of trench warfare witnessed in World War I, thereby limiting overall human suffering.

In the post-Cold War era, Western air forces have fought against states led by dictators, ethno-nationalist tyrants and religious fundamentalists; all had little industrial might to sustain open hostilities for a long period of time. Nonetheless, victory came at a substantially lower cost to civilians than was the case during the air campaigns of World War II. The promise of the early airpower advocates seems to have been realized. Although the civilian casualties and significant hardship caused by recent conflict do not match those incurred during

# Coercion involves the destruction of certain targets but does not require complete annihilation of the adversary or of his necessary means of resistance 

An F-16 drops a Laser Guided Bomb (LGB)

World War II, they continue as features of post-Cold War air campaigns.

This article explores a new theory that reopens the debate over airpower's targeting priorities: axiological targeting. Lt Col Peter Wijninga of the Royal Netherlands Air Force and Richard Szafranski first explored this theory in their article Beyond Utility Targeting: Toward Axiological Air Operations. The term axiological, which combines two Greek words: axios (worthy) and logos (reason or theory), is the study or theory of values - what they are and where they are placed. Wijninga
and Szafranski argue that the Air Force should explore axiological targeting as a way of refining the theory and practice of coercive airpower. For them, "the aim of axiological aerospace operations is to use air, space, and information power to force a behavior shift in belligerent leadership in the quickest and most economical ways possible . . . Value targeting engages the minds and needs of leaders at all levels, knowing that they, and not their war-fighting stuff, are the real source of the conflict and its prolongation and the essential ingredient to its resolution. ${ }^{11}$ Axiological target sets might include bank accounts and finances, as well
as entertainment, sports, and recreational facilities, used by the senior leadership. In other words, axiological targeting sees non-military centers of gravity as more strategic and counter-value targets as more important than counterforce targets.

This new theory seeks to coerce adversaries by holding at risk those things they value most. The authors reason that one can reduce the suffering of innocents even further by striking more personal targets. Unlike previous airpower theories, axiological targeting does not focus on elements that an adversary uses to mount a military campaign. Rather, it is more flexible and more notional in its identification of counter-value targets that may be centers of gravity.

However, this approach is fraught with dangerous assumptions that may put civilians and armed forces at greater risk. In fact, axiological targeting represents the limits of airpower in practice and the complicated logic of airpower as theory. Now that the context of warfare has shifted away from trench fighting of the early twentieth century, one must evaluate how axiological targeting may be
applied against today's adversaries on today's battlefields. This article explores the risks of this new theory and demonstrates how it represents the overall limits of airpower in confronting opponents during the early twenty-first century.

## What is axiological targeting?

Axiological targeting is part of the school of coercive-airpower thought that believes airpower is uniquely suited to force an adversary to accept the demands of the attacker. It accepts the challenge issued by Robert Pape, who maintains that coercive airpower has significant drawbacks: "The key problem with coercion is the validity of the mechanisms that are supposed to translate particular military effects into political outcomes." ${ }^{2}$ Coercion involves the destruction of certain targets but does not require complete annihilation of the adversary or of his necessary means of resistance. As such, axiological targeting becomes a logical extension of the airpower theories of the interwar period. By identifying the correct target set within a center of gravity, airmen can use that set as a lever to modify an enemy's behavior and attitude.

## Utility targeting

 is designed to strike at the means of waging war. Troops, airfields, bases, ships, trains, tanks, aircraft, and command and control (C2) facilities exmplify targets...

# The most persuasive case favoring the effectiveness of axiological targeting may be the North Atlantic Treaty Organization's (NATO) air campaign against Yugoslavia in 1999 

One can easily recognize a campaign of coercion by examining the rhetoric employed by the political leaders of an attacking state - bombing campaigns are designed to 'send a message to the leadership' or 'ratchet up the pressure' in hopes the adversary will acquiesce to the attacker's demands. The modern airpower of many Western militaries is uniquely suited for a strategy of coercion since adversaries can do little to inflict substantial casualties against air forces that can evade their air defense networks.

The United States Air Force, in particular, can deploy rapidly and bring to bear tremendous and persistent firepower: "The USAF offers a highly versatile coercive instrument. air power can attack strategic, operational and tactical targets. It can re-supply friendly forces and provide essential intelligence. One, some, or all of these functions may play a role in successful coercion." ${ }^{3}$ In addition, airpower represents a large part of political calculations that include the quick resolution of a conflict on American terms. One of the advantages the Air Force has over other services is its ability to halt ground invasions or limit aggressions before they become a faits accomplis. ${ }^{4}$

Although the Air Force is a potent fighting machine, the challenge of axiological targeting (as with all airpower theory) lies in acquiring the necessary intelligence to glean some insight into the mind of the adversary. How does he meet his particular idiosyncratic needs? What does he value most, and what level of military pressure would make him capitulate? As such, axiological targeting stands in contradistinction to the current theory and practice of utility targeting.

Utility targeting is designed to strike at the means of waging war. Troops, airfields, bases, ships, trains, tanks, aircraft, and command and control (C2) facilities exemplify targets that have a direct use in military campaigns - what Wijninga and Szafranski call "war-fighting stuff". For them, John Warden's five-ring theory is the epitome of utility targeting. According to Warden, one can treat the enemy as a system comprised of five concentric rings (from the inside out): leadership, organic or system essentials, infrastructure, population, and fielded forces. One can target these elements
with airpower, either to create a malfunction in the system or induce paralysis, thereby bringing about surrender. Wijninga and Szafranski believe that axiological targeting further refines the center ring of Warden's theory by identifying objects that enemy leaders use to sustain themselves by fulfilling their basic needs. ${ }^{5}$

If Warden's five-ring approach is the epitome of utility targeting in theory, then the epitome of such targeting in practice is the air campaigns of the first and second Gulf wars. Leadership targets were of primary interest to air-campaign planners because by 'decapitating' the Iraqi regime, the coalition could prevent Saddam Hussein's military from mounting an effective resistance. In effect, coalition forces paralyzed the regime by targeting enemy leaders, communication systems, and infrastructure in major cities. During Operation IRAQI FREEDOM, the press referred to targeting by using the terms 'shock and awe', which suggested that by conducting precise and simultaneous attacks on utility targets at the initiation of hostilities, the coalition hoped to create so much fear and disarray that the enemy would have little choice other than capitulation. ${ }^{6}$ At first glance, hitting Saddam's palaces may seem in line with axiological targeting. However, we considered them utility targets due to the possibility that they contained labs for the production of weapons of mass destruction and / or that they served as fortified bunkers to protect senior Ba'ath Party leaders.

In contrast, the most persuasive case favoring the effectiveness of axiological targeting may be the North Atlantic Treaty Organization's (NATO) air campaign against Yugoslavia in 1999. The goals were purely coercive: "to demonstrate the seriousness of NATO's purpose so that Serbian leaders understand the imperative of reversing course, to deter an even bloodier offensive against innocent civilians in Kosovo, and, if necessary, to seriously damage the Serb military capacity to harm the people of Kosovo."7 Early on, political leaders selected airpower as the military instrument, excluding any use of NATO ground troops. Debates over centers of gravity and targets soon emerged within the US military and among NATO allies. Although conventional
utility targets - fielded forces in Kosovo and C2 nodes - were struck, American air commanders argued for more strategic attacks to break Yugoslav leader Slobodan-Milosevic's will. Days of air strikes continued, but the Serbian offensive against the Kosovars intensified, and the humanitarian catastrophe worsened. After much debate and political maneuvering, targets shifted to include institutions that Milosevic used to maintain his rule. As asserted by the Air Force's Lt Gen Michael Short, NATO's joint force air and space component commander, the threat of destroying everything that kept the Serb leadership in power and comfort did the job. ${ }^{8}$ Shortly thereafter, Milosevic capitulated to NATO demands.

Axiological targeting has a seductive quality about it - ground forces avoid the harshness of direct conflict, and standoff attacks focus on leadership rather than on civilians. With the advent of greater precision in munitions, targeting has become more accurate, thereby reducing suffering and hardship on both sides of the conflict. However, like the airpower theories before it, axiological targeting is not without its dangers. In fact, these liabilities reveal the genuine limits of airpower in modern conflict.

## Influencing behavior through bombardment

Much of airpower theory and practice is designed to influence behavior of the adversary. Early airpower theorists concentrated on 'civilian morale' believing that a population undergoing sustained bombardment would rise against its government and demand an end to hostilities. At the very least, citizens would be afraid to go to their jobs, thus crippling the target state's economy. Modern airpower thought during and after the first Persian Gulf War focused on paralyzing the leadership or shocking it so completely that it had no choice other than surrender. In this context, morale would mean very little if the adversary were simply incapable of organizing himself to resist.

Axiological targeting represents a return to the belief that airpower can influence behavior. Yet, throughout the history of airpower's use in warfare, human behavior has remained difficult to predict. In many cases, bombing elicited the opposite of the desired response - instead of
inciting rebellion, it strengthened enemy resolve; instead of crippling an economy, it led to the streamlining of industry. The case of Kosovo is not clear-cut in terms of illustrating effective airpower coercion or the overall value of axiological targeting. We simply do not know why Milosevic capitulated, but we do know about many other events that occurred during the bombing. For example, the US Army widened roads in Albania, some NATO allies deployed ground troops to Kosovo's borders, and the Russians actively engaged the Serbs diplomatically. Any of these events - or all of them - together with the bombing campaign could have figured into Milosevic's calculations.

## Ball-bearing factories or banks?

Although axiological targeting aims for greater precision and the further reduction of civilian casualties, issues of discriminating between combatants and noncombatants remain salient. Although such targeting is designed to inflict more pain on the leadership by striking those things it values, citizens will still suffer. Much like the ball-bearing factories so critical to Nazi Germany's war machine, axiological targets such as banks and sports stadiums are staffed by civilians. Clearly, the targeting of a Serb television station in Belgrade during Operation ALLIED FORCE compelled war fighters to face concerns about the cost to civilians.

Axiological targeting also fails to heed Pape's advice to study more carefully how state policy can depend upon a single leader. Dictators have proved adept at presenting those things they value as popular symbols of their rule as well as co-opting national treasures as part of their government. If air planners using axiological targeting determine that an ancient bridge is the dictator's most valued item, they cannot dismiss the possibility that the citizenry feels the same way about it. Moreover, knowing that it probably will be bombed, citizens by the hundreds might voluntarily stand on the bridge, hoping to prevent its destruction. Under these circumstances, bombing the bridge would likely fail to conform to the law of armed conflict (LOAC), thereby limiting the flexible application of force that axiological targeting presupposes.


> The strikes against the World Trade Center, whose towers symbolized American power and prestige, were a potent example of axiological targeting, but they did not elicit the desired response from the United States

Conversely, if the attacker values something within the target country, such as an ancient temple or museum that contains items of cultural significance, the adversary can position highvalue targets and resources nearby in an effort to thwart a bombing campaign. Aerial bombing, no matter the theory, will always be subject to political considerations, moral questioning, and the LOAC. These constraints and strictures do not disappear upon the adoption of axiological targeting and will continue to force airmen into difficult decisions about defining the effectiveness of airpower operations.

## Effectiveness of axiological targeting

Not an entirely new theory of airpower, axiological targeting instead demonstrates the same shortcomings that have accompanied airpower thought since its inception. Such targeting theory does not solve the puzzle of human behavior, political questions, and moral quandaries. In fact, the most recent example of axiological targeting used by terror groups points to the theory's major drawback.

The attacks by al-Qaeda against the United States on September 11, 2001, prove instructive when one examines the central thesis of axiological targeting. The strikes against the World Trade Center, whose towers symbolized American power and prestige, were a potent example of axiological targeting, but they did not elicit the desired response from the United States. Why, then, should we think that an
adversary would act differently if it were subjected to a US axiological-targeting campaign?

The underlying assumptions of axiological targeting continue to be plagued by problems of 'mirror imaging' - the notion that Western air forces will confront adversaries who rationally conduct a cost-benefit analysis of their actions. This fallacy further assumes that all enemy leaders value certain things subject to targeting from the air. They may in fact believe it more prestigious to stand up to a bombing campaign conducted by a powerful Western air force. Perhaps the greatest problem of mirror imaging, however, is the belief that Western air forces will inevitably face state actors in the future

## Globalization and non-state actors

Threats beyond those presented by nation-states demonstrate a growing need to understand the role of airpower as an instrument of national power. Axiological targeting still struggles with significant drawbacks when applied to non-state actors who operate in an increasingly globalizing world. Any new theory of targeting must take into account these actors and the context in which they operate.

Globalization, as described by Malcolm Waters, is a "social process in which the constraints of geography on social and cultural arrangements recede and in which people become increasingly aware that they are receding" ${ }^{9}$ This global social process has dispersed information and technology to greater reaches of the planet and, as a result, has empowered various types of human social organizations with the authority to declare war. These groups, such as ethno-nationalist zealots, clan-based warlords, terrorist organizations, and even criminal syndicates, now have both the means and the willingness to follow through and wage war, often justifying and employing violence in ways that challenge contemporary understanding of air operations.

Globalization also provides new sources of funding for such groups, permitting them to become more self-sufficient than they were during the Cold War, when the superpowers provided them support. They now take advantage of the
transnational nature of globalization by funding their activities through the international trafficking of narcotics, people, small arms, and illegally seized natural resources such as diamonds. Unlike nation-states, these groups do not rely on a national industry, so identifying proper targets for airpower continues to present problems for axiological targeting.

Striking against drug crops or diamond mines valued by a particular non-state leader still raises issues of behavior modification, morality, and effectiveness when axiological targeting is applied to nation-states. A rebel leader may see his stature elevated merely because the United States or some European country orders an air strike against him. One must also address the problem of discriminating between combatants and noncombatants. Do people who earn a living from drug crops represent legitimate targets? What about those forced to work in diamond mines? Also, regardless of whether one uses utility targeting or axiological targeting in a military campaign against non-state actors, the LOAC may serve as a hindrance to air-campaign planners and to overall military effectiveness against these types of actors. It is worth exploring whether a conventional counterforce approach would prove more effective.

## Evolution of airpower thought

Far from fulfilling the promises of early airpower advocates, axiological targeting serves to sustain the conversation about the effectiveness of airpower. If globalization continues to define the context in which challenges to national and international security arise, one would do well to discuss how airpower should be coordinated among various nations and alliances rather than debate what targets to strike from the air. In fact, NATO's campaign against the Serbs in Kosovo does not illustrate the effectiveness of axiological targeting so much as it demonstrates the need to think of ways to use airpower more effectively in concert with indigenous forces on the ground, such as the Kosovo Liberation Army. After Kosovo, the US airpower operation in Afghanistan also worked closely with another indigenous force on the ground - the Northern Alliance.

Axiological targeting remains true to the spirit of early airpower advocates by demonstrating that airpower's use in war continues to be more art than science

Since the end of the Cold War, the United States has used airpower in conjunction with various coalitions and alliances, bringing it to bear against an array of adversaries, from dictators to a radical religious regime. The coordination of these coalitions and the campaigns against these adversaries may foreshadow the challenges presented to us at the beginning of this new millennium. Clearly, further study of how we organize coalitions and how nonstate actors operate would benefit airpower thinkers and leaders. Undoubtedly, however, issues related to morality, effectiveness, and the unpredictability of human behavior will continue to intertwine with future airpower campaigns no matter who participates or against whom we direct them. These basic issues have accompanied advocates of airpower since its advent and application in warfare.

Rather than serving as a point of departure for airpower, axiological targeting asks us to think more creatively about how to meet violent challenges of the near future. The engendering of more discussion on one of the most lethal instruments of power in the world can only help. Thus, axiological targeting remains true to the spirit of early airpower advocates by demonstrating that airpower's use in war continues to be more art than science.

## Notes

${ }^{1}$ Lt Col Peter W. W. Wijninga and Richard Szafranski, Beyond Utility Targeting: Toward Axiological Air Operations, Aerospace Power Journal 14, no. 4 (Winter 2000): 53, 56, http: / / www. airpower.maxwell.af.mil/airchronicles/apj/ apj00/win00/ szafranski.pdf.
${ }^{2}$ Robert A. Pape, Bombing to Win: air power and Coercion in War (Ithaca, NY: Cornell University Press, 1996), 329.
${ }^{3}$ Ibid., 5.
${ }^{4}$ Daniel L. Byman, Matthew C. Waxman, and Eric Larson, air power as a Coercive Instrument (Santa Monica, CA: RAND, 1999), 3.
${ }^{5}$ Wijninga and Szafranski, Beyond Utility Targeting, 48.
${ }^{6}$ Recent reporting, however, tends to downplay the significance of shock and awe. T Michael Moseley reveals that less than 10 percent of coalition bombs targeted Iraqi leadership or military command structures. The majority of air attacks went against fielded forces. See Operation Iraqi Freedom: By the Numbers
(Shaw AFB, SC: Combined Forces Air Component, Assessment and Analysis Division, 2003).
${ }^{7}$ Ivo H. Daalder and Michael E. O'Hanlon, Winning Ugly: NATO's War to Save Kosovo (Washington, DC: Brookings Institution Press, 2000), 101.
${ }^{8}$ John A. Tirpak, Short's View of the Air Campaign, Air Force Magazine
82, no. 9 (September 1999), http://www.afa.org/magazine/sept1999/
0999watch.asp.
${ }^{9}$ Malcolm Waters, Globalization (London: Routledge, 1995), 3.

# The Battle of the Bismarck Sea 

1-3 March 1943<br>A proving ground for air theory and doctrine?



We have just passed the 60th anniversary of the Battle of the Bismarck Sea. It occurs to me that it is worthwhile to revisit the experience to examine its implications for the history of the evolution of airpower theory and doctrine in the subsequent years. I will begin by examining the context of the Battle: its environment, climate and the forces arrayed on both sides. Then we shall turn to a summary of the strategies being pursued on both sides. We will follow that with a brief description of the way that the Battle unfolded and the results. We will then conclude with speculations on the ways that the experience affected, or failed to affect, the articulation of post-war air theory and doctrine. Perhaps the case study will also suggest some areas in which the traditional view is not completely accurate and some of the implications for the current doctrine of the Expeditionary Air Force. ${ }^{1}$

## The context

In the spring of 1942, the military fortunes of the United States and Australia were at their lowest
ebb ever. The Japanese rampage had conquered a huge physical arena containing millions of people and vast natural resources not theretofore found in the Japanese Empire. We shall see below, that the Japanese planned the establishment of a huge defensive perimeter and a stand that would wear down Allied counteroffensives. That was to cause the latter to settle for a negotiated peace that would substantially strengthen Japan as a great power. ${ }^{2}$

The Allies were in a bad way. The Germans were still rattling the gates of Moscow and threatening the Suez Canal. The US fleet was badly damaged, and General Douglas MacArthur had fled the Philippines under the orders of the President. He was installed in Australia, and for all he knew, the Japanese did not intend to stop at the north shore of that land. ${ }^{3}$ The navies available to him were weak, combat weary, and largely devoid of airpower. The air doctrines of the Americans did not seem to fit the problem facing him, and the organization of the US military forces had a long way to go. The Australian Allies were also stressed. A substantial fraction of their best forces had been

deployed far away to assist the British in the war against the European Axis. The population and material resources of their land were clearly not up to fending off the Japanese alone. ${ }^{4}$

The background to the Japanese onslaught in 194142 is complex and extends well back into the $19^{\text {th }}$ century and beyond. Japan had emerged from a kind of feudalism only at the end of that century and had been modernizing at a rapid pace in industry and technology. This was announced to the world in their great victory over the Russians culminating in the final defeat of the Tsarist Fleet at the Battle of the Straits of Tsushima, in May, 1905. The Japanese went on to make enormous gains in Asia and in the Pacific as a result of the First World War. They did so at minimal cost, and had enjoyed successful diplomacy at the Versailles Peace Conference and generally in the naval disarmament negotiations in the years that followed. All this had been possible because of the preoccupation of the great powers of Europe with each other. ${ }^{5}$

We saw that the Germans were on the outskirts of Moscow in December 1941. The British, though relieved of the threat of renewed air attack on the British Isles by the German move east, were nonetheless in a bad way. The submarine campaign threatened them and the Axis was menacing the

Suez lifeline. The Nazi armies occupied Norway, Belgium, the Netherlands and France. Japanese resources were running short, in part because of US economic warfare, so they grasped at the Second World War as another opportunity.

## The Japanese grand strategy

The Japanese undertook a massive campaign to make huge gains while the Europeans and Americans were tied down. They planned to grasp the oil-rich European colonies in the East Indies and the rubber and other resources of Southeast Asia. Then as we noted above they aimed to set up a defensive perimeter and wear the Allies down until a negotiated peace became possible. Things started to go wrong for them in the summer of 1942. The Japanese took Rabaul with its splendid harbor in January 1942, along with positions along the northeastern shore of New Guinea. They probably could have easily taken Port Moresby as well then, but neglected to do so. Then the first invasion attempt of Port Moresby was turned back in May with the Battle of the Coral Sea, and the next month they lost four large aircraft carriers and many airplanes at Midway. ${ }^{6}$

For all the Allies knew they intended to invade Australia. At that point, the Allied objective was merely to hold off the Japanese until the job against Germany was completed.

The geography and climate of the theater The geography of the region made that part of World War II quite different from the struggle in Europe. Though the area of the campaigns in New Guinea and the Solomons is in an oceanic environment characterized by huge distances, there are many islands. Those in the Solomons chain stretch for six or seven hundred miles, and William Manchester describes New Guinea as the second largest island in the world being over a thousand miles from east to west. It has high mountains and many rivers running out of them to the sea on all sides. New Guinea is subject to frequent earthquakes and has many large swamps. Terrain in Solomons is also mountainous, and they are also subject to volcanoes and earthquakes. ${ }^{7}$

The climate in the Pacific also made that part of the war much different than the ones in Europe and North Africa. Both the Solomons and New Guinea are hard by the equator and subject to heavy rainfall. The temperatures are exceedingly high and the weather humid. This leads to a multitude of tropical diseases and infections that make the maintenance of the health of troops a major challenge. ${ }^{8}$ There is not much temperature variation through the year. The climate to the east in the Solomons is similar, with frequent typhoons. New Guinea was heavily wooded, and very little of it could be successfully farmed. The situation was similar in the Solomons. There were few roads and airfields. Clear areas for building air bases were scarce. Offshore coral reefs were many and often uncharted. ${ }^{9}$
$5^{\text {th }}$ Air Force and New Guinea natives, 1943

The people in the Southwest and South Pacific were also far different from Europeans. The natives of New Guinea were mostly Melanesian, Papuan, Negrito, Micronesian, and Polynesian. The vast majority of people in the Solomons were Melanesians. But there were also a few Caucasians in both areas almost all of whom were favorably disposed to the Allied cause. Especially in the case of the Guadalcanal Campaign, their coastwatching was to yield as much as an hour and a half warning of Japanese bomber raids for the air defenders. That was more than the radar of the day could provide. The coastwatcher service was vital what with the slow-climbing fighters available at Henderson field. ${ }^{10}$

The natural resources sought by the Japanese were in large part further to the west and in Southeast Asia. In New Guinea there were gold, copper, silver, natural gas, tropical timber, oil and seafood resources. Most people there nonetheless lived in a primitive, subsistence economy. Notwithstanding the New Guinea petroleum resources, the principal oil fields in the Southwest Pacific Area were to the west in the Netherlands East Indies (now Indonesia).

In large part, the Japanese grand strategy arose from their environment on the home islands and their limited natural resources and dense population. Partly because of those limitations, Japan had been the first among Asian nations to industrialize. The grand strategy was to take advantage of World War II to create a more balanced economy over a larger area. As explained by Ronald Spector, there had been some talk in Japan about a possible attack on the Soviets to expand the Japanese holdings on the Asian mainland, but because of the need for a dependable source of oil, the decision was to expand to the south and west. This was to be done largely at the expense of the holdings of the Allied European powers that were fully occupied by the War there. ${ }^{11}$ The idea was that Japan would supply the leadership, technology and manufacturing; the other Asians would provide the raw materials and labor. ${ }^{12}$

## The Japanese grand strategy and initial results

 By mid-1942, the Japanese campaign strategy in the south was in large part governed by events ofthe preceding six months. Having been checked in its drive to the east by the Battle of Midway, Japan decided it was time to go over to the defensive and to consolidate its gains while the War was being fought out in Europe. However, the exception to a general defensive was to be in the south. There, in the summer of 1942, the Japanese sought to continue the offensive to take positions at the eastern end of the Solomons and at Port Moresby. The ultimate desire was to threaten the line of communications from the US to Australia and thus to hamper the generation of a counter-offensive as well as to complete a defensive perimeter for Japanese bases in the South Pacific. ${ }^{13}$

## Forces

Before the war, the Japanese military forces were by far the most potent in the region. But, in 1941 the naval forces certainly were not capable of standing up against those of the Allies except for the fact that the German submarine campaign was at its height and the Mediterranean sea line of communications was still blocked. Thus the US and British fleets could not be fully released against the Japanese. The Japanese naval and air forces outnumbered the combination of Australian and American forces and were better trained and experienced at that point. Their ground forces were also more numerous and were well seasoned though not so much so in jungle warfare. ${ }^{14}$ By and large the navy and army dominated Japanese doctrine and the air forces in both cases existed to support the surface battle. Furthermore, the Allies underestimated the naval and air technologies of
the Japanese. ${ }^{15}$ But though the enemy was ahead in a few areas, across the board their military technologies were not yet up to western standards. Radar was shortly to be a huge advantage for the Allies both at sea and in the air, but it was not fully ready for the campaigns of 1942 and 1943. Landbased radar was not available at Port Moresby until September, 1942, and prior to that the Allies were largely dependent upon the 'poor man's radar' - coastwatchers. ${ }^{16}$ In Japan, there was no separate air force, and Army-Navy rivalry was even more intense than in the West. ${ }^{17}$ According to Henry Sakaida in The Siege of Rabaul, that rivalry extended to the Japanese forces involved in the Southwest Pacific:
"The Japanese Army had their priorities in New Guinea; their ground troops needed air support which the Navy could not or would not provide. There was very little cooperation between the Army and Navy at Rabaul or elsewhere. Thus Rabaul's Army air regiments achieved very little success, and by the end of August, 1943, almost all of the Army fighters had been transferred to Lae and Wewak. If Rabaul was the Graveyard of (naval) Fighter Pilots, New Guinea was the Army's." 18

## Allied grand strategy

The Allied declared grand strategy was to use all of the instruments of power to first achieve the defeat of the more dangerous enemy, Germany. Only after that was achieved was the Alliance to turn its full effort against Japan. But there were some Americans who chafed under this idea, especially in the Navy. ${ }^{19}$



#### Abstract

The Americans largely dominated allied theater strategy making in the Southwest Pacific Area. The traditional plan had been to mount a naval campaign straight across the central Pacific capturing bases and building them up as we proceeded. Then, somewhere in the vicinity of the Philippines, a great sea battle would be fought. Having defeated the Japanese navy, the Americans were to then either blockade or bomb the enemy into submission or use some combination. This had been known as War Plan Orange before the War. ${ }^{20}$

But, largely unpredictable and fortuitous circumstances confused US Pacific strategy making. No one had expected the Japanese advance to move as far to the south as rapidly as it did. There had not been much concern about Australia, but now a threat to her seemed real and, also fortuitously, General Douglas MacArthur wound up there. Almost inevitably, he was given command and the mission to protect Australia and its lifeline from North America. ${ }^{21}$ According to Stephen Taaffe and others, some US Navy leaders saw this as an Army intrusion into a naval theater, ${ }^{22}$ and agreement on a single strategy did not prove feasible. Rather, MacArthur was to be permitted his return to the Philippines along the New Guinea coast to the west and thence northwest back to the Philippines. After that, the Japanese would somehow be defeated. Meanwhile, another strong man, Admiral Ernest King, also was


## General George C Kenney


to be permitted his preferred strategy, essentially a return to the War Plan Orange thrust across the central Pacific. But his strategy could not be implemented until the US carrier and amphibious fleets had been built up. In the desperate days of late 1942, for a time the only operational aircraft carrier left in the Pacific was the battle scarred USS Enterprise.

Having been frustrated in their effort to take Port Moresby at the Coral Sea, the Japanese Army decided to give it a shot with an overland march from the Buna area via the formidable Kokoda Trail. They made it most of the way but were frustrated by the fierce opposition of the Australians on the ground with assistance from the $5^{\text {th }}$ Air Force through aerial resupply and air-to-ground attack. After the Coral Sea and the defeat of the Japanese at the Kokoda Trail in September, their advance had been checked and the lifeline to Australia was assured. ${ }^{23}$ This required a modification of Allied strategy. As early as April 1942 the Combined Chiefs of Staff agreed that a limited offensive with two wings could be contemplated notwithstanding the Germany First Strategy. ${ }^{24}$ The western prong would be under MacArthur and drive up the New Guinea coast to the westward and thence along New Britain to threaten the great Japanese base at Rabaul from the west. Similarly, the Navy would drive up the Solomons chain to threaten it from the east. The great naval fortress was to then fall to the combined thrusts. ${ }^{25}$

After the Battle of Midway, the forces of both the South Pacific including the Cactus Air Force and those of the Southwest Pacific containing $5^{\text {th }}$ Air Force were directed in 'Phase II' to proceed westward to isolate and then capture Rabaul. The removal of that base would so undermine the Japanese position that it would permit the Allies to proceed on to later phases leading to the conquest of the Philippines or other objectives.

## Allied Air Forces in the Southwest Pacific: Campaign strategy, doctrine and forces

 Ideally, doctrine constitutes one input to air strategy. The $5^{\text {th }}$ Air Force Commander, Lieutenant General George Kenney, had been an instructor at the Air Corps Tactical School (ACTS) in the
# The Lightning pilots quickly learned to use those assets rather than engage in turning fights and the result was superiority 

late 1920s, and had managed the air attack course there. He had also served on the operations staff of the GHQ AF. It is clear from his operations that he applied the concepts later found in Army Field Manual (FM) 100-20 to his campaigns. Those concepts suggested that the strategist: collocate the air commander with the ground commander, deem air superiority as the first mission, see interdiction as usually next, then ground support (which can come earlier in case of a ground emergency), then reconnaissance and finally tactical airlift. ${ }^{26}$ Kenney was fully cognizant of the Industrial Web strategic bombing theory, ${ }^{27}$ but had little opportunity or equipment to apply it in his theater.

On the eve of Kenney's assignment as an instructor at the Air Corps Tactical School in 1927, one of his predecessors, William C Sherman published a book, Air Warfare, that was derived from his World War One experiences and his own service at the School during its formative times. In the work he is quite clear on the primacy of air superiority. ${ }^{28} \mathrm{He}$ asserted that pursuit existed to control the air and all the other air missions were dependent upon that control. In his next chapter, he describes 'attack' aviation and asserts that direct support of the troops in contact or as a substitute for artillery are certainly legitimate functions, but ones to be deemed exceptional. He asserts that the assignment of the command of aviation to the lower units of the Army gives away its primary virtue: the ability to mass its effects anywhere in the battle zone. Thus, it should be controlled in a centralized way and usually be used at places that artillery cannot reach. He had written all these things in the early 1920s at the School and published them commercially in 1926. He had been close to General Billy Mitchell and Thomas DeWitt Milling from the First World War onward.

At the Army War College in 1921, Mitchell spoke of the primacy of the air superiority mission and of direct air attack on enemy land and sea forces. He was explicit in calling 'auxiliary' air work to enhance the operations of the surface forces "secondary." ${ }^{29}$ In a 1923 lecture at the same school, Mitchell also dwelt upon the importance of centralized control of air forces by one person. ${ }^{30}$ Thus, the ideas expressed were common ones
inside the Air Service and Air Corps from 1918
forward, and George Kenney shared them. ${ }^{31}$

## Bombing experience prior to the campaign against Rabaul

Earlier in the War, the US Army Air Forces level bombers at Midway got no hits on the Japanese ships and the USN torpedo aircraft were slaughtered there. Through 1942 the SWPA and South Pacific operations against convoys were decidedly disappointing. According to B-17 pilot James T Murphy, who was there:
"The 19 ${ }^{\text {th }}$ Bomb Group . . . had arrived in Australia from the Philippines in March 1942, the same month the Navy brought General MacArthur by PT boat. Their bombing continued to be from altitudes above 25,000 feet. The percentage of their hits on Japanese shipping, however, was less than one percent of all bombs dropped." ${ }^{32}$

One $38^{\text {th }}$ Bomb Group wag, B-25 navigator Hollis Rushing, reminisced that he and his mates used to taunt the high-level B-24 crews by accusing them of helping the Japanese - by being unable to hit the Pacific Ocean and by killing so many fish with their bombs as to supply the enemy with food. ${ }^{33}$ Kenney's $5^{\text {th }}$ Air Force dive-bombers did little better and were quickly used up. On 29 July 1942, five out of a force of seven A-24s went down after they lost their escorts going across the OwenStanley Mountains and were caught by Zeroes. Only one got back to Port Moresby and the seventh was so badly shot up that it had to recover at Milne Bay. Nor did Kenney's level bombers get enough hits from medium altitudes. ${ }^{34}$

But during 1942, even though the European Theater had the first priority, $5^{\text {th }}$ Air Force did grow. In the beginning of the year, its fighter forces were largely composed of ragged survivors of the northern campaigns, largely P-40s. They were joined by some P-39s along with the P-400 which was the export version of the same aircraft. The lattermost was especially useful in close air support (CAS) because of its 20 mm cannon and many machine guns. But neither was as capable as the Japanese Zeros, though their inferiority was somewhat diminished as the Allied pilots learned not to engage in dogfights with the Japanese. ${ }^{35}$


Late in 1942, though, the older American and Australian fighters were joined by the twin-engine P-38 Lightning. That airplane was not favored in Europe as it was not quite competitive with the best German fighters, but its long range was a great asset out in the Pacific. ${ }^{36}$ Also, it was not as maneuverable as the Zero, but it had a higher speed, heavier armament and a high rate-of-climb as well as superior diving speed. The Lightning pilots quickly learned to use those assets rather than engage in turning fights and the result was superiority. In fact, America's leading wartime ace, Richard Bong, won all his victories in the Southwest Pacific in P-38s (40 kills), starting in the winter of 1942-43. ${ }^{37}$


General Kenney also served as the commander of Allied Air Forces, and the Australians made significant contributions to the outcome. They, too, were equipped with P-40s, along with A-20s and B-25s. But they also had a number of British designed Beauforts equipped for dropping torpedoes and Beaufighters armed with 20 mm cannons along with machine guns. ${ }^{38}$

All the way back to colonial times, a typical American response had been to seek technological solutions. In the SWPA, commanders deliberately and systematically sought technological and tactical innovations. As noted, Midway had also demonstrated that torpedo attack against well-defended ships could be highly dangerous. Later, an Army-Navy agreement had taken the USAAF out of the torpedo business in any event. Yet, we have seen that ships often could not be hit from altitude. The solution was to modify the B-25s and A-20s by removing the bombardier (and the lower turret in the case of the B-25) and installing as many machine guns as the space would allow all firing forward. This was rather a radical modification to be carried out under field conditions:
" . . . Knowing that replacements (for the guns of new Douglas A-20s that had arrived without their weapons) were not on the horizon, the mechanics of the 3d Bomb Group, under the supervision of Maj Paul 'Pappy' Gunn, went to work modifying their A-20s. To increase range, mechanics installed two 450-gallon

B-25 gunship and crew, New Guinea, 1943
fuel tanks in the forward bomb bay. The resultant loss of bombload was offset by inserting four .50-caliber fixed, forward-firing machine guns in the nose in place of the bombardier station. This package installation was a masterpiece of design and was eventually adopted throughout the Pacific, European, and China-BurmaIndia theaters. When these guns were combined with the remaining four fixed, .30-caliber fuselage guns, the A-20A became a potent strafing weapon." ${ }^{39}$

Similar modifications were made to some of $5^{\text {th }}$ Air Force's B-25s. Lieutenant Colonel Jarred Crabb provides one example. On taking his medium bomb group into combat he quickly found that it had very poor results from medium altitudes. He immediately prevailed upon General Kenney to make his unit one of those sent to Brisbane for modification into gunships. Crabb was sure that a 14-gun strafer would be much more effective than an unmodified bird. ${ }^{40}$

All the modifications and maintenance were done under trying conditions. Not only was the climate particularly deadly in generating extra maintenance requirements, but the European theater took priority for supplies and replacement aircraft. The distance from the US factories was another major factor - parts took 26 days to move from the West Coast to Australia. Moreover, once the aircraft arrived in theater, they required modifications just for openers. Most of the multiengine aircraft were flown over, and they came in a winterized condition suitable to the fight in Europe - but unsuited for the Southwest Pacific. Thus, before they could go into combat, they had to be dewinterized by removing the de-icing boots and other cold-weather equipment. Too, unlike the semi-permanent maintenance facilities in Europe, those in the Southwest Pacific had to move forward as the fight progressed northwestward. Though it was only a little help at first, Australia did have an airline industry and a budding aircraft manufacturing capability that grew in 1942 to where some of the time delays involved in shipment from the US could be avoided. Early in 1943, all of the drop tanks needed for the $5^{\text {th }}$ Air Force were being manufactured in Australia. Also of a little help was the deliberate salvage effort in the theater that was suffering substantial losses of aircraft. Teams were sent out into the jungles to


38th Bomb Group B-25 skip-bombing off New Guinea. Note bomb about to hit the water
recover the parts from airplane wrecks and came back with adventure stories all their own. ${ }^{41}$

The heavy fire forward on B-25s and A-20s could suppress the anti-aircraft fire (AAA) coming from ships long enough for the medium bombers to make a low-level attack in relative safety. Though all of the crews involved in this were commanded by American pilots, many had been fleshed out with Australians who brought a wealth of flying experience to the work. ${ }^{42}$ The tactical innovation was to use skip bombing instead of torpedoes in such attacks. ${ }^{43}$ Although it was to be the medium bombers that would use that technique in the Battle of the Bismarck Sea, B-17 pilots also developed it. As Fortress pilot James T Murphy described it in a mission to Rabaul on October 2, 1942:
". . . I then let down again; this time I broke out at 2,500 feet. Dawn was just breaking and I was fortunately flying east right into the sun . . . When Lombard and Hirsh, my bombardier and navigator both saw the huge transport about forty degrees off to our

# The training was so realistic that one B-25 was lost when its wing hit the mast of the wreck and two others received fragment damage from bombs that went off early 


#### Abstract

left, I dropped down and angled into the biggest ship I had ever seen. I had told Lombard to drop the four $1,000-$ pound bombs simultaneously when we reached the target. We knew we would have little time to get away at dawn. Everything around the harbor seemed to be firing at us. I had a good 20-second run, straight and level. The bombs went exactly as we hoped - one hit the ship directly, with the other three very close to it. Major fires broke out all over the ship. The results were fantastic. I had hit a $15,000-$ ton transport . . . On that mission, I received a number of holes in the wings and tail. At 2,000 feet, we just couldn't miss! Four ships were sunk that night. Extremely low-altitude bombing was dangerous, but it worked!" "


## The South Pacific theater campaign

Meanwhile, on 7 August 1942, the Marines had landed far to the east at Tulagi and Guadalcanal in an effort to head off the establishment of a Japanese base there. The entire object of that campaign was to deny the Japanese an airfield they had started in Guadalcanal and to establish one on the same site for the Allies - which became Henderson Field. The Japanese air threat was still serious enough that the American carrier that was supporting the amphibious assault pulled out on D+2,55 and the amphibious vessels themselves were withdrawn soon after - without having completed the unloading of the equipment and supplies belonging to the stranded Marines.

It came to be one of the bloodiest and most hard fought campaigns of the Pacific War, and the first couple of weeks were especially bad. The Marines were devoid of air cover, and it was only on the $20^{\text {m }}$ of August when the first land-based air units arrived at Henderson Field. The Japanese had begun to build the field, but the Marines using captured Japanese hand tools to a large extent, completed it even while under enemy fire. From the beginning, there were airmen from the Marines, the Navy and the Army Air Forces all operating at Henderson. During the Guadalcanal part of the Solomons Campaign, USMC Brigadier General Roy S. Geiger led what came to be called The Cactus Air Force, but later Army Air Force and Navy officers assumed command at different times - and with little complaint from any quarter. ${ }^{46}$ Some of his units had been supplied by AAF General Millard Harmon and others came from

Admiral John S McCain and they all fell under the control of USMC General Alexander A. Vandegrift and did what had to be done with little or no controversy. All the aviation gasoline had to come in by 50 (55) gallon drums. The fighters were using 20,000 gallons a day, all of them wrestled ashore by hand by the combat troops and then pumped into the aircraft by hand. The AAF was staging about 15 B-17 missions per month through Guadalcanal that fall, and those missions had to be provided 20,000 drums of fuel by the same methods until docks and storage tanks had been built in December, 1942.4 By the end of the year, the battle was pretty well won and Army troops were brought in to relieve the battered Marines. ${ }^{48}$

Technological solutions are often important factors, but seldom are sufficient in themselves. Time and again, training has also proven to be a decisive factor in air war. As the Guadalcanal Campaign wound down, MacArthur and Kenney quickly understood that the Japanese would be free to concentrate their forces in New Guinea - if they could move them there by water. ${ }^{49}$

## Southwest Pacific area plans, preparations, and preliminary operations

Thus, once the above technical innovations had been conceived and tested, the $5^{\text {t }}$ Air Force spent a considerable part of the fall training crews against the old German shipwreck SS Purth outside Port Moresby. Much of this done by the B-25 crews of the $90^{\text {h }}$ Bomb Squadron without the bombardiers they had been used to. They soon found that they could get superior accuracy from merely flying at masthead height aiming directly at the ship instead of skipping the bomb. The training was so realistic that one B-25 was lost when its wing hit the mast of the wreck and two others received fragment damage from bombs that went off early. The B-25s attacked in pairs with one strafing and the other strafing and bombing. They used objects on the nose of their airplanes as references for aiming. The crews flew as fast as they could and maneuvered while inbound to throw off the aim of any gunners with enough courage to stand up to the strafing. ${ }^{\text {s0 }}$ The final dress rehearsal was flown on 28 February 1943. General Kenney himself narrated that while the all-out coordinated attack would strike the convoy,
a vital part of the initial plan also aimed a classic offensive couterair attack:
" . . . The combined attack would be covered by all the $P$-38s we could put in the air. In the meantime, to cut down the Jap fighter cover as much as possible, we would attack Lae with all the shorter-ranged aircraft. I also told him (MacArthur) that I expected to have at least one full-scale dress rehearsal of the combined show run off during the next day or two ... ${ }^{51}$

The purpose was to repress the Japanese fighters on the ground at their fields around Lae so that they could not interfere with the Allied assaults on the inbound Japanese reinforcements. The Japanese had planned a similar counter-air attack on the Port Moresby fields as the convoy was getting underway, but just could not generate the air forces for that. ${ }^{52}$ The $5^{\text {th }}$ Air Force commanders knew that large convoys would come, and they were determined that their own airmen would be ready for them.

Modern theories of military affairs argue that neither technological change nor doctrinal adjustment is often decisive without organizational adaptation as well. In the $5^{\text {th }}$ Air Force case, Kenney remained in Australia coordinating with the ground commander and taking care of the administration. Kenney apparently had the confidence to trust his subordinates just as MacArthur seems to have left the air war largely in Kenney's hands. ${ }^{53}$ Kenney in turn put the operations into the hands of the commander of the advanced echelon, Brigadier General Ennis C Whitehead. ${ }^{54}$ Later they further organized air task forces assigned to specific operations and equipped them accordingly. One example was the Buna Air Task Force established to protect that base and the nearby Dobodura airfield. During its tenure, many of the $5^{\text {th }}$ Air Force squadrons rotated in and out of Dobodura for the purpose. ${ }^{55}$

In fact, the experience of the Buna Air Task Force offers some fine precedents for the recent USAF switch from its long-standing forward deployed modus operandi to an expeditionary organization and process. The airfield preparation at Dobodura began even before Buna was completely subdued, and the Task Force was activated the day after
the Battle of the Bismarck Sea was over. It was deployed over the mountains under the command of then-Colonel Frederick Smith and a microscopic staff. Within two days, they had a headquarters up and running complete with the necessary communications. The Task Force set up on the banks of the cold Samboga River for easy access to water for bathing, and with purification, for drinking. There was a handy grove of coconut trees to shelter the tents and the headquarters building. Significantly, the Buna Air Task Force mission was stated as: " . . (1) air superiority . . . (2) the enemy line of communications would be interdicted, (3) direct attack support for allied ground forces, and (4) airborne transportation and supply . . ${ }^{56}$

There was then and long after a need to move fields forward into undeveloped areas to get closer to the war so as to bring more enemy targets into range, to improve the timely response for ground support, and to facilitate higher sortie rates. But once across the high mountains, the effectiveness of radio communications was diminished. But even more important, the quality of the command and control was also reduced. Thus, Kenney and Whitehead thought it necessary to install a leader with the talent for good decisions nearer to scene of the action and yet not burden him with the administrative trivia that was certain to haunt the headquarters further back at Port Moresby and Brisbane. ${ }^{57}$

As noted, the Americans had been reading the Japanese codes for some time, and were quite aware that the enemy was giving up on Guadalcanal and concentrating on New Guinea. The Japanese had been repulsed in their attempts to take Port Moresby first at the Battle of the Coral Sea, and then by their frustration on the Kokoda Trail across the Owen-Stanley Mountains. Once that latter offensive was defeated, the Allies drove on up to the north coast and during early 1943 managed to dislodge the enemy from Buna. ${ }^{58}$ They did all this with the heavy use of aerial re-supply and the rapid construction of forward air fields; however, MacArthur's battered divisions were in no shape for an early resumption of the ground offensive. ${ }^{59}$

A participant of the campaign, USAAF Colonel Frederick H Smith, explained that the Allies were
aware through reading the codes that the Japanese were intent on reinforcing their ground units in New Guinea. ${ }^{60}$ On the 25 February, General Kenney read a decrypted message in General MacArthur's office. It showed him that the prospective convoy would triple Japanese strength at Lae were it to get through from Rabaul.. ${ }^{61}$ One convoy had indeed gotten through to Lae and Salamaua in January 1943 albeit with substantial losses. ULTRA authority Edward J Drea confirms that decryption revealed that difficulty had not dissuaded the Japanese and they were planning to send another major convoy in early March with most of their 51* Division embarked.

They were fully aware of the dangers from Allied airpower, but they could not land the troops outside Allied air range. The jungle terrain was simply too impassable to permit a substantial march overland of the entire division. The Japanese were therefore ready to accept the losses of some to get the rest through to Lae. ${ }^{62}$ In addition to their other motivations, the enemy had the lure of Wau, only 30 miles inland from Lae - but with no roads thence. Not only were there gold mines at Wau, but more importantly the town had been serviced entirely by air since the 1920 s and it had a good airfield that could be used to threaten Port Moresby, only 150 miles across the mountains. The Australians had been defending the place for some time, but they would not be able to hold out against the reinforcements the Japanese were trying to send in. ${ }^{63}$

Meanwhile, USAAF B-17s based in Australia had long been staging through Port Moresby to do reconnaissance and bombing at the harbor at Rabaul with some significant results. The Allied fields at Port Moresby and north of the formidable Owen Stanley Mountains were being developed at a very rapid pace. Until 1943, the heavy bombers (B-17s and B-24s) were based in Australia, but by February new facilities were being set up for them around Port Moresby. The bases north of the mountains were then to support the medium bombers and the fighter units. The latter fields had been taken by troops delivered by aircraft
and supplied by air as well. ${ }^{\epsilon \top}$ There were constant competing demands for materials and engineering labor, and their development were a priority and large time sink for General Whitehead. The waters north of New Guinea were full of coral reefs and largely uncharted so that logistics by sea were not feasible at first. Even the heavy construction equipment had to be brought over by air in airplanes not very well suited to the task. ${ }^{65}$

Battle of the Bismarck Sea: Day One, 28 February 1943: The Japanese deliberately planned to make their deployment by seaborne convoy during a very bad weather period so as to hide from Allied airpower beneath the clouds. (The US had not yet deployed many radar-equipped aircraft to the theater.) Too, their destination was still uncertain for they might have landed west of the Vitiaz Straits or turned through them toward Lae around the Huon Peninsula. Alternative routes were along the north or the south coasts of New Britain, either to be covered by fighter patrols out of bases on that Island. ${ }^{66}$ Notwithstanding the decryption it was thus essential that long-range air reconnaissance spot and track the convoy at the earliest moment possible so as to confirm the route and determine the destination. In fact, Admiral Shofuku Kimura selected the northern option not only in the hopes of weather coverage, but also to keep his enemies concerned that he might turn West toward Wewak rather than east towards Lae. ${ }^{6}$ The Allied commanders wanted the Japanese to know they were under aerial surveillance. That might reduce the chances that the enemy would suspect that his codes had been broken and change them at an awkward moment. ${ }^{68}$

Battle of the Bismarck Sea: Day Two: 1 March 1943: The Japanese convoy of 16 ships had departed Rabaul Harbor at midnight on the 28th. A $5^{\text {th }}$ AF B- 24 crew commanded by Lieutenant Walter Higgins got a glimpse of it about 1500 through the murky weather on the 1st of March, and it was clear that the route was along the north coast of New Britain and that the heading was in the direction of New Guinea. ${ }^{.9}$ The Japanese listened to Higgins' radio report back to Port Moresby in a way playing into Kenney's hands. But whether Kimura's convoy would turn left through the Vitiaz Straits or right along the north shore of New


B-24 Liberators arrive in New Guinea shortly before the Battle of the Bismarck Sea. They featured in the rest of the campaign to isolate Rabaul

Guinea remained uncertain. Attempts were made at bombing the convoy with B-17s on the 1st, but the results were limited.

Battle of the Bismarck Sea: Day Three: 2 March 1943: The weather continued to offer the enemy convoy some protection, and it was still out of range of $5^{\text {th }}$ Air Force medium bombers and fighters. But it had been tracked and harassed with occasional bombs through the night by an Australian Catalina piloted by Flight Lieutenant Terry Duigan, and additional raids by B-17s were launched that day. ${ }^{70}$ Unlike the $8^{\text {th }} \mathrm{AF}$ operations in Europe, they bombed from medium altitudes around 8,000 feet and without escort. They did so without losses notwithstanding Japanese fighter escort and did indeed get hits on three ships, one of which went to the bottom. ${ }^{71}$ Partly because of the murky weather and partly because of the natural inaccuracies of crew reports in the heat of combat, the feedback to the commanders on the exact size of the convoy and the bombing results was uncertain and characterized by conflicting reports.

Battle of the Bismarck Sea: Day Four: 3 March 1943: During the wee hours of the fourth day, the Australians launched some torpedo-equipped Beauforts and though they found the convoy, their attacks did not add any damage. But after the dawn, the Allied prayers were answered. Not only had the Japanese made the desired left turn and sailed into the range of the medium bombers, but also the weather cleared - an unusual event for the region. Further, during the night the Japanese commander had circled about some to incur a delay so as to arrive at Lae at a time he deemed better - a bad mistake according Lex McAulay. ${ }^{72}$ The convoy was then to be caught off shore rather than under the protection of the AAA guns of the Japanese installation on the beach. The local enemy airfields had been largely shut down. The Allied rehearsed operation was launched with little interference and mayhem was worked. About 120 airplanes were involved in the morning strike. Most of the strike aircraft were still based across the mountains. The rendezvous for the entire morning force was made at 0930 over Cape Ward


Hunt, just a few miles northwest of Buna. They departed the Cape on a northeasterly heading and soon found the convoy. While around 35 fighters patrolled above protecting the strike aircraft below, Australian Beaufighters led the parade against the convoy firing their four $20-\mathrm{mm}$ cannons and four machine guns as they approached the Japanese at extremely low altitudes. Their purpose was to clear the enemy decks of anti-aircraft gunners and to concentrate on the bridges of the ships to kill the officers and especially the captains. The Japanese made a mistake. Though we have seen that the Beauforts had a little earlier missed with all their torpedoes, they may nevertheless had done some good. Now, the Japanese skippers apparently thought they were under torpedo attack again and they turned bows on toward the Beaufighters. They wanted to present the narrowest possible targets to the expected torpedoes. That was exactly the wrong move. ${ }^{73}$

By presenting their bow instead of their beam to the Australian flyers, they enabled the Beaufighters to more easily rake the whole length of the ship. One Australian afterward commented that he was caught in a shower of drop tanks as did the inbound pilots of the 3d Attack Group. The American P-38 Lightnings had been sent in high to engage the Japanese escort fighters to prevent the latter from descending to attack the low-level
bombers and Beaufighters. As the P-38s closed in on the Zeroes above, they had discarded their drop tanks to improve their own agility but unknowingly endangered their allies and countrymen flying below.

A 'lesson' learned by the Japanese at Guadalcanal had been that American bombers attacked from high altitudes - and it happened to be the wrong lesson here. They found the P-38s up there, but the bombers and Beaufighters had a relatively free ride far below. ${ }^{74}$ Another Australian pilot remarked that when he looked outside he found that one of the American low-level bombers had arrived a tad early, and launched a 500 lb skip bomb that was zooming alongside practically in formation with his airplane! ${ }^{75}$ The B-17s were bombing from atop. The conventional B-25s were bombing from a slightly lower level. The 3d Group B-25 gunships and the A-20s were coming in low with their forward guns blazing.

Major Ed Larner led an eleven ship B-25 3d Group squadron, attacking almost simultaneously with the Beaufighters. About five miles out, he ordered a peel off, but as he approached his target, he found that he still had some of his mates on his wing. He came up on the radio and chased them off after their own targets wanting his own victim to himself. The Japanese were completely

# The lifeboats and rafts were shot up and the blood in the water attracted numerous sharks to make the nightmare all the worse 

surprised with the low altitude technique, and the American crews claimed that close to half of their bombs were hitting the ships. The lowlevel attack denied even the destroyers the time to evade the falling bombs. A few aircraft were troubled by faulty bomb racks that did not release their weapons as they crossed their targets. But they nonetheless sprayed the ships with their .50 calibers causing secondary explosions and deck fires - and then flew around for additional passes until their ammunition was exhausted. The Japanese fire was largely ineffective but it did shoot out the hydraulic system of one B-25, thus reducing it to using emergency procedures to get the landing gear and flaps down and to brake the aircraft after landing. The lieutenant in command took it back across the mountains, and crash landed at 7-mile air strip. Three of the crew members did survive though the top turret gunner did not make it. ${ }^{76}$ Another B-25 crew was luckier when it returned with a dent in its right wing — made by colliding with a ship's mast. As Major Larner himself was leaving the scene, a Zero got on his tail. However, his tail gunner drove off the enemy with his twin .50 caliber guns. Larner and his crew would live to lead a second strike. ${ }^{77}$

Amidst all this, a B-17 piloted by First Lieutenant Woodrow W. Moore was shot down and seven of its crewmembers bailed out. The Zeros followed the parachutes down, and gunned the Americans to death as they descended - all this in the plain sight of many of the Allied airmen. ${ }^{78}$ Many of the
strike aircraft did not go back over the mountains to the home field. Instead, they landed at a couple of new servicing strips around Dobodura. There the $480^{\text {h }}$ Service Squadron was in place to refuel and rearm the force - and did so in time for the second strike takeoff at 1300. Again rendezvousing above Cape Ward Hunt, they were soon again on the scene to finish the job. There were not many Japanese cargo ships left, so the remaining ammunition was expended against the survivors in the water.

Between the first attack and the return engagement the same afternoon, all of the surviving Japanese transports had been hit, and only one was still afloat. Four of the eight escorting destroyers had also been sent to the bottom. ${ }^{79}$ But again, the reports coming back from the heat of battle were confused and exaggerated. As complete as the victory was, Generals MacArthur and Kenney both issued early statements on the damage that were soon shown to be overstated. That was unfortunate because the true results were certainly glorious enough to satisfy everyone.

Aftermath: 4 March and beyond: The last Japanese transport was sent to the bottom that night by a US Navy PT boat. ${ }^{80}$ In the meantime, the whole afternoon of the 3 d had been spent in gunning down the Japanese survivors in the water. Some felt that this was in reaction to the killing of the B-17 parachutists that day, but perhaps it would have happened anyhow. The lifeboats and rafts

B-25 bombers based in New Guinea send a Japanese Freighter to a watery grave, 1943


# Admiral Yamamoto had sent many of his naval aviators who had survived Midway and the Coral Sea to the Solomons and New Guinea (without their carriers). Few of them ever came back 

were shot up and the blood in the water attracted numerous sharks to make the nightmare all the worse. ${ }^{81}$ The massacre was so bloody and complete that some Allied crewmembers later confessed to becoming nauseous during the work. Even the B-17 crews went as low as fifty feet to participate in the strafing of the survivors. But the Allied airmen felt they had to do it as the Allied ground troops were in a tough spot and every enemy that managed to get to shore would only make it more desperate. ${ }^{82}$ In the end, only about 800 of the 6,000 or so people embarked ever made it to Lae. The other survivors were picked up by the remaining destroyers and were all returned to Rabaul leaving their compatriots in New Guinea in a bad way.

## Battle effects and implications

The initial feedback to the commanders came from the air crew reports. Such data is almost always inaccurate, and usually exaggerated. This was all the more so in this case because of the weather, smoke, and many aircraft involved. The Third Bomb Group history of 1945 was clear in asserting that the convoy size was variously reported by its crews as 16,22 or 23 ships - and that all had been annihilated. ${ }^{83}$ Both General MacArthur and General Kenney quickly latched on to the most optimistic reports and issued them to the public. Some of them had placed the count of the ships in the convoy far above what it actually had been, and turned in highly inflated claims of the number sunk and the numbers of casualties put upon the enemy. This was unfortunate for the airmen because accurate feedback was soon had through ULTRA intelligence, and that yielded the true results. ${ }^{54}$ Those were great enough to satisfy anybody, to be sure, but the Southwest Pacific Area leaders having made higher claims went into their defensive modes and refused to adjust them downwards. Partly because of interservice rivalry, those assertions were credibly disparaged and the luster of the achievement was unnecessarily diminished.

Dr Donald M Goldstein, an authority on the Battle of the Bismarck Sea, did a detailed analysis of the outcomes before some of the information about decryption had been declassified. ${ }^{85}$ More recently Kenny biographer Thomas Griffith, writing after the existence of ULTRA had been declassified,
generally concludes along similar lines as follows. The real Japanese losses amounted to an annihilation of all the transport ships in the convoy as well as half of the warships in its escort. Though about half of the people embarked were lost and only 800 made it to Lae, the claims had asserted more than twice as many Japanese were lost than was actually was the case, about 3,000 perished. Some claims rose as high as 22 ships sunk, but the actual total was 12. Soon after the War was over, the information already acquired by ULTRA was confirmed by interviewing the survivors. It was nonetheless a very lopsided victory. The Americans lost a total of five airplanes. One B-17 and three P-38s shot down and one B-25 lost to a landing accident. The wisdom of developing the bases like Dobodura north of the mountains was demonstrated in that several of the B-25s and P-38s damaged in combat, and other aircraft facing the deteriorating weather along the mountains were able to recover there safely. The Australian Air Force came through without any combat losses, but one Beaufighter was destroyed in an accident. ${ }^{86}$

The Japanese had already been checked in the Solomons by having been driven out of Guadalcanal. After that, they had the hope of concentrating the surviving forces in New Guinea and reversing the tide against MacArthur's wing of the drive toward Rabaul. But the destruction of their convoy bound for Lae marked the turning of the tide for good. Potentially, they would have been superior on the ground had they landed. But the experience was more evidence that air superiority was absolutely essential to success on the surface. Worse, the fight completed a process begun at Midway and Guadalcanal. Admiral Yamamoto had sent many of his naval aviators who had survived Midway and the Coral Sea to the Solomons and New Guinea (without their carriers). Few of them ever came back, and the experience level of the Japanese air forces was driven so low that it never had a chance to recover. Air superiority had been permanently yielded to the Allies. ${ }^{87}$

Though the battle was more akin to interdiction than to strategic bombing, it did have some implications for the latter role of airpower. The hard knocks for the strategic bombing campaign air advocates that 'boots on the turf' may not always be necessary to success
in Europe were still in the future. The B-17s and B-24s operating in the South and Southwest Pacific did so with reasonable safety, and did it at a lower altitude than was being used in Europe. It was thus easier to get hits on precision targets and to return with acceptable losses than it was to be in the campaign against Germany. In hindsight, the limited ability to hit small, moving targets from high altitude did have implications for the theories of high-altitude, daylight, precision bombing. But the strategic bombing was just getting rolling out of England, and there was not enough cross-flow of information from the Pacific to yet stimulate serious doubts about the precision part of the theory. In any event, the German ground-based air defenses were so much more formidable than the Japanese to the bitter end that going to low altitudes over Germany was not a practical option until 1945 and even then it was highly dangerous. Thus, there was not yet much to call the basic industrial web theory into question.

Much of what has been written on the campaign in North Africa at the same time implies that the US Army Air Forces were ignorant of effective tactical air doctrine and that they had to be taught the basics by the RAF and the enemy Luftwaffe. The Battle of the Bismarck Sea came just a couple of weeks after the Battle of Kasserine Pass in North Africa. It occurred several months before the 'lessons' of the tactical air campaign in North Africa were codified in Field Manual 100-20. Yet, the campaign as practiced by Kenney and Whitehead certainly was conducted according to the precepts later expressed in 100-20. ${ }^{\text {s8 }}$ The point is that those notions were not at all peculiar to Africa and therefore did not arise during World War II from the RAF or the Luftwaffe. Rather, they were ideas that had been well understood by the Air Service and Air Corps leadership during the interwar period - and none more so than General Kenney who had taught the tactical air part of the curriculum at the Air Corps Tactical School. Clearly, Kenney and most other folks thought that air superiority was paramount and acted accordingly. Back in the 1920s, both Giulio Douhet and General 'Billy' Mitchell thought that air superiority was paramount and a prerequisite for all other operations. They differed in method
though, for Douhet thought that it might be best achieved by killing enemy airpower on the ground. Mitchell and most other Americans of the day felt that it would be best achieved by some combination of an air battle and an attack on enemy airpower assets on the ground. Major General Jarred Crabb who was a unit commander under Kenney during the New Guinea campaign, made it clear that his boss was at one with Mitchell on the notion. Offensive counterair operations against enemy airfields had been a major element in Kenney's campaign - though the leading American air-to-air ace of the entire war, Richard Bong, fought in $5^{\text {th }}$ Air Force P-38s. ${ }^{89}$

The traditional next priority for airmen has been interdiction, and the battle of the Bismarck Sea itself and the favorable postwar judgment of the official Army history of the $5^{\text {th }}$ Air Force's contribution in that regard during the Buna Campaign both support that notion. Finally, the next priority for airmen has usually been close air support, and that is the one area of air operations that the cited Army history found disappointing. ${ }^{90}$ It is certainly true, though, that CAS is inherently more difficult (and less useful) in trackless jungle terrain than in more open areas. But the point remains that neither Kenney nor Whitehead could have learned their trade from the RAF or the Luftwaffe. ${ }^{91}$

Since the end of the Cold War, the USAF especially, has found it necessary to reduce its dependence on forward basing on a semi-permanent basis. Instead, it has implemented a doctrine of the Expeditionary Air Force. That requires a large part of the force to be based centrally in the continental US ready to deploy to whatever troubles arise in unpredictable locations. ${ }^{92}$ The recollections of the aviators in the Southwest Pacific make relevant readings. Most of the practice deployments lately made by the Air Force have been made either to open Middle East locations or to the Korean Peninsula. The problems faced in jungle locations by people like Perry Dahl and Danforth Miller were quite different, and examining them would be a useful practice for the modern air-warrior. Were trouble to arise in a place like New Guinea again, the challenges of the deployment, basing, maintenance of machines and the health of the airmen, sustaining combat
sortie rates in primitive conditions all would be significantly different from those faced by our forces in the Persian Gulf today. ${ }^{93}$

It is probably fair to say that the experience in the Southwest Pacific showed that combined operations could go fairly smoothly as they were less difficult than they were with the British in North Africa. Certainly they were far less difficult than they were between the Germans and the Italians. A common language was certainly a facilitator, and the disparity in numbers and resources among the allies in the Southwest Pacific may have made it easier than it was with the British. Still, there was chagrin between nations, and both Kenney and MacArthur were a little rough with Australian national pride (as had been the British for a long time). ${ }^{\text {a }}$

Very bad relations between the US sea and land forces had characterized the interwar period. In the Southwest Pacific Area MacArthur had his difficulties in this regard as he could not get the degree of support he thought he had coming from the Navy: certainly he did not have the naval resources that Halsey was enjoying in the campaign up the Solomons. ${ }^{95}$ But the distances between objective areas in New Guinea were less and could usually be covered by land-based fighters, which eased the problem some. Too, the Navy had taken some major losses in the Solomons, it did not have abundant resources left, and the situation was ever more perilous for naval forces the further west they traveled. When Admiral Nimitz felt he could not risk the remaining carriers in that region, he did recommend that MacArthur be provided with more land-based aircraft. ${ }^{6}$

Before the War, the Air Service's relationships with the Army ground forces were not as bad as with the Navy, but still were bitter. A major achievement by General Mason Patrick had been to extract a concession from the General Staff that sometimes it might become reasonable to run an independent air campaign before the ground forces had been mobilized and made contact. ${ }^{97}$ A good case could be made that here was an example in both New Guinea and the Solomons of the air being the supported force and the land units being the
supporting. ${ }^{98}$ The Battle of the Bismarck Sea was sure to stimulate ideas among air advocates that 'boots on the turf' may not always be necessary to success. ${ }^{99}$ But it was easy for the bomber airmen to forget that without ground force support (and airlift service) in the capture of bases north of the Owen-Stanley Mountains, the Battle would not have been possible. Too, the smashing victory was to some extent due also to good fortune and Japanese mistakes - like clearing weather at an opportune time, and perhaps the Japanese tarrying during the night of 2-3 March and then being caught in open water rather than in the vicinity of Lae with its ground defenses.

Certainly the Campaign against Rabaul is a prime candidate for illustrating the idea that information superiority can be a decisive factor if not the dominant one. According to Whitehead biographer Donald M Goldstein, the information that MacArthur, Kenney and Whitehead had via decryption was absolutely essential to the lopsided outcome in the Bismarck Sea and indeed that in turn had major strategic effects. ${ }^{100}$ Aerial reconnaissance and coast watching had also been important, but the Allies could not have operated with the vigor and confidence they had without ULTRA. The current interest in Information Warfare has important precedents in the Battle of the Bismarck Sea - and long before that.

A large part of the prewar controversy had been related to the issue of command and control. Were air forces to be subordinate to the ground unit commanders at the corps level and even below, or was the command to be centralized at the theater level reporting only to the theater commander? The success of both the Solomons and New Guinea Campaigns plus the relative authority of the air commanders in both theaters suggests that the current AF doctrine that the air campaign should be centrally controlled at the theater level by an airman has important precedents in these campaigns, among others. Yet, neither Kenney nor the various air commanders in the Solomons had a legal status making them equal to and independent of the land or sea commanders which suggests that unity of effort may sometimes be possible without unity of command - through cooperation. Desperate circumstances seem to be

## conducive to such unity of effort. ${ }^{101}$

The famous American naval theorist, Admiral Alfred Thayer Mahan had long ago preached that command of the sea, once achieved, would enable all other operations. This could be best achieved by a great sea battle between the battle lines of the contending navies. The Battles of both the Coral Sea and Midway had already suggested that such a battle may not be necessary after all - that aircraft might command the surface as well as the air. Both the Solomons and New Guinea Campaigns certainly further suggested that important results can be had without the great sea battle and also that where there are land bases available, command of the sea can be achieved by airpower.

In the end, the effect of personality can be vital. Forceful yet cooperative personalities can operate under austere conditions with inadequate forces, and flawed doctrine and yet prevail. Yet, others much better fixed with the implements of war can fail through personality quirks of many kinds. Kenney was a forceful, intelligent and industrious man. The way in which he stood up to MacArthur's Chief of Staff Major General Richard Sutherland said something about his leadership. Sutherland tried to micromanage the affairs of Fifth Air Force, but Kenney successfully prevented that. Yet he practiced what he preached and trusted Whitehead leaving the latter to make his own decisions. That might not have worked with many other leaders. Kenney and Whitehead both had a deserved reputation for innovation and it served them well in the Southwest Pacific. MacArthur, too, for all his ego, seemed capable of leaving enough authority to Kenney to permit an intelligent campaign to be run. ${ }^{102}$ For all of Halsey's bullish reputation, he found it possible to get along with MacArthur when many others could not and the two cooperated with one another in an important way. In the end the fit was adequate to see the US and her allies through to a substantial victory at the Bismarck Sea that may fairly be seen as a turning point. It was, in fact, so recognized at the time. Piercing the Fog, the new and authoritative history of air intelligence in World War II, records that General Kenney had to take off for a Washington conference the day after the battle ended. The news preceded him to the effect that
both Generals Henry Arnold and George Marshall himself met the air commander at the airfield-a clear recognition that the war in the Southwest Pacific was no longer a backwater. New supplies of aircraft were soon inbound to $5^{\text {th }}$ Air Force's theater. ${ }^{103}$

The fate of the Japanese at Rabaul was sealed. Though there was much hard fighting ahead, the twin thrusts so isolated the fortress that it was unnecessary to capture it. Rather, it was neutralized and in effect became a prison camp for tens of thousands of Japanese who were left to waste away.

## Notes:

${ }^{1}$ This paper is a derivative of my article on the same subject that appeared in the summer 2003 issue of Military History Quarterly. I wish to thank the editor, Colonel Rod Paschall, USA, (Ret.) for his kind permission to use the similar paper at the SMH Conference in advance of its publication. I also owe thanks to my colleagues, Colonel Thomas Griffith, Dr. Richard Andres, Professor Dennis Drew and Dr. Dan Mortensen who reviewed the manuscript and helped me improve it; its remaining faults are my own responsibility.
${ }^{2}$ John B. Lundstrom, The First South Pacific Campaign, (Annapolis, MD: Naval Institute, 1976), 5.
${ }^{3}$ Henry I. Shaw, First Offensive: The Marine Campaign for Guadalcanal, (Washington: Marine Corps Historical Center, 1992), 1; Lex McAulay, Battle of the Bismarck Sea, (NY: St Martin's, 1991), 3.
${ }^{4}$ Lundstrom, First South Pacific Campaign, 28; McAulay, Battle of the Bismarck Sea, 9-10.
${ }^{5}$ On the naval limitations see Ronald H. Spector, Eagle Against the Sun: The American War Against Japan, (NY: Vantage, 1985), 20-21; Spector, At War at Sea, (NY:Penguin, 2001), 1.
${ }^{6}$ US, Strategic Bombing Survey, Military Analysis Division, No. 71, Air Campaigns of the Pacific War, July, 1947, 14; Spector, At War at Sea, 193; Mark R. Peattie, Sunburst: The Rise of Japanese Naval air power, 1904-1941, (Annapolis, MD: Naval Institute, 2001), 174-75; McAulay, Battle of the Bismarck Sea, 5.
${ }^{7}$ William Manchester, American Caesar: Douglas MacArthur, 1880-1964, (NY: Dell, 1978), 339; Earl Hinz, Pacific Island Battlegrounds of World War II, (Honolulu, Hawaii: Bess Press, 1995), 44; Spector, At War At Sea, 219.
${ }^{8}$ Shaw, Guadalcanal, 32; Samuel Milner, U.S. Army in World War II, The War in the Pacific, Vol. 7, Victory in Papua (Washington: U.S. Army, 1955, 1989), 372; George C. Kenney, Dick Bong: Ace of Aces, (Washington: Zenger, 1960), 20.
${ }^{9}$ Samuel Eliot Morison, History of United States Naval Operations in World War II, Vol. IV, Breaking the Bismarcks

Barrier, 22 July 1942-1 May 1944, (Edison, NJ: Castle Books, 1950), 30-32; Shaw, Guadalcanal, 1.
${ }^{10}$ Shaw, Guadalcanal, 17; Peattie, Sunburst, 182; Lieutenant Colonel Danforth Miller is only one of many who comment on the great services of the coastwatchers and their native assistants, Interview, Danforth Miller with David MacIsaac, 29 January 1975, Air Force Academy, CO, USAF Historical Research Agency (herinafter HRA) Oral History Number K239.0512-923, 38.
${ }^{11}$ Ronald H. Spector, Eagle Against the Sun: The American War with Japan, (NY: Vantage, 1985), 42.
${ }^{12}$ Spector, Eagle Against the Sun, 35.
${ }^{13}$ Charles A. Willoughby and John Chamberlin, MacArthur, 1941-1951, (NY: McGraw-Hill, 1954), 109; Lundstrom, First South Pacific Campaign, 24-5, 40.
${ }^{14}$ Spector, Eagle Against the Sun, 38.
${ }^{15}$ Shaw, Guadalcanal, 21.
${ }^{16}$ Richard L. Watson, Jr., The Fifth Air Force in the Huon Peninsula Campaign, January to October, 1943, Historical Studies, United States Army Air Forces, 1946, Copy in Air University Library, No. M-U, 27218, No. 113, c1, p. 10.
${ }^{17}$ Lundstrom, First South Pacific Campaign, 6.
${ }^{18}$ Henry Sakaida, The Siege of Rabaul, (St Paul, Minnesota: Phalanx, 1996), 8.
${ }^{19}$ Thomas B. Buell, The Quiet Warrior: A Biography of Admiral Raymond A. Spruance, (Annapolis, MD: Naval Institute Press, 1974, 1987), 167-68.
${ }^{20}$ Edward S. Miller, War Plan Orange: The U.S. Strategy to Defeat Japan, 1897-1945, (Annapolis, MD: Naval Institute Press, 1991), entire work; Stephen R. Taaffe, MacArthur's Jungle War: The 1944 New Guinea Campaign, (Lawrence, KS: University Press of Kansas, 1998), 8.
${ }^{21}$ Salvatore A. Angelella, A Prototype JFACC: General George
C. Kenney, unpublished masters thesis, School of Advanced Airpower Studies, 1994, 7; Lundstrom, First South Pacific Campaign, 58.
${ }^{22}$ Taaffe, MacArthur's Jungle War, 10, 17; Manchester, American Caesar, 381; MGEN Donald Wilson, interview by Hugh Ahmann, 10-11 December 1975, HRA Oral History No. K239.0512-878, Maxwell AFB, AL, 204.
${ }^{23}$ General Frederick H. Smith, Jr., interview by James C. Hasdorff, 6-8 June 1976, San Antonio, Texas, copy in Air Force Historical Research Agency, No. K239.0512-903, 51; Hinz, Pacific Battlegrounds, 45-6; McAulay, Battle of the Bismarck Sea, 6-7; Kenn C. Rust, Fifth Air Force Story . . . in World War II, (Temple City, CA: Historical Aviation Album, 1973), 5; Richard L. Watson and Kramer J. Rohfleisch, The Crisis in the South and Southwest Pacific, in Wesley Frank Craven and James Lea Cate, The US Army Air Forces in World War II, Vol. 4, The Pacific: Guadalcanal to Saipan, (new imprint, Washington: Office of Air Force History,
1983), 23.
${ }^{24}$ US, Strategic Bombing Survey, Military Analysis Division, The Thirteenth Air Force in the War Against Japan, No. 69, 30 September 1946, 1; Taaffe, MacArthur's Jungle War, 10.
${ }^{25}$ Thomas E. Griffith, Jr., MacArthur's Airman: General George
C. Kenney and the Air War in the Southwest Pacific in World War II, (Ph.D Diss., University of North Carolina, 1996), 210; U.S. Strategic Bombing Survey, Military Analysis Division, Air Campaigns of the Pacific War, July, 1947, 14; Taaffe, MacArthur's Jungle War, 10, 12-3; Richard L. Watson, Jr., The Fifth Air Force in the Huon Peninsula Campaign, January to October, 1943, Historical Studies, United States Army Air Forces, 1946, Copy in Air University Library, No. M-U, 27218, No. 113, c1, p. 20.
${ }^{26}$ US, Strategic Bombing Survey, Military Analysis Division, Air Campaigns of the Pacific War, No. 71, July, 1947, 18, gives the priorities of missions in exactly that order; Angelella, Prototype JFACC, 15, 18; Rust, Fifth Air Force, 8, also cites them in that same priority; Joe Gray Taylor, "American Experience in the Southwest Pacific," in Benjamin Cooling, Case Studies in Close Air Support, (Washington: Office of Air Force History, 1990), 311.
${ }^{27}$ An analogy that likens an enemy state to a spider web. The idea is that if bombers can take out one or a few of the nodal points in the web, then the whole will collapse with much less effort and damage than would be required in a more general attack.
${ }^{28}$ William C. Sherman, Air Warfare, (reprint, Maxwell AFB, AL: Air University, 2002, 1926), [originally published in 1926 by Ronald Press, New York], 118-19.
${ }^{29}$ BGEN William Mitchell, Lecture, 1921, File No. 27-10, Army War College Curricular Files, Military History Institute, Carlisle Barracks, Pa, 1.
${ }^{30}$ Mitchell, Lecture, 20 September 1923, File No. 240-49, Army War College Curricular Files, Military History Institute, Carlisle Barracks, PA, 35, 52.
${ }^{31}$ Sherman, Air Warfare, 118-21.
${ }^{32}$ James T. Murphy, Skip Bombing: The True Story of Stealth Bombing Techniques used in 1942, (Troy, NY: Book Technology, nd), 22; Timothy K. Gann, Fifth Air Force Light and Medium Bomber Operations in 1942 and 1943, (Maxwell AFB, AL: Air University, 1993), 4; Major General Alexander A. Vandegrift, USMC, just before the Battle of the Bismarck Sea was a great fan of air power and the need for air superiority, but asserted most strongly that attacking moving ships from altitude was a futile exercise in the Guadalcanal Campaign just then completed, interview, USAAF, Intelligence Services, 3 February 1943, HRA File Number 142.052, 7-8.
${ }^{33}$ Hollis H. Rushing, interview with W.J. Shinneman, 5 July 1990, Homer, Louisiana, HRA Oral History Number K239.0512-2009, 22.
${ }^{34}$ McAulay, Battle of the Bismarck Sea, 20; Rust, Fifth Air Force, 5; Richard L. Watson, Jr., The Fifth Air Force in the Huon Peninsula

Campaign, January to October, 1943, Historical Studies, United States Army Air Forces, 1946, Copy in Air University Library, No. M-U, 27218, No. 113, c1, p. 8, 84; Watson and Rohfleisch, Crisis, 25; Brigadier General William Hipps, who was an A-24 pilot in the Southwest Pacific refers to the same incident. He thought the Dauntless was a sturdy airplane, but not suited to USAAF work from undeveloped air bases in the Southwest Pacific - it came to New Guinea with hard carrier deck tires that sank into the mud and its bomb shackles would not accommodate the standard lugs on Army bombs! Interview with Daniel Mortensen et al., Bolling AFB, DC, 28 November 1984, HRA Oral History No. 239.0512-1732, 31; the one pilot who survived, Raymond H. Wilkins, later was awarded a posthumous Medal of Honor for a mission over Rabaul where he sank a destroyer and had his right wing shot off, U.S., AF, $5^{\text {th }}$ Air Force, 3d Bomb Group, A Short History of the Third Bombardment Group, HRA File Number GP-3-HI, 1917-1945, 1.
${ }^{35}$ Air Commodore F.M. Bladin, RAAF, interview with Lt. Thurstin, 7 May 1945, HRA File Number 732.620-1, 3, in early 1942 instructed his RAAF P-40 pilots not to engage the Zero in a turning fight, but rather to merely make one high-speed diving pass and to leave the scene. ${ }^{36}$ Herman Wolk, George Kenney: The Great Innovator, Chapter 6, in John L. Frisbee, ed., Makers of the United States Air Force (Washington: Office of Air Force History, 1987), 135; Kenney, Bong, 22-3; Danforth Miller interview, 54-7, Miller flew both P-400s and P-38s out of Henderson Field.
${ }^{37}$ U.S.A.A.F. Resource Group/Heroes of the Air-Richard Ira "Dick" Bong, available on the internet at http:/www. warbirdsresourcegroup.org/URG/bong.html, accessed 15 March 2003; Kenney, Bong, 24; Colonel Perry J. Dahl, interview with Captain Phillip Meilinger et al., Air Force Academy, CO, HRA Oral History Number K239.0512-1222, Dahl repeatedly made the point on with words like " . . if a Zero pilot ever saw you, you'd never shoot him down," 8.
${ }^{38}$ McAulay, Battle of the Bismarck Sea, 29-31.
${ }^{39}$ Gann, Fifth Air Force Medium Bombers, 7.
${ }^{40}$ Major General Jarred V. Crabb interviewed by Thomas Julian and Donald Goldstein, Air Force Academy, Co, 17 \& 28 April 1970, HRA Oral History Number 239.0512-622, Maxwell AFB, AL, 3.
${ }^{41}$ Richard L. Watson, Jr., The Fifth Air Force in the Huon Peninsula Campaign, January to October, 1943, Historical Studies, United States Army Air Forces, 1946, Copy in Air University Library, No. M-U, 27218, No. 113, c1, pp.44-56.
${ }^{42}$ This practice had been started before General Kenney became the commander. He found it as a source of confusion in the cockpit because of language differences and moved to end mixed crews though he kept some Australians on his staff, General George Kenney, interview by Colonel Marvin Stanley, no date, HRA Oral History Number K239-0512-747, 24.
${ }^{43}$ See Griffith, MacArthur's Airman," 211-17; Donald M. Goldstein, Ennis C. Whitehead, Aerospace Commander and Pioneer, (Ph.D

Diss., Denver University, 1970), 103-05; US, Strategic Bombing Survey, The Fifth Air Force in the War Against Japan, 57; Willoughby, MacArthur, 110-11; the great success of these early innovations led to attempts to escalate to forward-firing 75 mm guns on B-25s for the Pacific fighting. However, that gun's size also required the removal of the copilot's position and required a longer stable flight lining up for the final approach to the target. Too, it was possible to fire only a few 75 mm rounds on this final approach and though it was effective on heavier targets it did not suppress the AAA as well as the .50 calibers had and made the aircraft more vulnerable to ground fire. I have flown the B-25 without a copilot but only on short flights and not in combat. The extra four eyes of the missing bombardier and copilot were doubtless important assets in low level flight in combat. General Kenney argued that the use of forward firing rockets on his B-25s and A-20s would be preferable to the 75 mm because they did not require the long, straight-in approach. Information on the 75 mm in Trip to S.W.P. H., Pacific, 1944, CHM Roberts Papers, Archives, US Army Military History Institute, Carlisle Barracks, PA; on the Australian crew members on U.S. airplanes, see McAulay, Battle of the Bismarck Sea, 26.
${ }^{44}$ Murphy, Skip Bombing, 42; actually, something like skip bombing was being tested at Eglin Field, Florida earlier in 1942, U.S., Hq USAAF, A-2, Impact, Vol. 1, No. 2, (May, 1943), 9.
${ }^{45}$ US, Strategic Bombing Survey, Military Analysis Division, Air Campaigns of the Pacific War, No. 71, July 1947, 19; Shaw, Guadalcanal, 7-10.
${ }^{46}$ James A. Winnefeld and Dana J. Johnson, Joint Air Operations: Pursuit of Unity in Command and Control, 1942-1991, (Annapolis, MD: Naval Institute, 1993), 23-38; Spector, At War At Sea, 205; Vandegrift interview, 1-8.
${ }^{47}$ Vandegrift interview, 7-8.
${ }^{48}$ Taaffe, MacArthur's Jungle War, 11,
${ }^{49}$ Griffith, MacArthur's Airman, 209; Douglas MacArthur, Reminiscences, (NY: McGraw-Hill, 1964), 171; Edward J. Drea, MacArthur's ULTRA: Codebreaking in the War Against Japan, 1942-1945, (Lawrence, KS: University Press of Kansas, 1992), 67. ${ }^{50}$ Goldstein, Ennis C. Whitehead, 127; McAulay, Batttle of the Bismarck Sea, 20; Watson, Huon Campaign, 84; 38 th Bomb Group Navigator Hollis Rushing long after recollected that the aircraft was lost when a 100 pound practice bomb skipped up into its wing and caused it to crash into the ship, interview with W.J. Shinneman, Homer, Louisiana, 5 July 1990, HRA File Number 239.0512-2009, 19.
${ }^{51}$ General George C. Kenney, USAAF, General Kenney Reports, (reprint, Washington: Office of Air Force History, 1987), 199; Steve Birdsall, Flying Buccaneers: The Illustrated Story of Kenney's Fifth Air Force, (Garden City, NY: Doubleday, 1977),50; James, The Years of MacArthur, 294; McAulay, Battle of the Bismarck Sea, 22; Kenny-Stanley interview, 33.
${ }^{52}$ Drea, MacArthur's ULTRA, 64; Charles M. Westenhoff, Aggressive Vision, Air Chronicles, available on the internet at http:/ / www.airpower.maxwell.af.mil.airchronicles/apj/ apj89 / westen.html, 7, accessed 13 March 2002.
${ }^{53}$ Michael E Fischer, Mission-Type Orders in Joint Air Operations, The Empowerment of Air Leadership, (Masters Thesis, School of Advanced Airpower Studies, 1995), 19; Salvatore A. Angelella, A Prototype JFACC: General George C. Kenney, unpublished masters thesis, School of Advanced Airpower Studies, 1994, 26-27. ${ }^{54}$ Smith interview, 53-54, at that point, Colonel Smith was Whitehead's Chief of Staff; Whitehead ultimately reached the rank of lieutenant general; BGEN Hugh J. Casey, interview, available on the internet at http:/ /www.USACE.army.mil/inet/ USACE-docs/eng-pamphlets/ep870-1-18/c-19.pdf, 191 accessed 13 March, 2002; Richard L. Watson, Jr., The Fifth Air Force in the Huon Peninsula Campaign, January to October, 1943, Historical Studies, United States Army Air Forces, 1946, Copy in Air University Library, No. M-U, 27218, No. 113, c1, p. 5.
${ }^{55}$ Angelella, Prototype JFACC, 23; Rust, Fifth Air Force, 9. ${ }^{56}$ US, USAAF, 5AF, $308^{\text {th }}$ Bomb Wing, 5 March 1943-20 May 1944, HRA File Number WG-308HI (Bomb), p. 8.
${ }^{57}$ USAAF, $5^{\text {th }}$ Air Force, $308^{\text {th }}$ Bomb Wing, Heavy, 5 March 1943-20 May 1944, HRA File Number, WG-308HI (Bomb).
${ }^{58}$ US, Strategic Bombing Survey, Air Campaigns of the Pacific War, 18; Spector, At Sea At War, 193; Richard L. Watson, Jr., The Fifth Air Force in the Huon Peninsula Campaign, January to October, 1943, Historical Studies, United States Army Air Forces, 1946, Copy in Air University Library, No. M-U, 27218, No. 113, c1, p. 1.
${ }^{59}$ US, Strategic Bombing Survey, Military Analysis Division, The Fifth Air Force in the War Against Japan, July, 1947, 27; Huon Campaign, 5.
${ }^{60}$ Smith interview, 64.
${ }^{61}$ John F. Kreis, ed., Piercing the Fog: Intelligence and Army Air Forces Operations in World War II, (Washington: Air Force History and Museums Program, 1996), 265.
${ }^{62}$ Edward J. Drea, MacArthur's ULTRA: Codebreaking and the War Against Japan, 1942-1945, (Lawrence, KS: University Press of Kansas, 1992), 61, 64-6; Samuel Eliot Morison, History of United States Naval Operations in World War II, VI, Breaking the Bismarcks Barrier, (Boston, MA: Little Brown, 1950), 54-5; John Miller, Jr., The U.S. Army in World War II, The Pacific War, Vol. 8, Cartwheel: The Reduction of Rabaul, (Washington: US Army, 1959), 38-9; Huon Campaign, 73.
${ }^{63}$ Watson, Huon Campaign, 70, 76.
${ }^{64}$ D. Clayton James, The Years of MacArthur, II, 1941-1945, (Boston, MA: Little Brown, 1975), 290; Huon Campaign, 7.
${ }^{65}$ BGEN Hugh J. Casey, interview, available on the internet at http:/ / www.USACE.army.mil/inet/USACE-docs/eng-
pamphlets/ep870-1-18/c-19.pdf, 191 accessed 13 March, 2002; Rust, Fifth Air Force, 7.
${ }^{66}$ Goldstien, Ennis C. Whitehead, 126; James, Years of MacArthur, 292.
${ }^{67}$ McAulay, Battle of the Bismarck Sea, 33 .
${ }^{68}$ Drea, MacArthur's ULTRA, 70.
${ }^{69}$ Manchester, American Caesar, 379; McAulay, Battle of the Bismarck Sea, 44-5; Watson, Huon Campaign, 87.
${ }^{70}$ Alan Stephens, The Australian Centenary History of Defence, Vol II, The Royal Australian Air Force, (South Melbourne, Australia: Oxford University, 2001), 162; Douglas Gillison, Royal Australian Air Force, (Adelaide, Australia: Griffin Press, 1962), 691; McAulay, Battle of the Bismarck Sea, 55-6.
${ }^{71}$ McAulay, Battle of the Bismarck Sea, 59.
${ }^{72}$ McAulay, Battle of the Bismarck Sea, 70.
${ }^{73}$ Stephens, Australian Air Force, 163; Gillison, Royal Australian Air Force, 693; Watson, Huon Campaign, 90; US, Air Force, $5^{\text {th }}$ Air Force, 3d Bomb Group, History, 1919-1944, 39-40.
${ }^{74}$ Drea, MacArthur's ULTRA, 68; Morison, Breaking the Bismarcks Barrier, 59.
${ }^{75}$ Eric M. Bergerud, Fire in the Sky: The Air War in the South Pacific, (Boulder, CO: Westview, 2000), 591.
${ }^{76}$ 3d Bomb Group, History, 1919-1944, 40-42.
${ }^{77} 308^{\text {th }}$ Bomb Wing, History, 1 March 1943-1 March 1944, HRA File Number WG-308-HI, 1 Mar 43-1 Mar 44; 3d Bomb Group, History, 1919-1944, 42-44.
${ }^{78}$ Gillison, Royal Australian Air Force, 693; Watson, Huon Campaign, 93.
${ }^{79}$ McAulay, Battle of the Bismarck Sea, 146, reports that one of the four destroyers was still floating as an abandoned derelict on the fourth, and it was finally sent to the bottom by a Japanese aircraft.
${ }^{80}$ Gillison, Royal Australian Air Force, 694.
${ }^{81}$ McAulay, Battle of the Bismarck Sea, 144 reported in 1991 that all of the shark reports came from the Allied flyers, and none from the Japanese survivors; Colonel Perry Dahl, a P-38 pilot, reported that later in the war the gunning down of parachutists was an accepted practice on both sides, Dahl interview, 29. ${ }^{82}$ Stephens, Australian Air Force, 164; James, The Years of MacArthur, 294; Murphy, Skip Bombing, 117; McAulay, Battle of the Bismarck Sea, 131.
${ }^{83}$ US, AF, $5^{\text {th }}$ AF, 3d Bomb Group, History, Jul 1919-Mar 1944, HRA File Number: GP-3-HI (Bomb), 39.
${ }^{84}$ James, The Years of MacArthur, 298-300; Whitehead's chief of Staff, Colonel Frederick H. Smith, was married to one of Admiral Ernest King's daughters, and Smith remarks that the good Admiral was skeptical that MacArthur's airmen had put down the whole convoy - and that indeed they had not, Smith interview, 67; as late as 1964, MacArthur still wrote that there
had been " . . . from eight to twelve transports . . ." in the convoy and that all of them had been sunk, Macarthur, Reminiscences, 171; as early as 1950, Watson and Rohfleisch had the correct figures in, Crisis, 147-49; MacArthur's intelligence officer, also got the figures approximately right in a book published in 1954, Willoughby, MacArthur, 111
${ }^{85}$ Goldstein, Ennis C. Whitehead, 133-36; Griffith, MacArthur's Airman, 236-41; it was publicly known even in the 1940s that some Japanese codes had been broken, US, Strategic Bombing Survey, Air Campaigns of the Pacific War, July, 1947, 62. ${ }^{86}$ Gillison, Royal Australian Air Force, 695; Wayne P. Rothgeb, New Guinea Skies: A Fighter Pilot's View of World War II, (Ames, Iowa: Iowa State University Press, 1992), 161.
${ }^{87}$ US, Strategic Bombing Survey, Air Campaigns of the Pacific War, 18; the Midway losses of Japanese naval pilots have been widely exaggerated, though the combination of that and the campaigns in the Solomons did attrit the pilot force and drive the experience level down as the American learning curve was rising rapidly and the result was air superiority, Mark R. Peattie, Sunburst: The Rise of Japanese Naval Airpower, 1904-1941, (Annapolis, MD: Naval Institute, 2001), 174-75, 184; Paul S. Dull, A Battle History of the Imperial Japanese Navy, (Annapolis, MD: Naval Institute, 1978), 268.
${ }^{88}$ Griffith shows that the exact priorities cited in the manual had indeed been followed by Kenny and $5^{\text {th }}$ Air Force in their campaigns, MacArthur's Airman, 209; so does Joe Gray Taylor in American Experience in Southwest Pacific.
${ }^{89}$ Crabb-Julian interview, 39.
${ }^{90}$ Milner, Victory in Papua, 375-76.
${ }^{91}$ Kenney had been in France just prior to its fall, but he was teaching the main outlines of classical tactical air doctrine long before at the Air Corps Tactical School.
${ }^{92}$ Daniel R. Mortensen, The Air Expeditionary Force in Perspective, (Maxwell AFB, AL: College of Aerospace Doctrine, Research and Education, 2003), 3-4.
${ }^{93}$ Dahl interview; Danforth Miller interview - a whole different set of health hazards would have to be counteracted; instead of dust, the machinery would have to be better protected against corrosion, and the protection of air fields would be made more difficult by the obscured terrain - for openers.
${ }^{94}$ McAulay, Battle of the Bismarck Sea, 10 (McAulay himself being a retired Australian Army officer.)
${ }^{95}$ Wilson-Ahmann interview, 205.
${ }^{96}$ Richard L. Watson, Jr., The Fifth Air Force in the Huon Peninsula Campaign, January to October, 1943, Historical Studies, United States Army Air Forces, 1946, Copy in Air University Library, No. M-U, 27218, No. 113, c1, p. 22.
${ }^{97}$ Robert P. White, Mason Patrick and the Fight for Air Service Independence, (Washington: Smithsonian, 2001), 66. ${ }^{98}$ William Manchester, one of MacArthur's biographers, doesn't
exactly say that, but comes close to it in a paragraph, American Caesar, 384; Tim Gann is explicit on the point, Fifth Air Force Medium Bombers, 30 .
${ }^{99}$ Lex McAulay, himself a retired Australian soldier, said that Billy Mitchell had been vindicated and that the Battle had been won by airpower alone, Battle of the Bismarck Sea, 170.
${ }^{100}$ Goldstein, Ennis C. Whitehead, 124.
${ }^{101}$ Winnefeld and Johnson, Joint Air Operations, 23-38; Angelella, Prototype JFACC, 22.
${ }^{102}$ Harry A. Gailey, MacArthur Strikes Back: Decision at Buna, New Guinea, 1942-43, (Novato, CA: 2000)190.
${ }^{103}$ Kreis, Piercing the Fog, 267, before the Washington visit was over, Kenney was invited to visit President Roosevelt at the White House and the airman's picture appeared on the cover of Life magazine.




# The Flight Towards Fascism 

The Aviator as Superhero

Past and
Future: Indonesia

# Coming to Terms with the Cultural Revolution 

## The Aviator as Superhero?

# The Individual and The First War In The Air 

The following narrative focuses on the pilots and observers employed on a single squadron (No 9 Army Co-operation Squadron) during the Third Battle of Ypres, July-November 1917. It aims to achieve a better understanding of the personal experience of individual aircrew involved in the First World War and, in particular, the mental and physical aspects of the war in the air. It was stimulated by a recent article in History Today' that examined 'The Aviator as Superhero' in the context of the rise of fascism. The author has suggested that First World War pilots were 'special', pursuing an attractive existence far above the trenches and able to resist the mental traumas that afflicted ordinary soldiers due to their unique control over their fate.

## By Air Cdre Peter Dye

On Monday morning 7 January 1918, Lieutenant Robert Barton Cameron, a 21 year-old observer with No 9 Squadron Royal Flying Corps, flying from an airfield at Proven on the Western Front, was reported as Killed In Action. What the official record does not reveal is that he had deliberately jumped to his death from $1,000 \mathrm{ft}$ over British Lines.

We will never know for certain what motive lay behind the decision to include this particular casualty as one of the 50 aircrew from No 9 Squadron who were reported as Killed In Action during the course of the war - rather than employing the more prosaic 'Killed Accidentally' — but it might be inferred that the Squadron

# A single death, however regrettable, may not seem significant compared to the hundreds of thousands killed in the trenches yet suicide remains a subject little discussed by either surviving participants or subsequent historians 


#### Abstract

Commander, Major James Rodwell, felt Robert Cameron's parents would prefer to believe their son had died in the face of the enemy rather than by his own hand. In so doing, Major Rodwell may also have believed that Robert Cameron was as much a casualty of the fighting as those killed or injured on active operations.


A single death, however regrettable, may not seem significant compared to the hundreds of thousands killed in the trenches yet suicide remains a subject little discussed by either surviving participants or subsequent historians. It was certainly a surprise when I stumbled on an account of the actual circumstances. At the time, I was unaware of any other suicides or self-inflicted injuries within the Royal Flying Corps, although on reflection the manner of Robert Cameron's death was unlikely to have been an isolated occurrence. ${ }^{2}$ It also raised a number of potentially uncomfortable questions. In disguising the events surrounding Robert Cameron's death did the Squadron Commander (and presumably Higher Authority) conform to a wider perhaps unconscious deception that sought to provide an image of war acceptable both to those at home and those at the front? How did his comrades react? And, was it indicative of a wider problem - the exceptional and relentless pressure felt by individuals fighting a lonely, very personal and unprecedented battle in the sky?

While there is a substantial body of work on the suffering of those caught up in the maelstrom that was trench warfare, very little has been written about the effect on the relatively small group of airmen engaged in the war in the air. Yet, it was a struggle that tested men and machines to their very limits, both physical and psychological, although both areas were poorly understood at the time. In fact, much of the contemporary medical literature appears to be directed at the identification of characteristics that make for a good pilot, focussing on temperament as a key factor rather than any deeper or wider analysis. ${ }^{3}$ Moreover, one need only consider the initial
treatment of shell shock to understand how limited was medical knowledge about mental health and the effective treatment of post-traumatic stress disorder. ${ }^{4}$

The following quotation, forming part of a contributing chapter on the medical aspects of aviation published in 1918, appears to reflect the generally held view about pilots suffering from 'nerves'. "It is certain that an aviator's disinclination to fly must have its basis upon some temporary defect of body or mind, and, without being unduly sensitive or timid, he should realize this and overcome the cause rather than tempt Providence by running the danger of overtaxing his power" ${ }^{5}$ In the remaining five pages, the novice aviator is offered advice encompassing visual, auditory, tactile, muscular and balance reflexes as well as the need to avoid drinking and to restrict smoking. The text is a mixture of the sensible, the simplistic and the simply odd, including the following: "The fact that aeroplanes are now so improved and structurally strong that there is little or no danger of anything giving way in the air, should reassure pupils, who sometimes are distressed with this thought whilst in the air"; and, "Most aviators fly with the mouth slightly open. Pupils should see that their teeth and gums are in a healthy state, otherwise any local disease therein is apt to be increased by the cold and rush of air"

To be fair, it is hardly surprising that the medical aspects of aviation were poorly understood. There had been little opportunity for research and little time to build up a body of knowledge. What is more puzzling is that the literary legacy, by and large, does not seek to explore the impact on individuals and the price they paid physically and mentally. In fact, much post-war writing portrays aviators as heroes (the knights of the air) fighting an honourable war (in chivalric combat) far removed from the trauma and squalor of the struggle on the ground. The emphasis on individual fighter aces (who quickly achieved

# Most aviators fly with the mouth slightly open. Pupils should see that their teeth and gums are in a healthy state, otherwise any local disease therein is apt to be increased by the cold and rush of air 

heroic status amongst the public on both sides), the natural pride in technological progress and the apparent freedom of the skies compared to static warfare of the Western Front, have largely masked the darker side of air warfare. ${ }^{6}$

Unfortunately, the ranks of the British Air Services have not produced the equivalent of a Sassoon or Blunden to argue to the contrary. The exception perhaps is Victor Yeates and his novel Winged Victory.

The exact circumstances of Robert Cameron's death might have remained a mystery were it not for the personal diary of his flight commander, Captain BUS Cripps. The entry for 7 January 1918 reads: ". . . I had put Lt Cameron down for a practice contact patrol, as he was in bed at the time, I went and strafed him and sent him up. He committed suicide by jumping out of the machine. I then went up with Lt Robson to do the practice contact. In the afternoon I went up again to take an officer for a joy ride. It snowed in the night".

As insensitive as this passage might read from a distance, it should be put in context. Captain Cripps had joined No 9 Squadron nearly six months previously at the very start of the Third Battle of Ypres, since when he had seen 52 of his colleagues killed or injured out of a total complement of 40 pilots and observers. Death was not a stranger to him or to the other members of the squadron, many of whom he would have known only briefly before they were struck off strength. After such a period of sustained offensive
operations a certain degree of fatalism might be expected. Interestingly, although the pilot involved — Lieutenant Jim Croden, a Canadian — has left an account of his experiences in France he does not mention the incident.?

Robert Cameron was a medical student in his third year at Glasgow University when he joined the Royal Flying Corps in 1917. After initial training he was posted on 10 September 1917 to No 9 Squadron, equipped with the two-seater RE8, as an Observer on Probation (OOP). An OOP was not awarded his observer's badge until he had completed a period of satisfactory performance, nominally after several months (or some 25 hours war flying). In this task he was evidently successful as a group photograph dated to late October 1917 shows a very young looking Robert Cameron in his RFC Maternity Jacket proudly displaying his observer's 'wing'.

No 9 Squadron was an army co-operation squadron and as such worked closely with the front line providing support to infantry attacks, counter-battery fire, artillery registration, photography and reconnaissance. Although the RE8 has subsequently suffered from a mixed reputation, it was generally liked by its crews proving to be a reliable and rugged aircraft. It was certainly not the sitting duck for enemy fighters that popular myth has suggested. There was almost equal danger from ground fire and accidents (Fig 1), including the not infrequent occurrence of being hit in the air by British artillery shells.


Fig 1: No 9 Sqn Aircrew Casualties
(By Cause) - 1917


9 Sqn RE8 damaged by AA fire - Captain Youdale and Lt Ashcroft


9 Sqn RE8 - engine failure during the Third Battle of Ypre


Lt Robert Cameron - standing centre, third from left

The graves of Lts Lewis and Holt, brought down by Allied fire


9 Sqn RE8 - hit by Allied shell fire - Third Battle of Ypres



Crashed 9 Sqn RE8 - on Proven airfield


# It was a rare sight not to see an aeroplane in an unnatural position somewhere on or near the aerodrome 

The squadron record book shows that Robert Cameron crashed twice in September and twice in October (the aircraft being written off on all four occasions). Between 18 October and 12 November he was attacked on three occasions by enemy aircraft, each time driving them off by fire from his Lewis gun. Although such experiences were not exceptional, they were hardly welcome and might well have weighed heavily on the newly arrived observer - all the more so as he appears not to have been crewed with a regular pilot. ${ }^{8}$ The importance of the pilot/ observer team has been commented on by a pilot who also flew RE8s at Proven. More significantly, perhaps, he adds "I was shot at and sometimes hit and I had as my constant companion a large quota of fear, which is I consider inevitable to all normal individuals in one form or another". ${ }^{9}$

The airfield at Proven was certainly difficult to land on as well as providing hazards to aircraft that had to abort their take-off. An observer who served on the squadron earlier in 1917 recalled that "The RE8s were reputed to have a landing speed of about $70-80 \mathrm{mph}$ or they would stall. This was all right on a big aerodrome but . . . Proven was very small and one approach was over a belt of trees. There were very many crashes especially on landing. I was now specialising in 'Contact Patrols' which involved close trench reconnaissance with photographing trenches and gun emplacements and so forth, flying just above the attacking infantry sounding a code on a klaxon at specified times. It meant flying very low in the midst of the artillery barrage. My pilot developed some nervous trouble that affected his landings. We crashed eight times
coming into land and then the next crash was on taking off downwind into a petrol store and onto a hangar where the machine turned upside down and I fell out and then the whole contraption descended on me. Miraculously there was no fire though petrol was spilling all around. My pilot - strapped in - escaped with a scratch to his nose but was much shaken. I was dragged by the wrists from the wreckage. A few days later our MO returned from leave and took me at once to the hospital which discovered that my right arm had a clean fracture above the wrist but the break had been set - presumably by my having been dragged by the wrists from the wreck." ${ }^{10}$

Although a request was made to extend the landing ground and remove some of the more prominent obstacles (such as the surrounding hop poles) no action appears to have been taken. A contemporary of Robert Cameron observed that "During the whole time I was there, it was a rare sight not to see an aeroplane in an unnatural position somewhere on or near the aerodrome". ${ }^{11}$

It is not clear that there was a common or consistent attitude towards aircrew who demonstrated 'nerves'. There appears to have been a degree of tolerance and what data is available suggests that squadron commanders were quick to root out new arrivals who were unsuitable for war flying and equally careful to return to Home Establishment those who had done their 'share' for the war effort. The approach taken on No 9 Squadron might best be described as 'robust sympathy'. It should also be remembered that it was not until late 1916 that a Medical Officer was

Fig 2: Average Tour Lengths for all Aircrew 1915-1918



Fig 3: Postings By Cause (less than one month served)
appointed to each brigade (comprising some five to 10 squadrons) in France. Individual squadrons were provided with a single RAMC Orderly - capable of providing First Aid but not allowed to administer morphia - responsible for taking the patient to the nearest hospital in a tender or a car, depending on whether he was a stretcher case or not. ${ }^{12}$

An analysis of more than 300 aircrew who joined No 9 Squadron during the three years December 1915 to November 1918 reveals that a significant number of pilots and observers only served briefly on the front line. In fact, just over $32 \%$ of all aircrew stayed less than a month with the squadron (Fig 2). Further evidence in support of this picture is provided by a post-war study that also calculated a monthly wastage of $32 \%$ in the number of effective pilots employed on the Western Front. ${ }^{13}$

The causes of wastage on No 9 Squadron were various, the largest single category being combat casualties ( $47 \%$ ) but a significant proportion ( $14 \%$ ) was returned to Home Establishment (Fig 3). Sickness accounted for 9\%: this excludes those hospitalised through accidents ( $11 \%$ ). While confirming the vulnerability of newly arrived and generally inexperienced aircrew, the data also provides some evidence for a conscious weeding out of those considered unsuitable for war flying.

Overall, about $8 \%$ of all aircrew serving with the squadron were returned to the Home

Establishment having served less than three months on the Western Front. An official study carried out in 1918 on 1436 pilots, who were sent to France during the six months July to December 1917, reveals that 7\% of RE8 pilots originally despatched to France were sent home having served less than three months (compared, for example, with $5 \%$ of fighter pilots). ${ }^{14}$

Reflecting on his wartime experiences with No 9 Squadron, Squadron Leader AWF Glenny wrote "I remember one incident (at Proven) when . . . one of my flight crashed (and) the RE8 loaded with bombs and ammunition caught fire and in a few moments the bullets were exploding and the bombs white hot . . . both pilot and observer . . . survived though the pilot's nerves were shaken further by being bombed in hospital in London shortly after he got home and he gave up flying! Nowadays, a crash creates a great deal of stir and alarm, the pilot and observer have to go to a medical inquisition and as often as not are recommended to a short rest if they are not seriously hurt. During the war a different spirit prevailed and I recollect that the principle was to step out of the remains of one aeroplane into a whole and flyable new one. To my mind the war idea is much sounder and I often think that many cases of 'nerves' one meets nowadays among beginners may be down to the present system". ${ }^{15}$

Notwithstanding the problems of landing at Proven, Robert Cameron can be considered to

## Once I was attacked by two enemy scouts and my observer cried like a child and refused to fire, though they fired about 200 rounds at us

have been unlucky in the number of crashes he was involved in - even if he was able to walk away. There is no doubt that he experienced a hectic and very testing first three months at the front. However, like many of his colleagues he was able to take advantage of the opportunity for two weeks leave once the fighting around Passchendaele ended. Returning on 3 December he found the squadron still at Proven but flying a great deal less intensively. ${ }^{16}$ The weather had turned particularly cold - something that was felt greatly by the RE8's observer who was more exposed to the elements than the pilot. Fellowobserver George Fuller, who had joined No 9 Squadron on the same day as Robert Cameron, wrote of a sortie on 3 January 1918. "I never suffered so badly from the cold; one of my cheeks was frozen by the time we landed. I certainly had taken all the measures that I could to combat the weather; heavy woollen underwear, silk socks underneath wool socks, slippers (I think these were of the ladies bedroom variety) with leather soles lined with felt and woollen uppers, overshoes, silk gloves under combination leather gloves with adjustable fur-lined mitt to cover fingers, Sidcot suit, woollen balaclava helmet under my fur-lined helmet, and face mask and goggles, both lined with fur" ${ }^{17}$

Although George Fuller knew Robert Cameron and must have been familiar with the circumstances of his death he makes no mention of it in his reminiscences. However, he concludes his account of his time on No 9 Squadron as follows. "Of the seven of us who had reported for duty just six months before, only two of us were going back. Three had been wounded and sent home and two others were buried in the Military Cemetery at Proven. The casualties sustained including those killed, wounded, or missing, numbered 157 - enough to provide over three squadrons" ${ }^{18}$

There is some evidence that the casualty rate amongst observers was higher than for pilots - the observer was certainly more exposed - although serious injury to the pilot almost invariably meant that the observer became a casualty. Captain 'Rosie' Hilton, in arguing that an artillery pilot's life was not devoid of risk, noted that he had two observers killed in his machine
and two others wounded during the year he was with the squadron. ${ }^{19}$ It took considerable courage to face the attacks of enemy aircraft. "I had several air fights, mostly unsatisfactory. Once I was attacked by two enemy scouts and my observer cried like a child and refused to fire, though they fired about 200 rounds at us. Foolishly I did not report this as I rather pitied his terror, which was akin to my own but more wantonly and stupidly expressed". ${ }^{20}$

The motives that caused Robert Cameron to take his own life can only be guessed at. A Court of Enquiry was convened at Proven on 8 January 1918 to investigate and report on the circumstances of his death. ${ }^{21}$ Having heard evidence from eight witnesses, it felt unable to show how his death had occurred, concluding only that the pilot was in no way responsible and that great credit was due to him for bringing the aircraft down safely. The various statements indicate, however, that the quality of Robert Cameron's work had fallen off considerably in the previous few months, that he was drinking heavily, he had not gone to bed sober the night before and he had seemed pale and confused in the morning.

Conclusive evidence is unlikely to emerge but there is no doubt that Robert Cameron and his fellow aircrew had to function under considerable physical and mental pressure. This is evident in the high attrition amongst newly arrived aircrew and the high level of hospitalisation ( $12 \%$ of all postings). The authorities were certainly aware of the impact of continuous operations on individuals (and on their overall effectiveness) and consciously chose to limit tours (for observers to a maximum of six months). ${ }^{22}$ Combat, the loss of colleagues, the limited ability to relax and the cumulative impact of long hours spent in noisy, open cockpits with no oxygen or heated clothing created an increasing level of fatigue. Indeed, it has been reported that $80 \%$ of aircrew grounded suffered from 'nerves' and that $50 \%$ of pilots developed serious neurosis during operational tours. ${ }^{23}$

Even though the effects of stress were evident, the medical causes remained unclear. This uncertainty was reflected in the wide range of official and unofficial terms employed to describe the symptoms. These 'functional nervous

It may be significant that none of his colleagues chose to refer to his death in their various memoirs. The reason could have been guilt, sympathy, embarrassment or a mixture of all three. We will never know
disorders' comprised hysteria, neurasthenia and psychasthenia, although the terms more commonly employed were 'fatigue', 'flying stress' or 'nerves'. The phrase 'Flying Sickness D' appears to have used on some medical records as a catch-all for any aircrew neurosis arising from anxiety, hysteria, depression or obsession. The relatively few Medical sheets that have been preserved indicate that the terms most commonly used were 'Shell Shock', Neurasthenia, Insomnia and NYD(N) - Not Yet Diagnosed (Neurological). ${ }^{44}$ In fact, it would not be until the early years of the Second World War that the primary causes of nervous disability amongst flying personnel would be fully understood. Under these circumstances, the treatment of individuals was at best haphazard - even though it was subsequently claimed that, of those treated for aircrew neurosis during the First World War, 40\% were returned to full flying duties. ${ }^{25}$

The decision to fix tour lengths (even if they were not formalised) was largely driven by the need to maintain efficiency. In the absence of a resident Medical Officer, the task fell to the squadron commander to determine whether individuals needed a temporary rest or should be returned permanently to Home Establishment. Although the brigade Medical Officer could and did provide an 'expert' opinion the ultimate responsibility was that of the squadron commander.

We now know how important leadership is to the prevention and management of stress on operations. ${ }^{26}$ Strong unit cohesion and high moral can create a high degree of resistance to stress. Of course, good leadership cannot compensate for predisposition or poor training, both of which factors can determine an individual's reaction to stressful circumstances. However, there is ample evidence of the powerful and positive influence exerted by the better squadron commanders. In the case of No 9 Squadron, Major Jack Hunter was greatly respected and much liked commanding officer. He led the squadron for over six months and throughout the Third Battle of Ypres. He was
dined out in some style at Proven on 19 November 1917 but his successor, Major James Rodwell, was less popular. George Fuller for one "was never very much impressed by our new squadron commander, who was much more reserved and who lacked the fine personality of Major Hunter". ${ }^{27}$

The question of whether Robert Cameron should have been hospitalised or transferred to the Home Establishment before his suicide cannot properly be answered. Of course, it is not even certain that he was suffering from stress, although the circumstances are persuasive. It may be significant that none of his colleagues chose to refer to his death in their various memoirs. The reason could have been guilt, sympathy, embarrassment or a mixture of all three. We will never know; although it was clearly a conscious choice on the part of the squadron commander (and Higher Authority) to record his death as Killed in Action.

In some ways the silence surrounding Robert Cameron's death merely reflects the contemporary state of medical knowledge about 'Flying Sickness $\mathrm{D}^{\prime}$. Indeed, a full understanding of the cause of flying-related stress and of appropriate treatments would remain elusive until well into the Second World War - witness the handling of Bomber Command crews suffering from stress and the inference by some that it was simply due to a lack of moral fibre.

Robert Cameron was buried in Medinghem Military Cemetery, a few hundred metres from the airfield at Proven. His grave is surrounded by those of nearly 2,500 other Commonwealth servicemen who died on the Western Front. The headstone simply reads 'In Memory of'.

[^2]${ }^{3}$ A classic example of this genre appeared in the Lancet of 28 September 1918 under the title, The Essential Characteristics of Successful and Unsuccessful Aviators with Special Reference to Temperament. Amongst the riveting insights provided by the authors (Capt TS Rippon \& Lt EG Manuel) is the observation that marriage is a definite handicap to producing a successful pilot owing to the increased sense of responsibility.
${ }^{4}$ Corns \& Hughes-Wilson, Blindfold and Alone, pages 52-59, Cassell \& Co, London 2001, provides a useful summary of attitudes regarding mental health in Britain before the First World War.
${ }^{5}$ McMinnies, Practical Flying, pages 212-216, Temple Press, London, 1918.
${ }^{6}$ The one notable exception is Denis Winter's study of First World War fighter pilots, The First of the Few, Allen Lane, London, 1982. ${ }^{7}$ Some Experiences of Captain James Eric Croden, No 9 Squadron RFC, Canadian Air Historical Society, Vol 2 No 1, Winter 1964. ${ }^{8}$ The 7 sorties were:
11 Sep 17-2/Lt Gardner \& 2/Lt Cameron. Engine failed on take-off and crashed into 2 lorries.
25 Sep 17 - 2/Lt Hackman \& 2/Lt Cameron. Aircraft overran aerodrome and crashed.
18 Oct 17 - 2/Lt Jones \& 2/Lt Cameron. Attacked by EA, driven off by observer.

27 Oct 17 - 2/Lt Cryer \& 2/L Cameron. Aircraft overturned on landing.
31 Oct $17-2 /$ Lt Dixon \& 2/Lt Cameron. Aircraft crashed on landing and ran into ditch.

9 Nov 17 - Lt Walker \& Lt Cameron. Attacked by 3 EA driven off by observer.
12 Nov 17 - Capt Anderson \& Lt Cameron. Attacked by EA, driven off by observer.
${ }^{9}$ Flt Lt P Warburton - Service Experiences, NA(PRO) AIR1/2388.
${ }^{10}$ Liddle Collection, Recollections of 2/Lt MH Harland,
University of Leeds.
${ }^{11}$ Sqn Ldr AWF Glenny - Service Experiences, NA(PRO)
AIR1/2389/228/11/119.
${ }^{12}$ NA(PRO) CAB44/1.
${ }^{13}$ NA(PRO) AIR1/686/21/13/2252.
${ }^{14}$ NA(PRO) AIR1/818/204/4/130 — Report on Average Lifetime of Pilots in France.
${ }^{15}$ Glenny, op cit.
${ }^{16}$ Robert Cameron flew for the first time back from leave on 8 December 1917 and undertook just 12 further sorties in the remaining weeks before his death on 7 January 1918.
${ }^{17}$ Fuller, Reminiscences of Lt GSB Fuller, Cross \& Cockade (USA) Vol 10 No 1, pages 34-54, 1969.
${ }^{18}$ The 7 observers were:
2/Lt T Simmons - Injured Accidentally (aircraft stalled and caught fire on take-off) 14 Sep 17

2/Lt AJ Powney - Died of Wounds (aircraft brought down by EA) 15 Sep 17
2/Lt GD Turner - Wounded in Action (attacked by EA) 20 Sep
17
2/Lt WE Rothwell - Hospital 20 Dec 17
2/Lt RB Cameron - Killed in Action (suicide) 7 Jan 18
2/Lt GSB Fuller - Home Establishment 13 Mar 18
2/Lt NS Robson - Home Establishment 13 Mar $18 \quad 19$
Richard Hilton, Nine Lives, pages 50-53, Hollis \& Carter, Londin, 1955.
${ }^{20}$ EL Williams - Personal Experiences, NA(PRO)
AIR1/2390/228/11/219.
${ }^{21}$ NA(PRO) AIR1/962/204/5/1061.
${ }^{22}$ The average tour length for all aircrew on No 9 Squadron was 4 months. This compares very well with the attrition assumptions employed to determine training requirements in 1917. NA(PRO) AIR1/683/21/13/2234 records the estimated life (in months) of pilots and observers as:

| Squadrons | Pilots | Observers |
| :---: | :---: | :---: |
| Corps | 4 | 4 |
| Night Flying | 4 | 4 |
| Fighter <br> Reconnaissance | 3.5 | 3.5 |
| Bombing | 3.5 | 3.5 |
| Single Seat Fighter | 2.5 | - |

[^3]


## Airrbase defence: the optimum strategy to counter modern threats to joint air operations

"It is far easier and more effective to destroy the enemy's aerial power by destroying his nests and eggs on the ground than to hunt his flying birds in the air". ${ }^{1}$

This oft quoted but appropriate comment dating from 1921 on the fragility of air power while it is stranded on the ground is particularly apposite when discussing airbase defence strategies. Airfields are highly specific areas within the battlespace that require largely static, high technology facilities that are also relatively fragile (certainly on expeditionary operations where hardened facilities are not usually available). Destruction of aircraft or any of their key vital support facilities may severely
degrade or even cease air operations. Put quite simply, without an effective defence that has been carefully planned and executed, the losses to the overall campaign architecture may become so great that commanders progress may be unacceptably delayed or changes to the strategic plan may be required until air power has been fully restored. Friendly casualties are likely to be increased as a consequence of these delays or changes to the plan. Airfield defence forms a key element in the defensive battle for air forces, arguably of similar importance to all of those defensive measures adopted whilst airborne. The aim of this essay is to discuss the optimum air asset defence strategy for expeditionary joint component operations.

## Vital air power and its dramatic effect on the battlefield have been severely reduced where airfields have not been provided with adequate defences



## The need for airbase defence

In all cases, history has shown that attackers will conduct penetrating attacks only where airfield perimeters are weakly defended, preferring otherwise to conduct stand-off attacks. The unavailability of forces, mal-deployment, poor leadership or weak command and control have all been exploited by attackers, resulting in notable successes by units such as those conducted by the SAS in North Africa and German Paratroops on Crete during WW II, and the Viet Cong in Vietnam. More than $60 \%$ of attacks have had the relatively modest aim of destroying vital equipment rather than seizing the airfield and
have resulted in over 2,000 aircraft being destroyed world-wide between1940 and 1992. ${ }^{2}$ The more complex, and difficult, aim of capturing airfields would entail the use of larger formations of troops, whereas relatively small groups of attackers can achieve great effect against poorly defended air assets. Capturing airfields is now often deemed unnecessary in a manoeuvre-battle scenario where the real estate is often of more value to the fixed defender as opposed to the highly mobile attacker who can simply flank the area and move on after rendering it safe by forcing the enemy to cease his air operations. The time and effort required to re-activate severely shelled air bases, and in
particular aircraft operating surfaces, may be too great for the speed of the campaign, and the choice to simply destroy enemy air assets rather than the entire infrastructure will allow rapid reoccupation by friendly forces that can then operate more closely with frontline units in the Offensive Counter Air role.

Vital air power and its dramatic effect on the battlefield have been severely reduced where airfields have not been provided with adequate defences. In certain cases, such as North Africa during Operation TORCH allied attacks against axis airfields greatly affected the precarious balance of air power in the campaign, resulting in a favourable air situation and thus assisting an allied victory. ${ }^{3}$ Modern airbases are necessarily large pieces of real estate, with even modest fixed wing bases requiring lengthy runways and comprehensive servicing facilities. The area covered comprises that inside the wire and a sizeable area of vital ground outside of the perimeter, from which stand-off weapons can be launched and in which the airfield and aircraft on approach or take-off are vulnerable to SAM attack. This results in large areas that need to be covered by observation, fire and patrolling around airfields (approx 100 sq km area for an average airbase ${ }^{4}$ ), highlights the requirement for a well sited observation post screen and a reaction force. In almost all cases where exterior patrolling has not been conduced, defenders have received extremely damaging attacks against their air assets. In the case of the Long Range Desert Group ${ }^{5}$ (LRDG), operating deep in the Libyan Desert during WW II, patrols usually observed the target by day and laid-up in positions adjacent to airfields before attacking at night. It is assessed that had the German defenders conducted patrols, set-up listening posts and observation posts in the limited likely approaches to their airfields the LRDG would have been successfully interdicted and deterred from attacking their intended targets.

## Ground defence

While much of the data applicable to airbase attacks concentrates only on those accurate records obtained from Main Operating Bases (MOBs), there is little doubt that effective attacks
on smaller airstrips, dispersed facilities such as helicopter operating locations and other air asset locations have taken place and been successful. The concept of defence for these dispersed locations can be assumed to have synergy with fixed MOBs to a greater extent: the major issues being simply of scale. Forward operating bases and units placed far forward in the battle space may attract a greater intensity of enemy threat, and the decision to position air elements here must be fully understood and justified by planners. As ever, greater potency is becoming available from weapon systems such as attack helicopters that need to operate in forward areas. The effect of their subsequent loss will be felt more acutely.

Success against aircraft and air operations has been achieved largely on the ground by groups of regular, irregular or specialist forces approaching the airfield on foot and in vehicles in order to conduct a stand-off attack with the aim of destroying aircraft or facilities. ${ }^{6}$ The enemy usually operate in groups of 4 to 30 personnel (the mode being 5 personnel ${ }^{7}$ ) with the aim of destroying or severely degrading materiel, aircraft or the vital support services that are needed to continue air operations. The mere threat, or potential for ground attacks, has caused disruption to allied efforts, and the need for dedicated airbase defence utilising specialist manoeuvre forces has long been recognised by the UK and written in to national doctrine. ${ }^{8}$ Other nations have adopted a static, 'wire-walking' approach, relying on army units or coalition forces to dominate the large areas of interest and vital ground that exist in the vicinity of airfields e.g. French and USAF Security Forces. Recently, more progress had been made within 'wire-walking' protagonists as they realise the needs and benefits of a more holistic approach. Some of the lessons have been learned the hard way, with successful attacks against French and US facilities in North Africa and Vietnam respectively. The US forces in Vietnam discovered the benefits of creating defended zones around their airfields that were usually situated close to built-up areas. In order to avoid rocket or mortar attacks these zones could be as large as 10 km from the airfield perimeter, with the most vulnerable area being that zone between $5,000 \mathrm{~m}$ and $10,000 \mathrm{~m} .{ }^{9}$ Within these

# Vital air power and its dramatic effect on the battlefield have been severely reduced where airfields have not been provided with adequate defences 

huge areas, key terrain must be identified and the most likely weapon launch sites dominated by either view or patrolling in order to make the defender's task manageable. The USAF Security Forces became adept at defending American airbases with the assistance of Vietnamese levies and US ground forces, that operated outside the wire. Unfortunately, no specialised forces were trained or employed and success depended upon the local quality and training of the forces assigned; differences that caused some serious losses of US aircraft and facilities. The employment of levies in both Vietnam by the US Forces and earlier in Trans-Jordan and Iraq by the RAF Regiment has proven the efficacy of their unique local knowledge and understanding of the demography of the area, leading to a far more effective defence in areas where significant cultural, language and political differences exist between defender and the host nation.

Most defence plans have worked from the outside inwards, dealing with the longest range threat first and working inwards towards short-range threats. This approach has the advantage of eliminating the longer range artillery and rocket attacks that proved so destructive in Vietnam, but on the other hand is costly in terms of the manpower and the effort required. Recently, some have postulated the opposite approach and recommended securing the individual assets first and working outwards. This approach favours the internal security concerns initially and allows for lighter forces to be deployed, perhaps as part of an initial package to provide defence. It has particular value in mitigating suicide attacks and improvised explosive devices, but cannot deal with determined stand-off attacks very effectively. Logically, threats must be dealt with as they occur and cannot always be accurately pre-determined. A wide range of deployment options must be available to the defender if he is to defeat all reasonable threats that may range from individual suicide bombers to long range artillery, cruise missiles and mortars. The choice of which stance to adopt may lean towards close-in or ranging out to the most likely stand-off attack areas and will be informed by careful analysis of the most recent intelligence. Additionally, host-nation
constraints may preclude external patrols; instead local security forces may provide sterile areas cleared of local civilians and strict control of entry procedures. Conversely, the area immediately surrounding the air base may be heavily populated (as were those at Da Nang and Tan Son Nhut in Vietnam ${ }^{10}$ ) or transited by the local population. The quality of local forces will range from rudimentary to extremely effective, and coalition partners may choose to defend their geographic boundaries alone. In all of these scenarios, close cooperation between commanders is required to ensure that defensive gaps are not left open and that fratricide is avoided.

Simple plans are always the best, and physical separation of activities between 'inside the wire' and 'outside the wire' provide clearly de-marked areas of operation. Within airfields national sectors are more easily defined by physical features such as runways etc, however the practical problems of managing the defence should not be underestimated, particularly where rules of engagement (and the willingness to use force) differ widely between coalition partners. In addition, the airfield must be considered as an entity by the Joint Force Land Component Commander and his staff. Formation boundaries should not be planned to bisect airfields since defenders will become greatly hindered in their attempts to control their area of responsibility if it is shared between adjacent brigade or other boundaries. This problem is made substantially worse if boundaries of different partner nations bisect airfields. Widely differing approaches to ground defence between coalition nations may cause fratricide if a combined C2 facility is not created. Inevitably, the key airfields will be shared by many partners and cultural differences need to be overcome in order to offer a robust defensive network between national sectors.
"Manoeuvre is the decisive element at all levels in the defence. By combining movement with fire, the defending forces make the best use of the terrain assigned to them in order to inflict high losses on the enemy and at the same time avoid destruction by enemy fire. By manoeuvre, the commander concentrates combat power, permitting him to
create a favourable force ratio in order to defeat the enemy". ${ }^{11}$ Although the RAF Regiment tends to specialise in the area defence of air assets, the concept of manoeuvre warfare remains extant. Post Op MERCURY, the German invasion of Crete in 1941, there has been a recognition in the UK of the need for specialist airbase defence forces. Those forces present on the island at the time were mal-deployed and ill-equipped (in the case of RAF tradesmen both mentally and in equipment terms) to face a determined enemy that attacked from an unexpected direction (by parachute, rather than by amphibious means as expected by the commander, Gen Freyberg, following ULTRA intelligence ${ }^{12}$ ). The following loss of Crete has been attributed largely to a poor understanding of the specific needs of airfield defence, the absolute requirement in this case to prevent the Germans from gaining their foothold at Maleme airfield and the poor use of reserves and tradesmen who were rendered useless due to a lack of available weapons and the will to deploy non-infantry troops in the defence of their own bases.

The need to defend against stand-off and penetrating attacks ${ }^{13}$ provide all-round defence and defence in depth with the limited force sizes available lead naturally towards a manoeuvre strategy. The 'find-fix-strike' principle ${ }^{14}$ results in a requirement to accurately observe and react to targets as they appear. Finding the enemy relies upon adequate 24 -hour observation ability including thermal imagers and battlefield radar coupled with an infantryman's skills in knowing where to look. Once found the enemy must be fixed by holding him in such a position that he cannot become 'un-found' again. This may be done by a mixture of channelling into holding areas where he is no longer such a threat, by harassing fire, patrol activity (in vehicles, on foot or by air) or by illumination at night that will force him to remain where he has been fixed. The need to able to operate 24 hours a day results in a much greater reliance on night vision aids with a consequent training bill and logistics chain. The benefits, however, are a decrease in the number of personnel required to defend a base and the ability to find and fix an enemy without always relying on fire support. Finally, neutralising the threat by
a strike could involve a direct assault, indirect fire or a combination of techniques that will render the enemy threat ineffective. More realistically, during periods of increased tension that fall short of general war, rules of engagement will dictate that the find might take place using sensors, the fix by illumination and the strike by arresting the suspects in co-ordination with host nation law enforcement agencies.

Type designed and equipped ground forces are required to increase the chance of a successful defence, particularly for forward deployed air assets such as helicopters or ground attack aircraft that may operate from bare base locations that do not benefit from any of the static defences usually built at permanent airbases. The use of non-dedicated forces has been largely discredited with army units often being re-assigned to more pressing tasks in forward areas. This development is coupled with the increase in terrorist activity post-9/11 and the subsequent attempts to shoot down aircraft on the approaches to both military and civil airports that have occurred, leading to greater thought being given to the mechanisms required to defeat this pressing threat. Novel approaches, including the use of pan-dimensional defences to reduce collateral damage, the inclusion of civilian agencies and the ever-present communication problems have tested defenders who have to succeed $100 \%$ of the time, whereas an attacker only needs to have one successful attack to achieve significant results. All of the most recent threats have forced defenders to modify their planning to take account of suicide attacks. Where terrorists are prepared to die for their cause routinely, the effects of collateral damage become significant in deciding how and where to neutralise the target. It may be appropriate to allow a 'controlled terrorist success' against a target if that area has been evacuated, rather than risking massive collateral damage in an uncontrolled crash following defensive action.

In the RAF Regiment field squadron the 81 mm mortar flight currently provides Mortar Fire Control parties (MFC) that make excellent use of Intelligence Surveillance Target Acquisition


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and Reconnaissance (ISTAR) assets in the form of MSTAR battlefield radar, thermal imagers and laser range finders linked to Special Purpose GPS Receivers (SPGR). The combination of the ISTAR and heavy degree of firepower available to the field squadron results in a high capability of finding and fixing the enemy while manoeuvre forces strike. Linked with the ability to project indirect fire out to nearly $6,000 \mathrm{~m}$, the mortar flight provides the bulk of the squadron ISTAR capability by operating the sensors and performs the vital communications links between static OPs and manoeuvre elements that ensures the success of any strike. The indirect fire characteristics of the mortar, coupled with its firepower effect
and accuracy when controlled by experienced crews equipped with the latest target finding and plotting aids give a field squadron the decisive edge. Unfortunately, bursting munitions often suffer from restrictive rules of engagement in operations other than war. In particular, high explosive rounds must be specifically requested prior to employment, although illumination and smoke may be authorised for more general use.

Direct fire weapon systems offer utility against point targets in scenarios where rules of engagement insist on discrimination. A variety of machine guns, sniper weapons and grenade launchers have been used to provide the firepower


Finding the enemy relies upon adequate 24-hour observation ability including thermal imagers and battlefield radar coupled with an infantryman's skills in knowing where to look
required. However, despite obvious advantages all point attack weapons lack the area coverage that bursting munitions provide. In addition, the relatively short range and line-of-sight requirements of most machine gun systems means that they must be transported to the firing point. In mobile scenarios, it might be expeditious to mount weapons on light vehicles, although targeting accuracy is generally compromised as a result.

As part of an overall weapon strategy the mixture of direct, indirect, point attack and area coverage systems seems to offer the greatest ability across the defensive scenario. Deconfliction with aircraft movements on approach and departure lanes is required if air ops are to continue. Only with local agreements between air traffic controllers and the deployed field squadron to establish agreed operating procedures can a mutually acceptable defence posture be maintained. Little doctrinal advice currently exists on this subject, but adhoc arrangements have been practised locally that have suited all partners. Issues such as the firing of munitions while aircraft operate locally, night vision blooming caused by infantry mortar
illumination and communications difficulties all require careful planning if the air operations and ground defence are to work in harmony.

The availability of intelligence information is not usually a problem for formations that are co-located with flying units due to their airintelligence gathering and analytical capability. The need for bespoke intelligence analysis in the specific ground role gives the ground commander the planning edge that he needs to deal with threats and mould his forces to meet them. Usually, the electronic access is available to glean local ground intelligence information and requests for information can be issued by collators to ease the flow. However, this task has skill-set and security clearance issues that are inextricably attached to it, and a trained analyst who is attached to the ground defence unit would achieve far greater quality results. This approach requires investment in training and cultural changes to the preconceived notions that dominate the employment potential of properly equipped personnel on frontline units. Use of other security agencies gives access to local knowledge that may not be available otherwise. This local knowledge greatly enhances the ability of the defender to do his job, and is of inestimable value but requires an investment in time, effort and staff work by planners to ensure that systems may be developed quickly once the deployment commences. Time and effort is also required to analyse all the available intelligence, a function that does not always exist at the appropriate level currently within units that are not equipped in terms of manpower or skill-sets to exploit that information which is available to them from both electronic and human sources. Limited size forces must have access to the best information if they are to operate effectively, and in addition to intelligence feeds, much information can be gathered locally from the indigenous population and security services leading to a requirement for attached interpreters. These higher level functions usually exist only at battalion-level and above. Greater flexibility is needed to ensure that the needs of airbase defenders are catered for by attaching personnel with the correct skills to conduct intelligence analysis at unit level. It is simply not adequate enough to plagiarise the

general intelligence summaries that are nearly always far too general or vague.

A level of local input is required from host nation and coalition intelligence/ anti-terrorist organisations in addition to the local information gleaned by patrolling activities. Indeed, the role of interpreters can be expanded to include the production of correspondence in local languages to facilitate force protection initiatives between forces and necessary contract writing. Indigenous employees are usually the ideal group to employ, and with streamlined hiring and security vetting procedures followed by careful management, their role could produce far greater integration between deployed forces and the host nation. This microlevel of detail knits together with pan-dimensional sources to form the tapestry.

## Defensive counter air battle

The immediate destruction of enemy fixedwing air forces during the opening stages of any conflict has reduced the air breathing threat in most scenarios to a minimum. However, as the effectiveness of technology to defeat one threat improves, so does proliferation of states acquiring relatively cheap alternative methods of prosecuting attacks. These new threats have concentrated GBAD thinking recently with an increasing requirement to defeat these challenging targets in restricted airspace scenarios where having to take the first hit may be decisive, particularly if the enemy successfully delivers a Weapon of Mass Destruction/effect (WMD/e) at a strategic point. The enemy can regain some of the balance of air power if he chooses to employ relatively cheap forms of attack vehicle that may be armed with WMD/e in massed attacks that may only be semiguided or unguided, but with potential to cause significant effects, whether real or psychological. Forcing allied forces to don protective clothing constantly throughout an already high heat stress environment will produce worthwhile effects for an enemy intent on delaying or affecting the prosecution of air power in a campaign.

As a key element in the Defensive Counter Air (DCA) battle, GBAD can release air assets further forward, tap into and exploit the Recognised Air


> As part of an overall weapon strategy the mixture of direct, indirect, point attack and area coverage systems seems to offer the greatest ability across the defensive scenario

Picture (RAP) for early warning and situational awareness, and layer with coalition missile systems to provide an umbrella of coverage out to several tens of miles from the defended assets. Most inservice GBAD weapon systems were designed for Cold War operation and optimised against air breathing threats in all but a few cases. Few have an anti-ballistic missile capability. Even the threat of TBM attack may halt an expeditionary operation before it has begun ${ }^{15}$ but this national capability is a subject that is not within the scope of this essay and will not be discussed.

Furthermore, many systems were designed to operate independently, and only recently have been equipped with appliqué data links as a first generation attempt to rectify the significant drawbacks that result from an inability to integrate into the wider airspace battle at an appropriate level. Without a RAP, ability to communicate by voice secure means, positively identify the target and assure the air-commander that fratricide risk has been minimised, GBAD systems remain tied to restrictive positive control methods that greatly reduce their effectiveness against the hard-tohit target set. The simple matter is one of lack of decision-making time. If the target is not positively identified early enough for the GBAD system to react and engage (often with only a single-shot kill probability of 0.5 ), perhaps with two missiles, then the target will often become un-engageable and the attack will probably succeed. Airspace control is the key to effective GBAD, with defenders requiring the technical and cultural ability to fully integrate into the DCA battle. One of the key challenges is to gain the trust of friendly air staffs and operators who will naturally suspect that the major threat to their survival is from fratricide rather than any enemy ground or air fire.

Complementarity is attained where coalition GBAD systems integrate into the defence and the layered concept plugs gaps (releasing airborne DCA assets further forward to deepen the defence) in capability that would otherwise cause concern that specific attack profiles could succeed. Ideally, a medium SAM system is teamed with short range (up to approx 10 km range) air defence platforms and very short range weapons (under 10 km approx)in a near real-time data network that is fed from the overarching radar coverage. Although currently limited, GBAD sensors should also feed back up to the overall RAP wherever possible. The coverage data from ground level to medium level obtained by the specially tuned Doppler
shift radars that equip GBAD units could provide useful gap filling for airborne radars that are often limited by ground clutter. Many radars that equip ground based control and reporting centres are necessarily interrogating only above-height limits, leaving gaps in coverage that an enemy may exploit with a variety of threat vehicles. The need for data transmission capability in a network enabled capability for GBAD is beginning to be addressed in a variety of ways worldwide. The sub-one second latency required for air defence networks is challenging industry to provide adequate deployable communication networks into the field that can connect all sensors together in order to allow commanders to view the full RAP

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and pick-off the appropriate information to suit their essential needs. This capability will unlock the latent potential for in-service weapon systems that are currently hindered through restrictive engagement practices that attempt to avoid fratricide. For the future, new GBAD weapon systems will be designed from the outset to exist within a fully NEC battle space that can fully utilise their capabilities. Certain GBAD systems also offer unparalleled surveillance in the ground role with extremely effective thermal imagers
that, while optimised to provide high resolution definition of air targets, can be programmed to conduct automated ground area searches during periods of lowered enemy air threat as a secondary role. In addition, the often remote nature of GBAD sites that require clear fields of view and fire for their effectiveness results in a defence problem and a solution at the same time. The extra guarding required to defend a remote site may be completed by a co-located active defence grouping.


GBAD can release air assets further forward, tap into and exploit the Recognised Air Picture (RAP) for early warning and situational awareness, and layer with coalition missile systems to provide an umbrella of coverage out to several tens of miles from the defended assets considered key ground, with any losses in scarce air assets likely to greatly affect the campaign outcome

## Commanding the force protection battle

Leaders in airfield defence have recognised the requirement for specialised units, formed from within their own organisations to eliminate their arbitrary re-allocation of forces to more pressing or seductive tasks during operations. Where airbase defenders are cultivated from within air forces there also exists the air force culture and air-mindedness ${ }^{16}$ that assists in integration of C2 and harmony of aims between aircraft operators and defenders. Historically, this aspect of ownership has proved decisive with many airfields being lost to the enemy simply due to the pressure from land commanders to re-deploy infantry formations forward.

Far from being classic rear-area locations, airfields are now considered key ground, with any losses in scarce air assets likely to greatly affect the campaign outcome. The threats are not usually from predictable, regular formations but are likely to encompass specialist units, special forces, terrorist attack and other asymmetric threats. Unless airfields are located within lines of advance on potential battlefields it is unlikely that the defender will face main battle tanks as a threat, but almost all other types of attack are possible from both land and air. Indeed, an occasional airfield attack during WWII featured a submarine approach! ${ }^{17}$ Although this method of insertion is unusual it remains a sobering thought that attackers will exploit any weaknesses in defences and approach by any means. Vehicle and foot insertion methods are the most popular with an initial vehicle approach followed by foot patrol into a stand-off attack area. This method allows for heavy stores to be brought forward efficiently and then carried the final distance for the attack. The weight of mortar rounds and rockets may preclude long insertion marches and terrain will assist any vehicle approach where dead ground or foliage permit camouflage to within striking range. Even in a desert arena attackers may approach airfields with stealth as the Luftwaffe discovered to their cost in North Africa during WW 2. Long Range Desert Group and SAS patrols were able to lay-up in the vicinity of airfields by day using camouflage and attack at night, causing significant destruction for the numbers involved. Careful recce will expose the most likely lines of
infiltration, exfiltration and weapon launch points. Defenders must conduct the same process when planning their defence and dominate the areas of interest by patrolling, observation or harassing fire. Luftwaffe commanders in the Western Libyan Desert did not appreciate the ability of determined troops to patrol for hundreds of miles by vehicle or foot in order to prosecute attacks and the lack of their own patrol activity in the vicinity of their airfields resulted in easily exploitable weaknesses. The SAS were able to infiltrate airfields and place demolition charges, damage or destroy facilities and aircraft and render airfields inactive. An Axis intelligence summary from April 1942 states:
"The LRDG plays an extremely important part in the enemy sabotage organisation. The selection and training of the men, the strength, speed and camouflage of the vehicles for the country in which they have to operate have enabled the group to carry out very effective work, particularly in the destruction of Axis aircraft on the landing grounds at Agedabia and Tamet". ${ }^{18}$

Clearly, the special forces-style attacks, begun by the LRDG and then bolstered by the SAS post-1942, caused the enemy much frustration and loss of vital equipment. With this requirement to defend large areas against a range of attacks, airbase defence has developed into a specialised business. Regular infantry formations are not equipped to provide the firepower, mobility or surveillance in sufficient numbers required to succeed. Therefore, a type-designed unit has been built within the RAF Regiment in order to provide the balance of skills, equipment and standard operating procedures that have been proven to be battle-winning against the range of threats. These may range from high tempo, challenging adversaries to asymmetric attacks by local levies or other irregular forces. The RAF Regiment Field Force units are equipped with a high degree of firepower that includes support weapons ( 81 mm mortar and Sustained Fire General Purpose Machine Gun, GPMG), snipers, and numerous GPMGs to replace the less powerful light support weapon (LSW). For illustrative purposes a field squadron deploys approximately the same firepower as a regular Army battalion and its size is akin to a Company Group, but this is where the similarities end. Each fire team
(four men) is equipped with mobility (Landrover, fitted-for-radio) and each man carries a weaponmounted night fighting aid. Squadron surveillance comprises battlefield radar, thermal imagers and a suite of passive night aids. Recently, the addition of Landrover gunships has increased both firepower and the physical presence of patrols. In total, the force package can find the enemy effectively, fix him with support weapons and strike using highly mobile teams.

A C2 system that is expeditionary, equipped with air-minded and experienced personnel, placed near to the centre of the deployed hierarchy, who can plan and execute the defensive plan is required. Specialist teams are needed from the planning stages in order to ensure that air power may deploy and operate effectively. Moreover, the number of agencies involved (ranging from medics and policemen to logistics and engineering groups) mitigates an adhoc approach. Leadership is required in order to manage the disparate interests of operator versus support agencies. Once a steady state has been achieved, the tactical element of the C2 network may be withdrawn and replaced by a roulement in most circumstances, leading to a smaller number of deployable teams. In addition, training as a formed team is the best method of ensuring that force protection is guaranteed from the outset. Finding the time and suitable locations for training has challenged exercise planners, but over time a culture of expeditionary preparedness can be established if the key groups of leaders are developed. Annual training in basic skills can be topped up with individual and team exercises, but this approach relies upon a common set of operating procedures and some external validation if the final team exercise is to have the required beneficial effects. Time to complete this training during a build-up phase cannot be guaranteed, although the value of training while deployed in assembly areas cannot be overemphasised due to the acclimatisation benefits and relative lack of distractions when compared to the predeployment phase. In the ideal world trained teams would be held at short-notice standby and require only acclimatisation training once deployed.

The actual equipment required for C 2 will depend on the type of location to be enabled, but as a general rule, should be lightweight, dismountable and weather-proof. Communications is one of the most challenging aspects initially and the ability to communicate to all sub-units and upward report by secure voice and data are essential. In addition, the ability to manage the local battle may result in requirements as diverse as local public address systems to management radios, mobile telephones and tactical radios. Public broadcast systems have great utility on fixed bases since they can give warnings of attack, all-clear information and better prepare personnel to survive myriad potential attacks.

Field defences on airbases often cause consternation due to the network of underground cable runs and pipelines that usually comprise the infrastructure. Building-up rather than digging positions may give the double benefit of increasing weapon and surveillance arcs over relatively flat ground. Tall buildings may limit arcs of view and fire but may be used to site positions on in order to turn their height to an observation advantage. Lightweight control of entry methods such as caltrops across entry points might be preferred to cumbersome barriers in an expeditionary scenario. Usually, novel approaches will enable reductions in the initial freight bill and greatly enhance deployability at a time where logistics planners scrutinise every item to reduce the overall freight costs. In the same vein, protected mobility might be essential in a high mine or sniper threat environment, but the weight of the vehicles, their lack of cross country mobility, in most cases, and the specialised servicing requirements often leads to them being excluded.

## Summary

The need for air asset defence has been proven historically and the techniques required to ensure a successful defence have evolved rapidly in the past decade since expeditionary air operations have become increasingly common. The fundamental changes in philosophy that have been required by all personnel involved in air operations when they have suddenly been required to move away from fixed, often hardened Cold War main base locations

# The fundamental changes in philosophy that have been required by all personnel involved in air operations when they have suddenly been required to move away from fixed, often hardened Cold Warmain base locations to austere locations must not be underestimated 

to austere locations must not be underestimated. In many cases the resourceful leader has been a vital commodity. Able to build and operate high-technology equipment from harsh climatic conditions worldwide, is no longer considered difficult by leading players, particularly in the War Against Terrorism. Instead, rapidly deployable air power is relied upon in order to prosecute rapidly moving multi-dimensional conflicts. Concurrently, the threat environment has widened with air bases being generally further forward, and the rear areas threatened by terrorist action with the potential for WMD/e weapons to be employed anywhere.

Command and Control structures are key to winning the force protection battle, with the need for centralised command and decentralised control within a network enabled communication system that includes both encrypted voice and data transmission at latencies that allow near-real time updates to provide the required situational awareness. Specifically, within GBAD C2 nearreal time means sub-one second latencies - a significant challenge to in-service networks, and an absolute necessity when defeating hard-to-hit targets. Future capabilities promise the kind of electronic ability and computing power that will be able to provide the speed necessary to command the battle at the pace that will destroy the enemy's ability to affect the decision cycle. With networked C2 systems and sensors greater synergy between air and ground platforms is created when all sensors feed into a RAP. Dynamic control becomes realistic and fratricide risk greatly reduced. In addition, the deployment of assets further forward will deepen air defences and reduce and effect of attacks. The relatively impermanent nature of air patrolling can be replaced to some degree by GBAD systems that have more permanence and cost less in general to provide.

Ground forces need to remain type-designed as light, deployable, and heavily armed with high
numbers of night vision aids and ISTAR assets in order to achieve the ever-shortening time-scales required for deployments world-wide. A flexible approach will allow access to mission-centric equipment such as protected mobility. Linkages with host-nation and coalition forces need to be robust to avoid fratricide; ideally within joint operations rooms. Furthermore, boundaries must be agreed and deconflicted at the outset. Skills required on expeditionary operations include the need for accurate intelligence in order to inform the choice of defensive posture. Employment of locals to decipher local customs, translate documents, produce letters etc, and assist in patrolling activities will enable a much better local tapestry to be produced when all sources are merged. Training unit personnel in low-level intelligence skills might seem expensive but pays dividends quickly on operations.

Operations in the littoral are set to increase in frequency, as deployments require landing areas, beachheads and ports in order to deliver equipment. Vulnerabilities increase where assets are bunched and the operating procedures for defenders are complicated greatly due to the wide range of differing units involved, single-service interests and lack of universal communications. In future, more universality should decrease communication issues, but the battle space will remain challenging for all sensors due to the terrain nature of the littoral where optimisation for land or sea use become an Achilles heel.

The increase in terrorist and asymmetric threats will probably result in a continued requirement for 'professionalisation' within air asset defence. If lessons are to be learned, leaving this vital area in the hands of enthusiastic amateurs usually results in vital equipment being destroyed or rendered ineffective.

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## Notes:

${ }^{1}$ Gen Giulio Douhet 1921
${ }^{2}$ Snakes in the Eagles Nest, p xiv.
${ }^{3}$ Snakes in the Eagles Nest pp 40-44.
${ }^{4}$ RAF Regt Tactical Doctrine para 0324.
${ }^{5}$ LRDG, pp164-165.
${ }^{6}$ Snakes in the Eagles Nest p xvi.
${ }^{7}$ Snakes in the Eagles Nest p 58.
${ }^{8}$ Formation of the RAF Regiment on 1 Feb 1942.
${ }^{9}$ USAF, Attack on Udorn (26 Jul 68): Project
CHECO Southeast Asia Report, 17 Dec 68.
${ }^{10}$ Snakes in the Eagles Nest, p 98. Da Nang and Tan Son Nhut were located adjacent to metropolitan Da Nang and Saigon respectively.
${ }^{11}$ ATP 35 (B) Para 0409.
${ }^{12}$ Crete, The Battle and the Resistance pp 156-7.
${ }^{13}$ RAF Regt Tactical Doctrine Para 0328 and 0329.
${ }^{14}$ RAF Regt Tactical Doctrine Para 0233.
${ }^{15}$ air power and Expeditionary Warfare, Goulter in air power 21. ${ }^{16}$ Flexibility of air-minded troops during WW II, Air Ministry Report, 1945.
${ }^{17}$ Snakes in the Eagles Nest- SBS raid on Kastelli Pediados, Crete 1942. P 118.
${ }^{18}$ LRDG, p 164.


## How critical was air power in the foullume of operotion Market Garden?

## By Wg Cdr Dave Winstanley

"Market Garden, a plan based on air power, was the only battle of the entire campaign in North-West Europe fought with Allied air inferiority, a large part of it self-inflicted." ${ }^{1}$

Operation Market Garden, like so many other Operations during the Second World War, was supposed to shorten the course of the war and bring our boys home for Christmas. Without doubt Market Garden was one of the most daring, ambitious and ultimately controversial Operations of the Second World War. The volume of books, articles and research surrounding Market Garden is vast and numerous authors
have endeavoured to capture the arguments as to why this allied Operation failed. When evaluating the factors that contributed to the failure of the Operation, the majority of authors appear to have concentrated on factors such as the single-lane carriageway, the poor selection of landing zones (LZs) by the British 1st Airborne, incompetent interpretation of intelligence and communications failure. However, few seemed to have concentrated specifically on air power and it's use during the Operation. Stephen Badsey's quote above provides a hint to the importance of air power and imparts an ideal spring board for this article.

# General Dwight D Eisenhower, the Supreme Commander Allied Forces in Europe, was faced with the unusual problem that the Germans were retreating faster than the Allies could advance 

"All the accumulated evidence confirms that, like Gallipoli, this was a British disaster where naked courage lacked the bodyguard of competent planning, competent intelligence, and competent technology. Yet war's object is victory, not Victoria Cross, and it was shameful that by the autumn of 1944 we could still be so amateur." ${ }^{2}$

The aim of this article is to assess how critical air power was in the failure of Operation Market Garden and to examine if a more effective application of air power could have resulted in Allied victory. This article will clearly view Market Garden as a failed operation and will not enter the debate as to the extent of its failure. Firstly, it is essential to put Market Garden into the historical context of 1944 to assess why it was undertaken before examining the fundamentals of Airborne Warfare, as they were perceived in 1944. With this foundation established, the article will outline the plan for Market Garden before concentrating on seven key areas within which air power's contribution to the operation can be examined in detail. The article will concentrate on the execution phase of the operation and will assess the following seven key areas of air power influence: control of the air; the selection of LZs; information exploitation; initial bombing campaign; troop transport aircraft; close air support; and sustainment.

The article will examine the employment of air power and, accepting the advantages of hindsight, will attempt to proffer alternative outcomes that could have resulted from a different application of air power. It will examine the conduct of senior air force officers during the planning stages and assess to what extent the operation was doomed to failure before the first aircraft had taken off. Key air power factors such as the shortage of transport aircraft, the role the RAF played in the selection of LZs and the lack of close air support, will be critically examined. The article will endeavour to highlight that the whole operation rested on foundations built from air power and, critically, that some of these foundations were fundamentally flawed. The article will not ignore many of the other factors that contributed to the failure of Operation Market Garden but it will critically assess if the application of available air power compounded rather than alleviated the problems. The article would not be
complete if it did not examine the operation from the German perspective and their relative inability to combat Allied air power.

## Historical context

"One powerful full-blooded thrust across the Rhine and into the heart of Germany, backed by the whole of the resources of the Allied Armies, would be likely to achieve decisive results."
(Field-Marshal Sir Bernard Montgomery ${ }^{3}$ )
It is essential to put Market Garden into its historical context within the European Theatre of 1944 to truly appreciate why it was considered as an appropriate course of action and why, if successful, it could have significantly shorted the war. The historical context is vital with regard to two critical factors: firstly, the conduct of the war in 1944 and the unexpected Allied progress, and, secondly, the creation of the 1st Allied Airborne Army and it's commanders desire to prove the organisation in battle.

The Second World War was in its fifth year and, after years of planning, the Allies eventually established a battlefront in North West Europe with the D-Day landings in Normandy. The speed of the eventual allied advance out of Normandy and the collapse of the German armies had taken both the allies and the Germans by surprise. General Dwight D Eisenhower, the Supreme Commander Allied Forces in Europe, was faced with the unusual problem that the Germans were retreating faster than the Allies could advance. The failure to secure a major port meant that supplies had to be transported by road from Normandy and the supply lines were becoming dangerously stretched. ${ }^{4}$ By August 1944, there were 36 Allied divisions in France, together with 450,000 trucks, but fewer than 15,000 of these were long-distance load carriers. ${ }^{5}$ The re-supply problem hindered Eisenhower's plan to advance on Berlin on a broad front, with the British 21st Army Group under General Bernard Montgomery on the left and the US 12th Army Group under General Omar Bradley on the right. ${ }^{6}$ Montgomery fundamentally disagreed with Eisenhower's broad front concept and believed that there were not enough supplies to sustain both the British 21st Army Group and the US 12th Army Group. Montgomery believed
that the Germans were a spent force and all that was required was one decisive push to drive the enemy back and capture Berlin ${ }^{7}$. He believed the Germans had been shattered by the defeat in France and that, having lost most of its army in the West, was vulnerable to a knock out blow. ${ }^{8}$ Montgomery was extremely forceful in his belief and pressed Eisenhower hard to afford him priority with regards to re-supply. Whether Montgomery believed the Germans were a spent force or whether he was driven by his desire to beat Patton to Berlin is open to conjecture. However, Alanbrooke was in no doubt and later observed that Montgomery was mistaken and gullible in believing that the Germans were finished. ${ }^{9}$

At first glance, the importance of the creation of $1^{\text {st }}$ Allied Airborne Army and its commander's desire to prove the organisation in battle may not appear that relevant. The $1^{\text {st }}$ Allied Airborne

Army was formed in June 1944, under the command of Lieutenant General Lewis H Brereton and effectively unified all Allied Airborne forces. However, in the weeks that followed the Normandy landings, while the new command was forming, no fewer than 16 airborne operations were planned and subsequently cancelled. ${ }^{10}$ Critically, most of these operations involved the British 1st Airborne Division, who were the strategic reserve during the Normandy landings, and were keen to see action before the end of the war. This feeling was admirably summed up by the words of its commander, Major General Roy Urquhart: ${ }^{11}$
"By September 1944 my division was battle-hungry to a degree which only those who have commanded large forces of trained soldiers can fully comprehend. In fact, there were already signs of that dangerous mixture of boredom and cynicism creeping into our daily lives. We were ready for anything . . ."

> The Wehrmacht were quick to see the advantages of surprise and shock effect, the importance of close air support to offset the lack of heary artillery and the ability of well-placed reserves to clazw victory from defeat

German paratroops land in the Netherlands


This article is not suggesting that Urquhart was so keen to see his soldiers committed to battle that he was prepared to undertake any risk to prove their worth, on the contrary, his request for additional reconnaissance sorties suggest his enthusiasm was far from clouding his judgement. However, the general desire to see battle may have increased pressure, certainly on Browning and other decision makers, and created an environment where fundamental principles were ignored and critical errors were made.

Eventually, Montgomery and Eisenhower met in Brussels on 10 September 1944 when Montgomery finally persuaded Eisenhower to allow him to implement a narrow thrust into Holland to Arnhem. ${ }^{12}$ Eisenhower agreed to afford Montgomery priority of re-supply and from this, combined with the approval to drive north as a prelude to an attack eastwards into the heart of Germany, ${ }^{13}$ the origins of Operation Market Garden were born. The strategic objective of Market Garden was to capitalise upon the German defeat in Normandy and bring the war to a close by the end of $1944 .{ }^{14}$ However, before highlighting the essential elements of the plan for Market Garden, it is important to grasp the fundamentals of air warfare, as they were perceived in 1944.

## Nature of airborne warfare

"An operation involving the movement of combat forces and their logistic support into an objective area by air. ${ }^{15}$

Before the start of the Second World War, both the USSR and Germany had experimented with the concept of military parachutists and Germany in particular had put considerable effort into developing gliders for use in airborne warfare. ${ }^{16}$ It is the Russians who are credited with originating the concept and the Germans who are credited with developing its combat effectiveness. ${ }^{17}$ However, it can be argued that AW was really a child of the Second World War ${ }^{18}$ and like any child it needed to learn, grow, develop and, most importantly, it needed to mature. There were early examples of success, notably by the Wehrmacht in Norway, Holland and Crete that demonstrated fundamental principles that the planners of Market Garden would have done well to heed. With regard to airborne warfare, the Wehrmacht were
quick to see the advantages of surprise and shock effect, the importance of close air support to offset the lack of heavy artillery and the ability of wellplaced reserves to claw victory from defeat. ${ }^{19}$
"Little things going wrong can cause a great deal of confusion in combat, and a certain amount must be accepted as normal, but if 'little things' go wrong in an airborne operation, you really have confusion." (Major General James Gavin²0)

The lessons of 1940/41 were clear enough ${ }^{21}$ and it is surprising that some of the fundamentals of airborne warfare were ignored during the planning and implementation of Market Garden. The tactics of Airborne Warfare were neither complicated nor complex. However, success depended upon the exploitation of surprise, on close co-operation with air force components, the ability of the commander to influence the battle by the use of reserves and the fighting abilities of the troops committed. ${ }^{22}$ Critically, given the nature of airborne warfare, when airborne troops come up against a determined enemy, in terrain where he could deploy tanks, the whole concept of Airborne Warfare becomes extremely hazardous. ${ }^{23}$ The inherent weaknesses of airborne operations were apparent early in its development, the most fundamental of which was that transport aircraft were vulnerable and could be restricted by weather. ${ }^{24}$ Furthermore, after landing, airborne forces have limited mobility, firepower and combat support, which made them vulnerable to a prolonged counter attack by the enemy. ${ }^{25}$ Because airborne forces are lightly equipped, reinforcement and re-supply are critical and, given the fact that re-supply via air can be disrupted, a successful operation must include a link up with ground forces or an extraction. ${ }^{26}$

The fundamental aspect of airborne warfare in relation to air power does not stop simply with close air support and co-ordination between land and air forces. The relationship is far more fundamental as it can be argued that without every capability of air power you cannot conduct airborne warfare. As argued later in this article, the critical role played by AP during Market Garden, involved every core capability from information exploitation to strategic airlift. So, having
examined the principles, as understood in 1944, of airborne warfare, it is interesting to see if any of these were followed during the planning of Market Garden.

'Operation 'Market Garden' - The Plan ${ }^{32 a}$

## The plan

"It was a bad plan and so the failure of 'Market Garden' must be seen as a failure of the air forces."
(RAF Commander ${ }^{27}$ )
The plan was a high-risk venture, which, if it had paid off, might have shortened the war by several months. ${ }^{28}$ Operation Market Garden constituted the largest airborne Operation ever mounted and significantly it was mounted as a daylight operation. There were to be over 35,000 men committed to the airborne element of the plan, nearly twice as many as had been involved in the airborne operations during the D-Day landings. ${ }^{29}$ The plan called for First Allied Airborne Army, under the command of Lieutenant General Lewis Brereton, to assist the Second British Army, under the command of Lieutenant General Miles Dempsey, in a rapid advance into Holland and eventually the Ruhr Valley. ${ }^{30}$ Market Garden had two main objectives: firstly, to secure a crossing point over the Rhine, and secondly, to capture or neutralise Germany's industrial heartland, the Ruhr Valley. ${ }^{31}$ The importance of the role air power was to play in Market Garden was evident from its very conception. The amount of airlift alone, required to fly over 35,000 Allied airborne troops to Holland was staggering.

The 'Market' element consisted of three Allied Airborne Divisions dropped behind enemy lines in Holland to capture bridges over the major rivers and canals on a single carriageway stretching from Eindhoven, through Nijmegen and eventually Arnhem. The 101st US Airborne Division under the command of Major General Maxwell Taylor was to secure bridges from Eindhoven to Veghel; the $82^{\text {nd }}$ US Airborne Division under the command of Major General Jim Gavin was to secure bridges from Grave to Nijmegen; and the $1^{\text {st }}$ British Airborne Division under the command Major General Roy Urquhart was to secure all the bridges at Arnhem. ${ }^{32}$ The $1^{\text {st }}$ Polish Independent Parachute Brigade, under the command of Major General Stanislaw Sosabowski would be dropped with the $1^{\text {st }}$ British Airborne Division at Arnhem.

The 'Market' element was under the command of Brereton's deputy Lieutenant General F A M Browning, commander of the British Airborne Corps.

The 'Garden' element consisted of the Second British Army, specifically XXX Corps under the command of Lieutenant General Brian Horrocks, punching a hole in the German lines and driving the 64 miles to Arnhem, linking up with each Allied Airborne Division. The plan was based on the assumption that XXX Corps could travel the 64 miles to Arnhem in two to five days. This was a considerable drive behind enemy lines; however, this was not expected to be beyond the capabilities of XXX Corps, which had already proved capable of covering 50 miles in a day. ${ }^{33}$ Once the bridgehead at Arnhem was secured, then XXX Corps would turn southeast and enter the Ruhr.

Success depended upon an absence of serious enemy resistance in the Arnhem area: the capture of the bridge before the Germans had time to blow it up or bring up reinforcements; successive waves of airborne reinforcements from England to back up the initial drop; and finally, the arrival at Arnhem of XXX Corps within 48 hrs of the drop. ${ }^{34}$ This solely addresses success from the ground perspective but this was an operation based on air power and what bears examination is the criteria for success of Market Garden in the air.

## Control of the air

"If we lose the war in the air, we lose the war and we lose it very quickly."
(Field Marshal Sir Bernard Montgomery ${ }^{35}$ )
Historical experience has proved that a degree of control of the air is crucially important not only to air operations but also to virtually all types of military operations. ${ }^{36} \mathrm{~A}$ lesson that Montgomery learnt himself during the North African Campaign from whence the above quote originated. Control of the air cannot be achieved without dedicated operations to limit an enemy's ability to employ its air power and the degree of control will depend upon the operation being undertaken. ${ }^{37}$ Control of the air allows friendly air assets to operate without serious interference from an enemies air assets and, even in a generally hostile air situation, it is usually possible to achieve a degree of air control. ${ }^{38}$ One of the core capabilities of air power; therefore, is to achieve and maintain a degree of control of the air required to achieve mission success.

With regard to Market Garden, it is an indisputable fact, that without at least local air superiority, the Allies could not have even envisaged conducting a

British 1st Airborne Division — Landing Zones ${ }^{38 a}$

large-scale daylight airborne operation. air superiority is defined as that degree of dominance in the air battle of one force over another which permits the conduct of operations by the former and its related land, sea and air forces at a given time and place without prohibitive interference by the opposing force. ${ }^{39}$ It could also be argued that this is somewhat of a moot point considering that the Allied landings at Normandy would not have been conducted without localised air superiority. However, it is debatable whether the Allies actually made best use of the air superiority they had achieved and, notwithstanding the limits of 1940s communications, whether their co-ordination of air assets was as effective as it could have been. The simple fact is that the Luftwaffe was able to interfere with the Allied operation but to what extent that interference was prohibitive, is hard to access. As Stephen Badsey hinted when suggesting that the allies fought Market Garden with air inferiority, which was self-induced, the Allies should have enjoyed the luxury of air superiority for Market Garden, but to a degree they failed to capitalise on the advantage. The weather did play its part in limiting the degree of dominance the Allied air forces enjoyed over the Luftwaffe; however, there were fundamental
errors made with regard to liaison and coordination, discussed later in this article, that were to prove critical to the failure of Market Garden. That said, the Allied air forces claimed 160 enemy aircraft shot down, and rescued 205 men from the North Sea during the operation. ${ }^{40}$

From the German ground perspective, the Allied airborne landings at Arnhem, Nijmegen and Eindhoven initially provided further evidence of their growing awareness of Allied air superiority. ${ }^{41}$ Reichsmarshall Hermann Goering had already lost credibility in 1940 having declared, "if ever an enemy plane flies over German soil, I shall henceforth be known by the name Hermann Meier" and the vast Allied airborne armadas of Market Garden only reinforced this. ${ }^{42}$ The perception of the German soldiers was, with the exception of a number of close-air support sorties, that the Luftwaffe was impotent and grounded due to a lack of fuel and destroyed aircraft. ${ }^{43}$ Evidence provided later in this article proves that this was not the case. Some Luftwaffe sorties were successful. However, this success was only apparent to the Allies. ${ }^{44}$ In respect to the protection afforded to the Allied air armadas, air power did

Operation Market Garden - Air Routes ${ }^{\text {44a }}$
 responsibility for this fundamental error of judgement
fulfil its critical role of securing a degree of control of the air that enabled over 35,000 airborne troops to be dropped into Holland with relatively low casualties.

Impact of AP on selection of British LZs and DZs
"Your hardest fighting, and heaviest casualties, will not be in defending Arnhem from the North, but in trying to get there."
(Brigadier Sir John Hackett ${ }^{45}$ )
The selection of LZs at Arnhem has been directly blamed for the failure of $1^{\text {st }}$ British Airborne to secure both ends of Arnhem Bridge and their ability to defend the selected sites. The role of air power, or the role played by senior Allied air force officers in the selection of these sites is often overlooked. After the Sicily landings a joint War Office Air Ministry memorandum had decreed that "airborne operations are air operations and should be entirely controlled by the Air Commander-in-Chief ${ }^{\prime \prime}{ }^{46}$. Thus, senior air force officers, free from the responsibility for the outcome of the ground campaign, could decide upon the air movement and marshalling plans. Whereas, Senior Officers of the parachute brigade, coming in on the second day, were well aware that to advance against opposition who were already aroused, to objectives eight miles from the DZ as the plan demanded, was quite impracticable. ${ }^{47}$ So, if this were the case, why were these LZs selected, or is it more appropriate to ask, why were they suggested in the first place?

The responsibility to devise the airborne plan for the $1^{\text {st }}$ Airborne Division, rested with its commanding officer Major General Roy Urquhart and his RAF opposite number, Air Vice-Marshal 'Holly' Hollinghurst who commanded the RAF troop carriers of 38 Group. Urquhart and Hollinghurst disagreed over the selection of LZs and the place of delivery, ${ }^{48}$ which should have been driven by Urquhart's ground plan. Urquhart wanted to land his main force near the bridge, with the intention of emulating the successful capture of Pegasus Bridge over the Orne Canal, during the Normandy landings, and in accordance with best practice regarding airborne operations. ${ }^{49}$ However, Urquhart's desire to select LZs close to his main objective were over ruled by Hollinghurst's insistence that the bridge was too well defended by heavy anti-aircraft guns and that RAF tug aircraft
would be too vulnerable. Numerous authors point towards the pressure applied by Air Force commanders, concerned about the shortages of strategic airlift, who wanted LZs that afforded the best protection for their aircraft, once their drop was completed. Clearly, their main concern was the shortage of troop carrier aircraft for subsequent lifts and as a result, they were driven by the need to reduce the threat posed by flak. This fear of flak was totally understandable as the RAF was well aware of what German flak could do. ${ }^{50}$ Large aircraft formations at 100-150 mph, at heights between 500 and $2,500 \mathrm{ft}$, in daylight, with no armour plating or self-sealing fuel tanks, seemed to the air force planners to represent an easy target for German flak. ${ }^{51}$ That said, as General Sir John Hackett argues in his forward to Tugwell's book, Arnhem - A Case Study, Air Force commanders should have been prepared to accept a higher degree of risk from anti-aircraft defences in the vicinity of Arnhem and those protecting Deelen airfield, which turned out in the event, to be less formidable than was feared. ${ }^{52}$ Deelen airfield had been extensively bombed during the build-up to Market Garden and it rightfully should be argued that the importance of securing both ends of Arnhem bridge, should have out weighed concerns over enemy anti-aircraft defences. Urquhart's plan had the support of the Commander Glider Pilots, Colonel George Chatterton, who recalled some years later: ${ }^{53}$
> "I went to see General Browning and suggested to him that we were landing too far away but he said that it was out of our hands. It was an RAF decision . . . I nevertheless suggested that my pilots could land near the bridge and although there would be more casualties due to the size and unevenness of the enclosures, it would surely be preferable to landing miles away. When General Browning said that no doubt there would be more tugs shot down this way, I suggested that this could be avoided by a remote release, so allowing the tugs to turn back for home well before the bridge."

The reference made by Chatterton to 'the size and unevenness of the enclosures' was based on information received by both the Dutch Resistance and RAF intelligence that the LZs south of the bridge were unsuitable for either parachutists or gliders. ${ }^{54}$ The ground consisted of low-lying
swampy 'polderland' interlaced with dykes, which it was assessed would significantly increase the chances of casualties during the initial drop. Ironically, the RAF agreed to drop the Polish Division south of the bridge during the third lift, because they assumed that the anti-aircraft guns would have been captured or neutralised by then. ${ }^{55}$ Chatterton's point is crucial, surely the risk of flak should be weighed against the risk of landing eight miles from an objective, which if secured would ensure the success of the whole operation and possibly reduce the length of the war.

Urquhart was forced to select alternative LZs that were considerably further away from his main objective than he had wished. The selected LZs were just over eight miles away from Arnhem Bridge and consisted of large open expanses of heathland and farmland. The selection of LZs eight miles to the west of Arnhem bridge meant that Urquhart had to leave a significant element of his force, the Airlanding Brigade to protect the western LZs for the subsequent drops the following day. This was particularly significant as it left Urquhart with only the 1st Parachute Brigade, a quarter of his total force, to achieve the divisional objective on foot during the first 24 hrs . ${ }^{56}$ In an attempt to address this, Urquhart planned for the 1st Airborne Reconnaissance Squadron, under the command of Major Freddie Gough, to race to the bridge in specially adapted jeeps to attempt a coup-de-main. Critically, this prevented the Reconnaissance Squadron from undertaking their primary role of probing enemy defences, a role which could have identified that the river-road provided access to reinforce the few troops that eventually reached Arnhem Bridge. ${ }^{57}$ However, Kershaw in his book It Never Snows in September argues to the contrary and suggests that the disposition of II SS Corps around Arnhem would have negated any advantage in landing closer to the bridge. ${ }^{58}$

The selection of LZs eight miles away form the main objective was in total contradiction to the fundamentals of airborne warfare and flew in the face of all airborne experience to date. It was a clear example of how concern over limited airlift and enemy flak had constrained Market Garden before its first aircraft had taken off. There has been much conjecture about who should bear the responsibility for this fundamental error of judgement; however, the compelling evidence would suggest that the RAF's reluctance to accept risk, in what was already a very ambitious and risky operation, was extremely significant. It can be argued, that should the RAF have accepted the risks and if Browning had forced the issue with regard to LZs closer to the main objective, then a coup-de-main assault could have been undertaken to secure both ends of Arnhem Bridge. It is accepted that this would not have resulted in XXX Corps reaching Arnhem any earlier but it would have facilitated an easier link-up with the Polish Division landing in the third wave south of Arnhem Bridge. With both ends of Arnhem Bridge secure and with reinforcements in the form of the Polish Division, then there is a better chance that a link-up with XXX Corps would have taken place. The shortage of troop-carrying aircraft and the risk of heavy losses due to German flak had effectively resulted in a decision that ignored the shortage of one of the most important factors in airborne operations, namely to land close to the main objective.

## Information exploitation/air reconnaissance

"Intelligence told us we had nothing to worry about. There was no armour in the area and only second-rate line-of-communications troops and Luftwaffe personnel - a piece of cake in fact."
(Private James Sims, $2^{\text {nd }}$ Para Battalion ${ }^{59}$ )
If modern warfare has taught military tacticians anything, it is that information exploitation is

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everything. The modern commander, who can utilise intelligence assets to form and maintain an accurate picture of the battle space, secures a tremendous advantage over his adversary. The same could be argued during 1944, when air reconnaissance played a vital role in Market Garden and provided compelling evidence that, if interpreted correctly, should have resulted in at worst an amended plan and at best a cancelled operation. The advantages of air reconnaissance were well acknowledged and the RAF had significant air assets, even modified Spitfires, assigned to the reconnaissance role. Reconnaissance flights were able to obtain information regarding enemy dispositions, strengths, weaknesses and even geographical characteristics of a given area. Given that the Air Reconnaissance assets were available, in the form of 83 Group's 39 (Royal Canadian Air Force) Reconnaissance Wing, why was intelligence indicating the presence of at least the cadres of two

Panzer Divisions in the Arnhem area ignored? ${ }^{60}$ There is no doubt, that both General Browning and staff within the Headquarters of the $21^{\text {st }}$ Army Group, had received air reconnaissance evidence of the presence of German armour in the Arnhem area. One such source was, Major Brian Urquhart (no relation to Roy Urquhart the commanding officer of the $1^{\text {st }}$ British Airborne Division) who was the GSO 2 (intelligence) within Browning's headquarters. Brian Urquhart, concerned over reports from Dutch Resistance of German Armour in the Arnhem area, had requested additional low-level photographic reconnaissance missions. ${ }^{61}$ One particular sortie, flown by the RAF on 12 September provided clear evidence of the presence of German armour near Arnhem. ${ }^{62}$ On receiving the results some three days later, Urquhart showed the pictures to Browning who dismissed them as not being significant. ${ }^{63}$ Urquhart recalled some 50 years after the Operation: ${ }^{64}$
> "The photographs would already also have been sent to the higher headquarters, so I merely showed them to General Browning. As I recall it, General Browning's response was to show interest but generally to downplay the importance of the information. My job was to provide intelligence for my own commander, General Browning, whose responsibility it would be to pass on conclusions and any change in orders to $1^{\text {st }}$ Airborne Division."

Critically, the air reconnaissance pictures not only showed the presence of German armour but also indications that the Germans were far more organised than had been expected. Furthermore, correct interpretation of air reconnaissance pictures would have provided sufficient battle damage assessment to permit an accurate picture of anti-aircraft capability at German airfields, specifically Deelen. That said, the speed at which this data could be interpreted in 1944 and be used to inform the decision-making process was limited. However, it would have provided a clear indication that the weight of effort devoted specifically to the destruction of German flak had been successful. The vital point to consider is that the intelligence data was unquestioningly available to all the critical decision makers within Market Garden and they were well aware of the capabilities provided by air reconnaissance. air power had fulfilled another core capability, which unfortunately had been woefully ignored. Air Reconnaissance had played a significant role; however, the intelligence provided is only of use if it is interpreted as being significant. As Cornelius Ryan argues in his book A Bridge too Far, all down the allied line of command the evaluation of intelligence on the Panzers in the Arnhem area was magnificently bungled. ${ }^{65}$ If the Allies had interpreted the battle damage data and geographical information provided by the air reconnaissance sorties to their full extent, then they could have had a profound effect on the selection of LZs at Arnhem.

## Initial bombing campaign

"Heavy softening-up attacks were carried out by the Allied air forces prior to the airborne operation." ${ }^{66}$

Air power played a significant role in shaping the battle space in terms of creating localised air superiority and the undertaking of, in modern
terminology, an offensive counter air campaign to suppress the German air defence system. German airfields and German anti-aircraft positions, both along XXX Corps intended route and around key objectives, were targeted for maximum effect. Brereton's intention was to deliver ground troops safely to their objectives by suppressing the German defences. ${ }^{67}$ The extent of the bombing campaign was significant given that the operation was planned at short notice and that allied bombers were busy elsewhere. ${ }^{68}$ More than 1,400 Allied bombers were used during the initial stages of the operation and carried out raids on flak defences, troop positions and barracks within the three main airborne objective areas. ${ }^{69}$

The specific preparation of the battle space commenced during the night of 16-17 September when more than 200 Lancasters and 23 Mosquitos of RAF Bomber Command dropped 890 tons of bombs on four German fighter airfields, one of which was a Messerschmitt 262 jet fighter base. ${ }^{70}$ The suppression of the German defences did not stop with the bombing of German airfields. Over the following 24 hours 1,395 bomber sorties were flown, which concentrated on the destruction of German light and heavy anti-aircraft guns. ${ }^{11}$ Concurrently, more than 800 Flying Fortresses of the $8^{\text {th }}$ US Air Force bombed a total of 117 German anti-aircraft positions along the Market Garden route, dropping in excess of 3,139 tons of bombs. ${ }^{72}$ In addition to the anti-aircraft positions that were attacked, the US Flying Fortresses bombed airfields at Eindhoven, Deelen and Ede. Deelen was significant because, the LZs used by the British $1^{\text {st }}$ Airborne were selected to avoid tug aircraft from having to overfly anti-aircraft batteries at this airfield. These raids were followed by 54 Lancasters and five Mosquitos, while another 85 Lancasters and 15 Mosquitos attacked anti-aircraft positions on Welcheren island. ${ }^{73}$ Importantly, the allies enjoyed air superiority to the extent that these attacks scarcely registered as unusual with the Germans and, as a result, did not provide a clear indication of what was to come. ${ }^{74}$ The suppression of German defences was not left purely to the bombers of RAF Bomber Command and the US $8^{\text {th }}$ Air Force. Throughout the early stages of the operation, anti-aircraft positions along the Market Garden route were bombed and strafed
 airfield
by 212 Thunderbolts of $9{ }^{\text {th }}$ US Air Force, while 50 Mosquitos, 48 Mitchells and 24 Bostons of RAF 2 Group bombed barracks and airfields at Nijmegen, Deelen, Ede and Kleve ${ }^{75}$.

It is difficult to assess accurately the effectiveness of individual raids within the Allied Bombing campaign. However, the vital role the raids played in preparing the battle space along XXX Corps route and around the three main airborne objectives, cannot be discounted. Interestingly, there is some discrepancy as to the effectiveness
of the Allied bombing when related to aircraft loses because it is difficult to the determine the specific cause of why an aircraft was lost. The success of the bombing against the anti aircraft positions is equally difficult to assess. On the one hand, only one Dakota was lost during the arrival of the second wave of the $1^{\text {st }}$ British Airborne Division at Arnhem, whereas, the $101^{\text {st }}$ Airborne lost 33 Dakotas around the Eindhoven area where German anti aircraft positions appeared least damaged. ${ }^{76}$ Throughout the period 17-25 September, Allied Air Forces were to lose around


The sky trains were immense, both stretching for 94 miles in length and three miles in breadth

164 aircraft and 132 gliders, which accounted for 454 casualties from USAAF IX Troop Carrier Command and a further 294 casualties from RAF 38 and 46 Groups. ${ }^{77}$ There is no doubt that these figures would have been significantly higher had the Allies not conducted the extensive bombing campaign in preparation and throughout the operation. Given the technology and aircraft available at the time, air power did all it could to achieve Brereton's plan to deliver the ground troops safely to their objectives.

## Airlift: Troop carriers

"Oh, how I wish that I had ever had such powerful means at my disposal."
(Colonel-General Kurt Student, Commander
German $1^{\text {st }}$ Parachute Army ${ }^{78}$ )
The airlift of troops was conducted in two streams, with 101st Airborne Division on the southern route into Holland, and both the $82^{\text {nd }}$ Airborne Division and $1^{\text {st }}$ British Airborne Division on the northern route ${ }^{79}$. The sky trains were immense, both
stretching for 94 miles in length and three miles in breadth. ${ }^{\text {s0 }}$. The $101^{\text {st }}$ Airborne was carried by 424 Dakotas and 70 glider/tug combinations and, on the northern route; the $82^{\text {nd }}$ airborne travelled in 482 Dakotas and 50 glider/tug combinations and were followed by the 38 glider/tugs of I Airborne Corps Headquarters. ${ }^{81}$ Significantly, the 38 glider/ tugs used to drop Browning's HQ could, and arguably should, have been used to carry an entire infantry battalion. ${ }^{82}$ The $1^{\text {st }}$ Airborne travelled in a total of 1,051 troop carrier aircraft and 516 glider/ tugs, which made the total number of troop carrier
aircraft 2,083. Critically, there was insufficient airlift for the British $1^{\text {st }}$ Airborne to be dropped in a single wave and consequently, the drop would have to be spread over three days. Of all the three Divisions, arguably the British $1^{\text {st }}$ Airborne was the most dangerously exposed and had good claims to priority in airlift resources. ${ }^{83}$ However, much of the troop transport aircraft supplied belonged to the US and it was argued that it was a priority to secure the bridges around Eindhoven and Nijmegen, without which XXX Corps would never reach Arnhem.

> The air power contribution to Market Garden in terms of troop carrying capability was truly staggering. Throughout the course of the Operation, Allied Air Forces had dispatched 4,852 troop carrying aircraft
> "If the weather had been good the operation would have been 100 per cent successful instead of 90 per cent." (Field Marshal Sir Bernard Montgomery ${ }^{\text {si }}$ )

The weather undoubtedly played its part in adversely affecting the delivery of reserve elements during the 18 September. The second airborne wave, due to depart at dawn, was delayed due to heavy fog in England but eventually got airborne at 10:00 hours. The wave consisted of 1,200 troop carrier aircraft escorted by 867 fighters and followed the same northern route flown the day before. ${ }^{55}$ On Tuesday 19 September the weather continued to play a significant role as the fog again delayed the departure of the third wave of allied troops. The third wave eventually took off at 13:00 hours when the last battalion of $327^{\star}$ Glider Infantry and $101^{*}$ Airborne's artillery travelled in 385 gliders, of which 189 were lost or turned back. ${ }^{86}$ However, that was the good news, for the 428 gliders carrying $82^{n d}$ Airborne's reinforcement and the 114 Dakotas of the $1^{*}$ Polish Parachute Brigade, remained grounded all day. ${ }^{87}$

During the planning Urquhart was keen that there should be two lifts of troops into Arnhem on the first day of the operation.ss Critically, Brereton listened to General Paul Williams, who was in overall command of the US and British Transport aircraft, which had insisted on a single drop per day.s. Williams was concerned that to attempt two drops in daylight would leave insufficient time for proper maintenance and that crew fatigue might lead to an increase in accidents. ${ }^{0}$ To counter this, the RAF suggested that the first lift could be flown prior to dawn. However, the standard of night flying and navigation amongst the US crews was inadequate for such a task. ${ }^{9}$ There is no doubt that the dissolution of the delivery of the British $1^{\text {st }}$ Airborne, with the subsequent loss of surprise, was a major factor in the whole operation's failure. ${ }^{9}$ However, the fascinating issue centres on what might have happened if a second wave had been undertaken on the first day of Market Garden. If a second wave had been conducted and if troop carrier assets had been re-assigned from carrying $1^{\text {t }}$ Airborne's HQ element to carry an infantry brigade, then there is a distinct possibility that both ends of the Arnhem Bridge could have been secured during the first day of the operation.

Urquhart had planned for the $1^{\text {st }}$ Parachute Brigade to hold the bridge at Arnhem and for the $4^{\text {th }}$ Parachute Brigade to hold the high ground to the north of Arnhem. This left the $1^{\text {st }}$ Airlanding Brigade to secure the western approaches and the Polish Parachute Brigade to take up positions to the East. A second wave in the first 24 hours and the re-allocation of Browning's $1^{\text {st }}$ Airborne HQ gliders to carry a brigade of infantry, would have provided Urquhart with the four Brigades he required for his plan. Urquhart's basic plan was fundamentally sound and there is sufficient evidence to suggest that had the force delivery been undertaken during 17 September, then British $1^{\text {st }}$ Airborne could well have been successful at Arnhem. It can be argued, that the decision by Brereton to veto the second wave during the first 24 hours, effectively doomed Urquhart's plan to failure before he had left England.

The air power contribution to Market Garden in terms of troop carrying capability was truly staggering. Throughout the course of the operation, Allied Air Forces had dispatched 4,852 troop carrying aircraft to their destinations, of which 1,293 delivered paratroops and a further 2,277 towed gliders. ${ }^{93}$ Some 39,620 troops were delivered by air to their targets $(21,074$ by parachute and 18,546 by glider) with 4,595 tons of stores. ${ }^{94}$ Purely in terms of the number of troops dispatched, it was a remarkable achievement and an unquestionable success. However, as previously argued, this needs to be balanced against the critical impact of Brereton's decision to veto a second British wave on the first day of the operation.

## Close air support

"Although I was naturally disturbed by the non-arrival of Horrocks's Corps, I was much more annoyed at the disappointingly meagre offensive air support we were receiving. The re-supply boys' gallantry had been magnificent, but the fighters were rare friends." (Maj Gen R Urquhart ${ }^{\text {s5 }}$ )

Urquhart's criticism regarding the lack of close air support has a familiar ring to it compared to the criticism levelled at the RAF during the early stages of the North African campaign. It would be unfair to draw too many parallels between Market Garden and North Africa because the nature of providing close air support to airborne troops
presents some unique problems. This argument is not offered as a defence of the air force elements during Market Garden but is merely used to help put the close air support aspect into context. Unlike conventional close air support operations, airborne troops usually operate behind enemy lines and, as a result, it is extremely difficult for pilots to distinguish between their own and enemy troops operating beyond established front lines. ${ }^{96}$ The only way to combat this was for the airborne troops to indicate their position by the use of pre-arranged signals or by radio, both of which were dangerous as they were open to enemy interference. ${ }^{97}$ Furthermore, it was difficult, if not impossible, to provide airborne troops with air support when they were at their most vulnerable while dropping into their LZs. ${ }^{98}$ The provision of close air support to advancing armour and ground troops was well practised by 1944 which makes the lack of effective and coordinated close air support during Market Garden worthy of debate.

Notwithstanding the difficulties of providing close air support for airborne troops, the arrangements for close air support during Market Garden were woefully inadequate. ${ }^{99}$ No proper liaison was established with RAF 83 Group, air control teams were few, poorly trained, and equipped with radios that never worked. Furthermore, Browning acquiesced to an Air Force ruling which barred 83 Group from supporting his Corps whenever troop carriers and their escorts were due overhead the battle area. ${ }^{100}$ This decision is understandable given the difficulties of de-conflicting the operations of two different air forces within the same airspace and the risks of errors in identification. ${ }^{101}$ Notwithstanding the difficulties in predicting the movement of fog and the limited communications in 1944, the failure in communication and coordination proved critical when delays in the second wave on the 19 September were not passed to $2^{\text {nd }}$ Tactical Air Force, which continued to fly support according to the original timetable. ${ }^{102}$ The consequences were severe as the airborne troops in Holland received no close air support compared to 125 Luftwaffe fighter sorties. ${ }^{103}$ The situation was further compounded by the fact that the $2^{\text {nd }}$ Tactical Air Force turned down nearly $50 \%$ of close air support requests from the Airborne Corps. This refusal was based on insufficient
target information to mount proper attacks and on experiences in Normandy where friendly troops had been bombed by Allied aircraft. ${ }^{104}$ It could be argued that this was an over cautious approach, given the fact that the $1^{\text {st }}$ Airborne were so desperate for support that they called down artillery support onto their own positions. ${ }^{105}$ The poor target information could have been as a result of Browning's failure to arrange RAF and USAAF liaison officers with his own troops and to support the small number of air control teams. As Urquhart recalls, even when air support did arrive it was not effective: ${ }^{106}$
"At this time I called for offensive air support and Typhoons rocketed German positions; but there were not many of them and the volume of fire from enemy mortars was not noticeably affected. I wondered then why so few fighters came to our aid."

Urquhart's criticism must be balanced against the difficulties of providing close air support in urban areas. The $1^{\text {st }}$ Airborne were involved in a bitter urban engagement, in which the identification of German positions from the air would have been extremely difficult. ${ }^{107}$ This may well account for the limited impact upon German mortar positions.

Complaints regarding a lack of close air support were not the sole prerogative of the airborne element. With regard to XXX Corps, persistent haze and low cloud prevented aircraft from identifying and attacking targets on several days and this was compounded by the difficulties in establishing a satisfactory bomb line. ${ }^{108}$ This is perfectly understandable given the situation where British tanks may be further north than German ones, and the latter may be heading southwards and the former north or eastwards. ${ }^{109}$ Notwithstanding this, the progression of XXX Corps north of Nijmegen was hampered by a lack of air support as Lieutenant Colonel J O E Vanderleur of the Irish Guards recalled after the operation: ${ }^{110}$
"Our bitterest regret was that the air tentacle was not working, for with even moderate support from the Tiffies (Typhoons) we might have broken through to Elst, if not further".

The lack of provision of close air support can also be attributed to the weather and specifically
the fog. The fog effectively grounded the Allied aircraft in Belgium and northern France for the morning of the 18 September, which meant that only a few close air support sorties could be flown. However, for the Germans it was a different picture, as the fog cleared early enough for the Luftwaffe to launch their main effort. ${ }^{111}$ As a result, the $82^{\text {nd }}$ Airborne received only 97 close air support sorties from RAF 83 Group, and the $1^{\text {st }}$ British Airborne received none, this was compared with the 190 Luftwaffe fighters committed to the area. ${ }^{112}$

In addition to the vast number of troop carrier and re-supply sorties flown during Market Garden, more than 6,172 air support sorties were flown, more than half of them by $8^{\text {th }}$ Air Force, for the loss of 125 aircraft. ${ }^{113}$ Significantly, the $2^{\text {nd }}$ Tactical Air Force and $9^{\text {th }}$ Air Force only flew 743 of the 6,172 air support sorties: this is no doubt a result of their refusal of 46 out of 95 requests for air support from I Airborne Headquarters. ${ }^{114}$ The Allied troops should have enjoyed the protection afforded by air superiority. However, as in the early part of the North African campaign, the ground troops fighting in Arnhem and along XXX Corps approach route, were left wondering as to the whereabouts of their promised air cover. The lessons regarding close air support had been hard learnt in previous campaigns and, although a large number of sorties were flown in support of Market Garden, they were poorly coordinated and lacked impact. The airborne troops were lightly equipped, facing German Armour, and XXX Corps route was along a raised causeway affording little protection. Therefore, the importance of well-focused and coordinated air support could not have been more vital. It is pure conjecture with the benefit of hindsight, that suggests that, should XXX Corps have been provided with adequate air support north of Nijmegen, then they could have made the final push towards Arnhem. Furthermore, it could be argued that had the $1^{\text {st }}$ British Airborne Division have received the close air support that they had the right to expect, they could have punched through the German lines and reinforced the northern end of Arnhem Bridge.

## The fight to sustain

"The sight of the Stirlings and Dakotas flying
unhesitatingly into the German barrage where sometimes, although hit and on fire, they continued to circle above the German lines while the RASC Dispatchers threw out the supplies before the aircraft crashed into the earth, was so moving that for many of those who witnessed it no more poignant memory of Arnhem remains." ${ }^{115}$

Because of the nature of Airborne Warfare and the necessity for troops to be dropped behind enemy lines, the issue of re-supply is always a critical one. Airborne troops, by necessity, are limited by the amounts of ammunition and supplies they can take into battle and re-supply by air is limited by the amount of aircraft available. Furthermore, transport aircraft are extremely vulnerable and a degree of control of the air is an essential element if re-supply by air is to be sustained or undertaken on a large scale. Other than for airborne operations, supply and maintenance by air, within the European Theatre, was planned only as emergency measure rather than as a routine part of normal operations. ${ }^{116}$

The extent of the airlift required for Market Garden was truly immense and although re-supply could be achieved via road once XXX Corps had linked up with each Airborne Division, the initial 24-48 hours of the airborne operation would have to be sustained via the air. In the case of the $1^{\text {st }}$ British Airborne Division, this sustainment was to extend well beyond 48 hours. The concept of airborne logistics, as undertaken during Market Garden was fundamentally sound and its broad principles have survived to the present day. ${ }^{117}$ The crews, both RAF and the air dispatchers, were highly motivated, well trained and, as the previous quote highlights, unquestioned in their bravery. As Frank Steer argues in his book, Arnhem - The fight to Sustain, there was nothing wrong with the overall concept for airborne logistic support or with the plan for logistic support at Arnhem. ${ }^{118}$ So, if this were the case, then why during only the second day of the operation were the $1^{\text {st }}$ British Airborne short of vital supplies and why were so many transport aircraft being lost? For example, on the 18 September 145 Stirlings and Dakotas of RAF 38 and 46 Group dropped re-supplies to $1^{\text {st }}$ British Airborne Division, but unfortunately, of the 87 tons dropped only 12 tons reached the British troops
at a cost of 13 aircraft. ${ }^{19}$ The Americans fared only marginally better when 135 Liberators of $8^{\text {th }}$ Air force dropped re-supply to $82^{\text {nd }}$ Airborne ( $80 \%$ of which was recovered) and a further 117 Liberators dropped re-supply to $101^{\text {st }}$ Airborne ( $50 \%$ of which was recovered), losing 11 aircraft. ${ }^{120}$

The key factor that prevented what was an excellent logistical plan being executed to the same degree was the breakdown in communications and the inability of the Allies to adapt their plan when things went wrong. The German reaction to the Allied assault was both more capable and faster than the Allies had predicted and will be examined in detail in the following section. The implication for the fight to sustain the British troops at Arnhem was that the Germans quickly over ran their re-supply drop zones and the badly needed supplies fell into German hands. This alone was not the critical factor, what rendered this problem difficult to resolve was the poor communications between the $1^{\text {st }}$ British Airborne and any unit outside Arnhem. Urquhart made every attempt to inform aircrews that the re-supply drop zones had been overrun via a BBC war correspondent's radio set and a Second Army 'Phantom' set linked to headquarters in Belgium. ${ }^{121}$ Unfortunately, these messages were never passed on and pilots continued to make drops to scheduled drop zones because contingency zones had not been identified and they had been instructed to ignore signals from the ground. All these factors combined to effectively negate the extraordinary bravery and courage displayed by the Allied aircrews. Should supplies have reached the $1^{\text {st }}$ Airborne according to the logistical plan, there is the distinct possibility that they could have sustained their fight for longer.

## The German perspective

"But the Germans, General, the Germans."
(Major General Stanislaw Sosabowski ${ }^{122}$ )
Although aspects of the German reaction have been included in previous sections of this article, no research into Operation Market Garden would be complete without a specific examination from the German perspective. Much is made of the fact that the $1^{\text {st }}$ British Airborne Division landed on top of two German Panzer Divisions and the misconception that the German forces were made up of old men and boys. However, whenever

Market Garden is studied in detail, the emphasis always appears to concentrate on Allied mistakes in planning and execution rather than, with the possible exclusion of Kershaw's 'It never snows in September', the effective counter-measures employed by the Germans. ${ }^{123}$ Kershaw provides compelling evidence of the speed of the German reaction and the success of the Wehmacht's adhoc army divisions. General Wilhelm Bittrich, the Commander of IISS Panzer Corps, took only 10 minutes to issue his first warning orders after receiving reports of the Allied landings, despatching 9SS Division to Arnhem and 10SS Division towards Nijmegen. ${ }^{124}$

Both Bittrich and later Field Marshall Walther Model, Commander Army Group B, were quick to realise the operational importance of Nijmegen and Arnhem and focused their counter measures on these 2 key objectives. ${ }^{125}$ To what degree Model's actions were governed by captured orders or by his talents as a commander are open to some debate. What is not open to debate is the extent to which the German forces were well-organised, well lead and fierce combatants. Although it is only right to acknowledge the counter measures undertaken by German ground forces, this article's focus is on air power and the Germans' efforts to combat Allied air power is a key factor.

The Allies should have enjoyed the luxury of Air Superiority; however, the air-to-air combat during Market Garden was not always as one sided as the Allies might have expected. Far from being a spent force, the Luftwaffe reacted as quickly and were particularly adept at drawing on fighters as far afield as Dortmund, Guetersloh and Werl, all well within the Reich. ${ }^{126}$ That said, these fighters were operating from airfields some distance from the conflict, which will have had an adverse effect on their sortie generation rate. Nevertheless, 300 fighters from the 'Reich' Jagdflieger (Fighter) Division 1, released from Wehrmacht Headquarters West, played a critical role in hampering Allied operations over Arnhem and accounted for 40 transport aircraft and 112 gliders. ${ }^{127}$ The Luftwaffe response was far from being either negligible or uncoordinated. The Jagdflieger division was directed by $95 S$ headquarters using newly established communications, which permitted the

# The Allies should have enjoyed the luxury of Air Superiority; however, some transport aircraft flew over Arnhem without fighter protection and paid a heavy price 

headquarters to direct the division in the air. The success of the Luftwaffe is not easy to quantify. Allied aircraft were encountering enemy fighters and suffering losses that could not be sustained indefinitely. An RAF 38 Group report later recalled: ${ }^{128}$
"The result is reflected in the casualties. For the first time enemy fighters were in full evidence, and 10 Focke-Wulf 190s, in particular, took heavy toll, shooting down 7 out of 10 aircraft from one squadron in the third wave. A total of 23 aircraft ( $20 \%$ of the force) are unaccounted for; a further 7 were damaged by fighters and 31 by flak, which was more intense than ever along the route and in the target area. A total of $52 \%$ of the force was lost or damaged . . ."

The Luftwaffe only formed one part of the German air defences and the role of the antiaircraft batteries, despite heavy allied bombing, cannot be ignored. Particularly around Arnhem, air defences were well coordinated and were reinforced by Lieutenant Colonel Swoboda's flak brigade. The brigade consisted of five battalionsize detachments of 88 m flak and heavy artillery, which the Germans claim accounted for more than 13 transport aircraft shot down and at least 97 damaged. ${ }^{129}$ Further flak assets were redeployed from the Ruhr industrial basin and, when all flak in the Arnhem area was placed under the control of Swoboda's brigade Headquarters, they helped to form an effective air-defence umbrella around Arnhem. The reorganisation of Luftwaffe and anti aircraft defences was both rapid and effective and both played a significant role in combating Allied air power.

## Conclusion

"Heavy risks were taken in the battle of Arnhem, but they were justified by the great prize so nearly within our grasp."
(Sir Winston Churchill ${ }^{130}$ )
History has ably demonstrated that the conduct of any successful airborne operation is dependant upon a number of factors but one of the most critical is close co-operation between the land and air components. In this respect, probably more than any other, there was a fundamental breakdown, which resulted in an inefficient use of a significant amount of Allied air power capability. The Allies should have enjoyed the luxury of Air

Superiority; however, some transport aircraft flew over Arnhem without fighter protection and paid a heavy price. The price paid was in terms of both aircraft lost and the adverse effect on the morale of Allied troops on the ground.

Much is made of the selection of LZs for the $1^{\text {st }}$ British Airborne Division at Arnhem and this article is no exception. The reluctance of Air Force commanders to accept risk, in what was already a very risky operation, resulted in the selection of inappropriate LZs that contradicted the fundamentals of successful Airborne Warfare. Furthermore, a more accurate interpretation of air reconnaissance data should have resulted in more informed decisions regarding the selection of LZs, the extent of German flak and the relative capabilities of German ground forces.

Probably the single most significant decision was Brereton's veto of a second British wave on the first day of the operation. Notwithstanding the selection of LZs eight miles west of Arnhem Bridge, a second wave would have provided Urquhart with all four of his Divisions and no requirement to leave the $1^{\text {st }}$ Air Landing Brigade protecting LZs. There is a significant possibility that such a force would have succeeded in reaching Arnhem via the river road and secure both ends of the Bridge. This alone could have changed the course of the whole operation.

Given the lessons learnt much earlier in North Africa, the failure of Allied Air Forces to provide adequate levels of close air support, through poor communications and coordination, was particularly damaging to both the operation and Allied morale. The problems regarding the coordination of close air support sorties, target identification, position of own forces and the nature of the ground battle are acknowledged. However, should XXX Corps have received even moderate close air support when north of Nijmegen, then they could have pushed through Elst and may have even reached Arnhem.

The extraordinary bravery and courage displayed by Allied aircrews in the fight to sustain the battle at Arnhem deserves acknowledgement but was negated by the breakdown in communications and
inability of the Allies to adapt their plan. Had the supplies reached the $1^{\text {st }}$ Airborne then they would have had sufficient ammunition, food and water, to maintain their defence against an enemy that was growing stronger by the day. Such supplies could have been sufficient for the British troops to hang on long enough for XXX Corps to have made the final push through Elst to Arnhem.

The Luftwaffe and German flak played a significant role in hampering Allied air power. That said, despite the flexibility shown in coordinating an effective air defence system around Arnhem and the ability of the Luftwaffe to draw upon additional resources, the Allies should have been able to employ sufficient air power to combat the German counter measures. As Stephen Badsey accurately assessed, Allied air inferiority was in a large part self-inflicted.

As with any historical study, hindsight and conjecture play their roles in formulating conclusions. However, there is clear evidence to suggest that air power played a critical role in contributing to the failure of Operation Market Garden and that a more effective use of air power would have resulted in a historically significant Allied victory. More importantly, Market Garden was not just a failure of air power, it was a failure of joint planning and execution.

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## Notes:

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${ }^{4}$ Longson and Taylor (1991), p. 13
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${ }^{41}$ Kershaw (1990), p. 153
${ }^{42}$ id.
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${ }^{115}$ Steer (2000), p. 164
${ }^{116}$ ibid, p. 33
${ }^{117}$ Steer (2000), p. 153
${ }^{118}$ id
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${ }^{122}$ Hibbert (1998), p. 34
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# Plotting a True Course: 

Reflections on USAF Strategic Attack Theory and Doctrine, the Post-World War II Experience

## Edited by David R Mets and William P Head

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## Reviewed by Mark K Wells

Scholarly volumes dealing with the topic of air power, and, most particularly any historical analysis of air power doctrine and theory, increasingly follow the format of this useful book. Rather than the reflections of a single author, these studies - now numbering more than a score - have generally presented the collective wisdom of several notable scholars. This approach certainly tells us much about the increasing complexity of contemporary thought on the subject, but also suggests that the fundamental debates about the role, impact, and ultimate influence of air power in modern war may never be finally resolved. In short, when the subject is air power, it seems clear that we cannot arrive at any consensus. Rather, it is by way of our continuing struggle to understand the issue that progress is made.
This book clearly adds to the body of argument and is fun to read. Like many of the earlier volumes, it presents a series of conference papers edited to develop a coherent primer on post-war airpower theory. The majority of these papers, originally presented in 1997 at the Air Force History and Museum Program of the Air Force Symposium, are authored by an impressive line-up. Dave Mets and William Head have put together four solid chapters bracketed by a thoughtful introduction on the dawn of the nuclear age and an insightful conclusion covering the last 50 years of air power.
To the extent that a single theme ties the essays of this book together, it is the question of whether or not technological change drives doctrine, or the other way around. Mets opens the debate in a review of General Carl Spaatz's legacy and determines that bureaucratic
negotiation and compromise were as much a factor in the organizational changes of the post-World War II US Air Force as were technology and doctrine. William Head contributes a well-written chapter on the use, or, more properly, misuse of B-52s during the Vietnam War. Avoiding any tendency to argue whether or not the air war there might have been 'won', he nevertheless accurately suggests that airmen came away from the experience convinced that airmen, and airmen alone, must fully control air power assets in any future conflict. Moreover, with the stakes so high in other areas of the world, most of them preferred to avoid struggling with the air power issues raised by limited conflict. Mark Conversino's chapter on deterrence nicely summarizes 50 years of American nuclear policy. He makes the point quite clearly that the Air Force's response to the ongoing development of nuclear weapons in the late 1940s drew heavily from air doctrine and theory developed during the Second World War. Moreover, contemporary notions of strategic targeting, parallel warfare, and potential escalation - perhaps with modern precision weapons - continue to rely on widely accepted airpower theories tracing back to the Cold War. Colonel P Mason Carpenter's essay on strategic air attack in Gulf War I accurately reviews the planning and conduct of that campaign. Carpenter suggests, with strong justification, that new technologies, particularly stealth and precision, have "staggering implications" for air power doctrine and future employment. Even so, arguing that airpower is the sole solution for military conflict is to set it up for failure. Head weighs in again with an astute analysis of the 1999 Kosovo air campaign. Noting the increasing requirement for the mobility and responsiveness of airpower, Head suggests that Kosovo seemed to demonstrate to air power advocates that, at least in some situations, air power could carry the day.

Addressing this fundamental assertion may be the ultimate value of this book. Despite its rather steep price, it should appeal to the growing coterie of scholars interested in the debate. Can airpower, however transformed by technology and applied by up-to-date doctrine, truly be decisive? Mets' and Head's book suggests that the answer to this contentious question is less important than the intellectual investigation itself.


[^0]:    Notes:
    ${ }^{1}$ Cook, The Myth of the Aviator, History Today, pages 36-42, December 2003.
    ${ }^{2}$ There are at least another 14 recorded suicides amongst members of the British Air Services during the First World War. However, the actual total may well be higher.

[^1]:    ${ }^{23}$ Winter, op cit, pages 174-191.
    ${ }^{24}$ These are preserved in NA(PRO) MH106/2202-2206 and cover the period 1916-1919.
    ${ }^{25}$ Medical Problems of Flying, Medical Research Council Pamphlet No 53, London, HMSO, 1920, NA(PRO) FD4/53.
    ${ }^{26}$ Kearney, Military Stress and Performance, pages 15-16,
    Melbourne University Press, 2003.
    ${ }^{27}$ Fuller, op cit.

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