

Air Power Review

Volume 16 Number 2

Summer 2013

**Rise of the Robots? Western Unmanned
Air Operations in Iraq and Afghanistan,
2001 to 2010**

Squadron Leader Joe Doyle

**African Union Intervention Capacity:
Implications for Air Power**

Wing Commander Rob O'Dell

**The Troublesome 1930s: General Unrest,
Intense Activity and Close Cooperation**

Colonel Andrew Roe

Viewpoints

Air Commodore Paddy Teakle

Book Reviews

Colonel (Ret'd) Philip Meilinger
Group Captain Clive Blount
Group Captain (Ret'd) Ian Shields
Mr Chris Hobson

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Royal Air Force Air Power Review

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Two Hawker Hart light bombers of 39 Squadron at Miranshah on the North West Frontier in 1938



The first deployment of troops from Ghana into Mali step off a RAF C-17 at Bamako airport on 11 February, 2013. Detached from 99 Sqn at RAF Brize Norton to Accra, Ghana, in support of OP NEWCOMBE (Photo by Sgt Ralph Merry ABIPP RAF)



An RQ-4 Global Hawk maintenance team tows an unmanned Global Hawk aircraft

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AUAB-11-036-KAF UK Reaper reaching 20,000 flying hours at Kandahar Air Base KAF. UAV taxiing and landing at KAF Kandahar Air Fields Afghanistan
Date: 17 March, 2011
(Photo by Cpl Steve Follows RAF)



Westland Wapiti, J9719/N, of 60 Squadron over the North-West Frontier, 8 August 1930

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A U.S. Air Force MQ-1 Predator aircraft
(U.S. Air Force photo by Master Sgt. Scott Reed)

Foreword

By Group Captain Peter Squires

This Summer 2013 edition of Air Power Review sees a mix of articles that cover contemporary and historic operations from tactical to strategic perspectives. The contributors are a blend of the Chief of the Air Staff's academic Fellows and members of the wider community of air power experts and academics, ensuring that thoughtful, relevant and contemporary analysis remain the touchstone of our publication.

This edition starts with an insightful article by Squadron Leader Joe Doyle who writes on a decade of unmanned air operations in the Iraq and Afghanistan theatres. The focus of Squadron Leader Doyle's paper is how Unmanned Aerial Vehicles (UAVs) have matured and developed since their initial deployment in support of the Global War on Terror in 2001. With UAVs initially heralded as signifying a revolution in the application of air power, the author suggests that despite very clear successes in these conflicts, perspective should be retained. This perspective should be informed by the relatively benign, permissive air operating environment within these counter-insurgency campaigns which presented little or no threat to the UAV. As such, he argues that it is perhaps premature to talk about the wholesale replacement of manned aircraft in western force structures and doctrine along with the removal of the human-being from the air. His justification for this argument rests on a realistic assessment of the pace of technological change, the pitfalls of over-promising and under-delivering in this emergent area and the dangers of relying upon unproven, untested platforms. In substantiating these concerns, Squadron Leader Doyle points to the relatively narrow, limited role of UAVs in Iraq and Afghanistan (ISR and to a lesser extent, attack) combined with significantly higher accident rates, technical difficulties and conceptual challenges that rest, in part, on the morality of unmanned warfighting from the air.

Our second article is by Wing Commander Rob O'Dell, a Chief of the Air Staff's Fellow, who writes on the contemporary topic of humanitarian, peacekeeping and military intervention in Africa under the auspices of the African Union (AU). Central to Wing Commander O'Dell's paper is how the AU has disappointed the international community in its willingness and ability to intervene in times of humanitarian crisis on the Continent despite many opportunities to do so since its inception in 2002. He sets out the importance of developing the AU's intervention capabilities, examining the subject from an air power perspective as well as from the wider, strategic viewpoint for the region. It is the disparate, uncoordinated nature of the AU that the author highlights as undermining its ability to intervene militarily, when needed, because of a paucity of shared doctrine, standard operating procedures, command and control, logistics and training. Each of these areas are carefully analysed by the author to give the reader a clear, unambiguous insight into where the practical shortcomings of this institution lie, also positing why the AU has failed to develop its intervention capacity over time. The African Union Mission in Somalia (AMISOM) is held up as an example in which serious questions were

raised about its ability to deploy and endure under austere conditions as AU fatalities from disease, poor conditions and lack of adequate medical facilities were seen in 2009 – a situation the author describes as more reminiscent of the Crimea than a 21st Century peacekeeping mission. Wing Commander O'Dell summarises that 'the AU's ability to conduct autonomous operations is highly questionable' and this has an impact on the Continent's own global standing. Ultimately, the author argues that a more balanced, partnered approach with the UN, as the European Union and NATO routinely do, could have the effect of transforming Africa's approach to managing internal conflicts.

The final article of this edition is written by Colonel Andrew Roe. Colonel Roe's depth of experience as a serving infantry officer in the British Army undoubtedly helps in providing a fascinating perspective on air power on the North-West Frontier of India in the 1930s and 40s. In this article, the author presents a view of the rapid advancement in the use of air power during this period with the region being at the forefront of innovation in air-land integration. Against a background of inter-Service rivalry, with the Royal Air Force having demonstrated an eagerness (and aptitude) for independent colonial policing in Iraq, Colonel Roe's well researched paper highlights how the Army and Royal Air Force partnered effectively to complement and mutually support one another as this campaign progressed. By necessity rather than altruism, each Service found that the optimum results in tribal control came through close and consistent cooperation, giving birth to joint planning and coordination. Colonel Roe describes how this, in turn, allowed for better targeting and closer integration of air assets when supporting ground operations. Readers will know from Lieutenant Colonel Weir's Viewpoint in the previous edition of APR (*Using Air Power in a Small War – A Battlegroup Commander's Reflections on Operations in Afghanistan – Winter 2010/11*) that the same theatre, 70 years on, poses similar challenges and requires cooperation to be absolute.

The three articles in our Summer Air Power Review are complemented by a personal viewpoint that is intended to be thought provoking and stimulate debate. As ever, the editorial team would welcome comments in response to this viewpoint and is poised to publish constructive comments or a counter viewpoint.

Air Commodore Paddy Teakle provides a viewpoint for this edition on the subject of 'Military Momentum – increasing velocity to offset reducing mass'. Based against a backdrop of Western recession and financial constraints, Air Commodore Teakle discusses the criticality of embracing the concept of 'military velocity' over the inherited concept of prioritising the application of 'mass'. The author underpins his argument by carefully defining both of these concepts before arguing that it is essential that the direction of velocity is fully understood in order for commanders to 'operate at the speed of the problem and consequently exercise control over campaign tempo'. Throughout his viewpoint, Air Commodore Teakle retains a strong linkage with the projection of air power within the context of military momentum as well as across the other four operating environments.

This edition of Air Power Review concludes with 3 book reviews and a review essay. The review essay, by Phillip S. Meilinger, pulls together three recently published books providing excellent insight into each one for the prospective reader. Meilinger examines John Stubbington's *Kept in the Dark: The Denial to Bomber Command of Vital Ultra and Other Intelligence Information During World War II* (Barnsely: Pen & Sword, 2010) before going on to discuss Air Commodore (Retired) Peter Gray's book *The Leadership, Direction and Legitimacy of the RAF Bomber Offensive from Inception to 1945* (Birmingham War Studies Series. London: Continuum International Publishing, 2012). Having reviewed books on RAF intelligence and leadership in the Second World War, Meilinger concludes with a revealing view from the 'other side' in *Germany and the Second World War: Vol. VII: The Strategic Air War in Europe and the War in the West and East Asia 1943-1944/5* (Horst Boog, Gerhard Krebs and Detlef Vogel; Oxford, Clarendon Press, 2006).

Group Captain Clive Blount provides a review of Neil Sheehan's *A Fiery Peace in a Cold War: Bernard Schriever and the Ultimate Weapon* (New York – Random House, 2009). Sheehan's book gives a thorough account of the United States programme to develop an Intercontinental Ballistic Missile with scientist and innovator, Bernard Schriever, as the key protagonist. Group Captain Blount describes the book as entertaining and thought provoking with much to offer any student of military innovation. This is followed by Chris Hobson's review of Air Commodore (Retired) Graham Pitchfork's recent work entitled *The Sowreys: A Unique and Remarkable Record of One Family's Sixty-five Years of Distinguished RAF Service* (Grub Street, 2012), profiling a family that produced no less than 6 pilots and a member of the Women's Auxiliary Air Force over the course of 2 generations. Last but certainly not least, Group Captain (Retired) Ian Shields reviews Anthony Beevor's *The Second World War* (London, Weidenfeld and Nicholson, 2012) which attempts to cover the conflict in a single, 850 page volume. Feedback is positive aided in part to its comprehensive, chronological approach.

Notes on Contributors

Squadron Leader Joe Doyle is a fast jet navigator who joined the RAF in 2000 after reading History at the University of Birmingham. Following a first tour on the Tornado F3, he transferred to the Tornado GR4 and served on 14 Squadron, based at RAF Lossiemouth, between 2005 and 2008. He then completed a tour as an instructor on XV(R) Squadron, the Tornado GR4 Operational Conversion Unit, before being promoted and posted to his current appointment as a Flight Commander on IX(B) Squadron at RAF Marham. Squadron Leader Doyle has flown on operations over Iraq and Afghanistan, most recently returning from Operation HERRICK in March 2013. He is a Kings College London alumnus, having completed the *War in the Modern World* MA, graduating in January 2012.

Wing Commander Rob O'Dell is a Fighter Control Officer by background, joining the AWACS force after initial tours in the UK and Cyprus. Ultimately qualifying as an E-3D Tactical Director, he flew over 300 missions in support of NATO operations in the former Yugoslavia, including 20 sorties during Operation ALLIED FORCE. Following a ground tour at RAF Buchan, O'Dell returned to Waddington in 2001 as a flight commander on 23 Sqn where he accrued further operational experience over Afghanistan and Iraq. On completion of this tour in 2004, Rob was posted to AWC as the ISTAR specialist within its Tactics Division.

In 2006, O'Dell graduated from ACSC where he gained an MA in Defence Studies from Kings College London; his thesis on the impact of EW on the WWII Night Bomber Offensive was subsequently awarded the 2007 Gordon Shephard Memorial Trophy. Following a tour in Iraq as the Air Component Commander's Liaison Officer to HQ MND(SE), Rob assumed command of the Air C2ISR OEU within AWC. Assigned the 56(R) Sqn number-plate during O'Dell's period in command, the Sqn was responsible for operational test and evaluation of E-3D, Nimrod R1, MR2 and MRA4, Sentinel R1 and Shadow R1 aircraft, as well as ground based C2 and intelligence exploitation systems.

Leaving 56(R) Sqn in Sep 09, O'Dell moved to PJHQ as SO1 ISTAR within J3. Wg Cdr O'Dell was then selected for a Tedder Fellowship to study for an MPhil in International Relations at Cambridge University from October 2011. His thesis examined the potential of airborne C4ISR in stabilisation and conflict prevention operations and he gained a distinction for this work as well as the Course overall. Prior to arriving at MOD, Wg Cdr O'Dell conducted a 6 month tour in Kandahar as Chief CJ3 to COMKAF during which he oversaw a major airfield and runway refurbishment.

Colonel Andrew Roe is currently commanding the British Army's Operational Training and Advisory Group (OPTAG). Prior to this he commanded the 2nd Battalion The Yorkshire Regiment (Green Howards) in Cyprus. He commissioned into the Green Howards in 1992 and has held various command and staff positions in Northern Ireland, Germany, Bosnia, Afghanistan, the

Falkland Islands and Iraq. He is a graduate of the U.S. Army Command and Staff College and the School of Advanced Military Studies, Fort Leavenworth, Kansas. He has a PhD from King's College London and is the author of *Waging War in Waziristan: The British Struggle in the Land of Bin Laden, 1849-1947*.

Rise of the Robots? Western Unmanned Air Operations in Iraq and Afghanistan, 2001 to 2010

By Squadron Leader Joe Doyle

This article examines how military, unmanned aerial vehicles (UAVs) have developed since the 9/11 attacks on the US and the ensuing Global War on Terror. Their evolution into an established technology, competing with manned platforms in the world's foremost air forces has led analysts and practitioners alike to question whether a broad revolution in the application of military air power has taken place

In fact, military UAVs did *not* show themselves to be genuine competitors to conventional manned aircraft between 2001 and 2010. Success in mission areas where UAV utility was most evident was enabled by a counterinsurgency-dominated strategic context combined with a permissive air environment. Significant technical and conceptual limitations endured throughout the period. The limited and context-specific extent of this UAV "revolution" should warn against the premature replacement of manned capabilities in Western force structures and doctrine.

This article is adapted from an MA Dissertation, supervised by Professor Philip Sabin and originally submitted to the War Studies Department of King's College London in July 2011.

Introduction

We have already made a 100-year war-fighting leap-ahead with MQ-1 Predator, MQ-9 Reaper, and Global Hawk... [they] have fundamentally changed the nature of warfare.

- General (Ret'd) Barry McCaffrey, United States Army, October 2007.¹

...remotely piloted planes won't be as effective in future wars as they are in Iraq and Afghanistan.

- General Roger Brady, Commander USAFE, July 2010.²

This article questions the extent to which the military unmanned aerial vehicle (UAV), for several decades a *developing* technology of potentially huge significance, matured in the aftermath of the 9/11 attacks on the US into an *established* technology that might compete with or even replace its manned contemporaries.³ This question lies within a broader theme; whether or not a recent "rise of the robots" has constituted a broad revolution in warfare that will fundamentally change the nature of military air power, and perhaps even the role of the human being as a direct and vulnerable participant in military conflict.

The contradictory comments by Generals McCaffrey and Brady above illustrate the active contemporary debate that surrounds the integration of unmanned aerial vehicles (UAVs) into Western military air power. In the main, this discussion has assumed a predictive timeframe of roughly twenty years hence. The authors of the UK's 2009 *Future Air and Space Operational Concept* claimed that, by 2030, 'unmanned platforms will predominate in hostile environments with a requirement for persistence in contested air space, or in homeland resilience tasks'.⁴ Western governments have implemented policies that suggest a belief in the imminency and viability of this near-term process of replacement. In 2009, US Secretary of Defence Robert Gates recommended a \$2 billion increase in intelligence, surveillance and reconnaissance (ISR) funding, the centrepiece of which would be enhanced UAV operational capabilities and development.⁵ Also during that year, the USAF trained more unmanned than manned pilots, and the US Air National Guard 174th Fighter Wing replaced its F-16 aircraft with Reaper.⁶ The UK Strategic Defence and Security Review of 2010 announced the removal of Harrier and some Tornado aircraft from service, radically reducing the size of the UK's manned combat air forces.⁷ Shortly afterwards, the British Defence Secretary announced plans to double the UK's Reaper force at an increased cost of £135 million, an increase achieved by the purchase of an additional five airframes with which to equip the reformed XIII Sqn at RAF Waddington.^{8 9}

The extent to which such decisions have been founded upon a sound understanding of contemporary operational experiences is not clear. A mid-decade US Government report criticised the Department of Defense for not having 'implemented a systematic approach

to evaluating joint [UAV] performance on operational deployments', thereby hampering an understanding of ongoing trends and enduring problems, and perhaps taking industrial proponents of game-changing technological developments too closely at their word.¹⁰ Nevertheless, it seems that advocates of change dominate official attitudes and continue to influence the decisions that will mould future Western air force structures. Beyond political and military discourse, academic observers have also taken differing viewpoints. For example, P W Singer's declarations of 'robotic' revolution are offset by the more measured assessments of Dr David Jordan and Ben Wilkins, who acknowledge the increased relevance of UAVs in the early 21st Century, but who also emphasise the continuing limitations of the technology and its employment.¹¹

This article seeks to place an assessment of the military employment and utility of UAVs within the correct operational and air power perspectives, presenting a view that is similar to the Jordan/Wilkins position described above while extending the argument to strongly emphasise the contextual, along with the inherent, limitations that affect contemporary unmanned air operations. Military UAVs did *not* show themselves to be genuine competitors to conventional manned aircraft between 2001 and 2010. Success in mission areas where UAV utility was most evident was enabled by a counterinsurgency-dominated strategic context combined with a permissive air environment. Significant technical and conceptual limitations endured throughout the period. The limited and context-specific extent of this UAV "revolution" should warn against the premature replacement of manned capabilities in Western force structures and doctrine.

Scope

This article opens with a brief consideration of the relationship between the prevailing counterinsurgency-dominated strategic context and contemporary UAV employment between 2001 and 2010. The article then explores in detail the weaknesses and limitations that were evident in unmanned operations of the period. Here, previously published comparative accident rates are reassessed with the benefit of updated statistics that span the entire decade. Some of the underlying technical issues are then discussed, and Global Hawk provides a short, sharp case study that questions the technical viability of existing programmes of replacement. Issues associated with the paradoxical *manned* nature of unmanned warfare are considered. Finally, this article outlines the breadth of additional problems that endured throughout the period, before presenting a concluding summary.

Definitions and Exclusions

This article primarily restricts its focus to military operations in Iraq and Afghanistan during the period 2001 to 2010. UAVs have a much longer history than this; however, details of unmanned operations in earlier conflicts are only referenced when necessary to establish a suitable context. The 2011 conflict in Libya is also referenced only by exception; although it transformed the strategic context for a short time, and has rekindled a planning focus on contingency operations with a light "boots on the ground" footprint, the Western commitment

in Afghanistan continues to dominate US and UK military activity and will likely do so until declared withdrawals are complete in the middle of this decade.

The term 'UAV' is used throughout this article in preference to 'UAS', 'UCAV', 'RPA' and other associated terms, in part due to the established place of this earlier term in existing literature, especially in the US and its armed forces, and partly as a simple stylistic choice and a useful simplification of inconsistent terminology.

This article considers only contemporary USAF-defined 'medium' and 'large' UAVs in Western air force employment: the MQ-1 Predator, MQ-9 Reaper and RQ-4 Global Hawk.¹² These fixed-wing platforms are the most established unmanned types with some degree of equivalency to traditional manned counterparts, and are therefore most suited to an exploration of the viability of near-term replacement. The contribution of rotary-wing platforms such as the MQ-8 to more recent operations is not explored.¹³ Small 'throwbots' or primarily army-fielded surveillance UAVs are also outside the scope of the discussion.¹⁴ Novel types such as the Lockheed Martin RQ-170 Sentinel are excluded from this study due to the extremely limited availability of information and their uncertain involvement in pre-2010 operations.¹⁵ The 2011 loss of an RQ-170 in an incident claimed as sabotage by Iran, who presented a supposedly captured aircraft to the world's media, is referenced but not explored in detail due to the limited availability of unclassified data concerning that incident. Parallel CIA activity in Afghanistan and Pakistan is not considered; this article focuses instead on the employment of UAVs by conventional military air forces. An exploration of CIA-run 'drone' operations in Pakistan can be found in Colonel Andrew Roe's article in the Summer 2012 edition of *Air Power Review*.¹⁶ Flight Lieutenant Kenny Fuchter also focused on extra-military counter-terrorist operations in an article in the Autumn/Winter 2012 edition of the same periodical.¹⁷

This article is perhaps inevitably dominated by discussions of American experience, a result of the availability of statistics, relative scales of military effort and the status of the US as technological leaders in the field of UAV development. The UK's involvement during this period, as an operator of Predator and Reaper aircraft, is difficult to measure statistically due to a lack of available unclassified data. The Italian experience with Predator in Iraq is acknowledged and discussed briefly, with specific reference to problems of command and control. The experiences of other states that may be assumed to fall within the political West, notably Israel, are excluded.

UAVs and Counterinsurgency: A Good Fit

*... the Iraq War ... was actually the war that proved robots could be useful, which finally led them to be truly accepted... "This was the war where people said 'UAVs? Yes, give me more!'"*¹⁸

The post-9/11 Western military campaigns in Iraq and Afghanistan were fundamentally compatible with the limited capabilities of early 21st Century UAVs. The growth of unmanned participation in intelligence, surveillance and acquisition (ISA) and, to a lesser extent, attack

missions was the result of context-specific mission requirements and in-theatre environmental realities. Specifically, the growing dominance of counterinsurgency tasks during extended conflict 'amongst the people', conducted within largely permissive airspace, suited the nascent capabilities of early 21st Century UAVs and also minimised the detrimental effects of defensive limitations.¹⁹

The primary and most attractive capability behind the increased desire among commanders for UAV employment was the novel 'persistent stare' capability enabled by long endurance. This capability '[mitigated] the negative air power characteristic of impermanence', and provided instead a form of 'virtual permanence' that gave the US and its allies 'the ability to deny the enemy a sanctuary both day and night'.²⁰ 'Persistent stare' coexisted alongside another new ability, the transmission of virtually real-time imagery directly into command headquarters and operations centres. This changed expectations among commanders, who 'no longer [wanted] pictures taken last week; they [wanted] streaming video with enough clarity and fidelity to anticipate the actions of the enemy'.²¹ In effect, UAV video feeds offered a perceived solution to the enduring problem of the 'fog of war'.²²

These novel capabilities proved to be a particularly "good fit" within an operational environment that emphasised ISA and precision attack missions. It was in these areas that unmanned platforms demonstrated their most significant absolute and relative growth. This generation of UAVs operated in an environment that was *not* dominated by high-end warfighting, which was truly evident only during the removal of Saddam Hussein's regime in Iraq in early 2003. There were no requirements beyond April 2003 to confront and destroy the military apparatus of an enemy state. Rather, 'low intensity conflict' tasks were required in support of ground forces, including 'providing overwatch [and] giving advanced warning of ambushes or obstacles along the route of a convoy'.²³ Close air support to troops in contact, frequently in populated areas, became a dominant feature of each campaign. Potential enemies and known high-value targets had to be carefully monitored and then if necessary precisely targeted. The precision of these strikes was important in the context of an increasingly casualty-intolerant counterinsurgency doctrine and international opinion.²⁴ The value contributed by 'persistent stare' and evolving targeting and precision strike capabilities was recognised in a mid-decade Jane's Defence study:

It is in "Long War" related contingencies that [UAVs] have already most obviously demonstrated their value on the battlefield. [UAVs] have been immensely effective in providing tactical intelligence of terrorist and insurgent locations and movements and... have also performed strike missions against individuals and small groups.²⁵

This beneficial compatibility between task and capability relied upon a key environmental enabling factor, and that was the permissive airspace environment that existed in both campaigns. Contemporary UAVs lack the means with which to avoid or defend against surface or air-to-air threats, due primarily to compromises in powerplant and payload that enable

the long endurance so critical to 'persistent stare' and 'virtual permanence'.²⁶ General Philip Breedlove, the Vice Chief of Staff of the USAF, summarised this limitation in 2011:

One has to remember that the current ISR fleet ... is absolutely a permissive fleet... The Predator, the Reaper, the Global Hawk will not fly in contested [airspace] and will certainly not fly in denied airspace.²⁷

This defensive inability was not critical in either Afghanistan or Iraq. While unguided and infra-red surface-to-air threats remained as fielded threats in each theatre, the most potent radar-guided and counter-air threats that might have prejudiced the effective employment of this generation of UAVs were absent during the extended COIN phases of each campaign. As a result, the defensive weaknesses of early 21st Century UAVs did not inhibit the synergy between unmanned capabilities and dominant counterinsurgency mission requirements. However, these permissive air environments were atypical and 'unusual in historical terms'.²⁸ The UK's *Future Character of Conflict* outlines an expectation that future battlespace, including the air environment, will be contested.²⁹ The utility of current generation UAVs in such an environment is likely to be compromised, as demonstrated by the US military's refusal to deploy Global Hawk into the Libyan theatre in early 2011 until integrated air defence systems, such as the long range SA-5, had been sufficiently degraded.³⁰

The above-identified "good fit" was not exclusive. Afghanistan's complex terrain represents a challenge to the operation of even established aerospace technologies.³¹ In addition, UAVs offered some contribution to missions beyond those most obviously associated with counterinsurgency operations. For example, a small number of Predators were briefly employed in the SEAD role in 2003 as decoys launched to tempt Iraqi air defence operators into engagements that would reveal the positions of their systems.³² However, such missions represented only a minor and short-lived facet of the air power effort across the decade as a whole, and overall the "good fit" was clearly the dominant feature of the interaction between UAVs and operating environment. Any lessons inferred from a decade of unmanned air operations should therefore be understood as being of specific and quite narrow contextual provenance. Such lessons should be applied to processes of doctrinal and structural revision with an explicit awareness of this background, and without inappropriately broad assumptions of onward relevance.

Enduring Limitations

[Global Hawk] is not operationally effective for conducting near-continuous, persistent ISR as specified in the Air Force Concept of Employment.

- Office of Director, Operational Test & Evaluation, May 2011.³³

It is not the technology of the UCAV which presents the challenge, but its intellectual mastery.

- AVM Professor Tony Mason, 2009.³⁴

As outlined in the first section of this article, some UAV limitations were mitigated by the essentially favourable operational circumstances in Afghanistan and Iraq between 2001 and 2010. However, many key weaknesses and problems endured despite a permissive air environment and ISA-heavy operational requirements. Many of these have been explored in earlier studies, but it is useful to revisit some of this existing discussion with the benefit of drawing upon a full decade's worth of increasing UAV employment and operational experience. This article focuses on two main areas that question the near-term viability of UAVs as replacements for manned aircraft. The first of these explores the way in which implementation of novel technology remained a very significant challenge throughout the period. UAV accident rates fluctuated but remained high, with evident contributory problems of technological immaturity and poor reliability. A brief case study of Global Hawk offers a useful insight into the extent to which enduring technical issues question the true replacement potential of this generation of UAVs. The second area that is explored, echoing Professor Mason's statement above, is the paradoxically *manned* nature of UAV employment throughout the decade. UAV operations remained a very human affair in Afghanistan and Iraq, with ongoing uncertainties regarding command and control and the place of remote warriors in contemporary military ethos. Beyond these two specific themes, the sheer breadth and variety of the enduring limitations observed between 2001 and 2010 perhaps most undermines confidence in the viable near-term replacement of manned aircraft with unmanned equivalents.

Accident Rates

An early and enduring criticism of contemporary UAVs has been their high accident rates compared to manned aircraft. However, much of the established debate revolves around immature statistical data sets that show high loss rates among medium and large UAVs as they entered operational service. It is important to acknowledge the rapid pace with which UAV platforms and their operating procedures have developed, and now re-examine issues of accident rates and reliability with reference to more recent data.

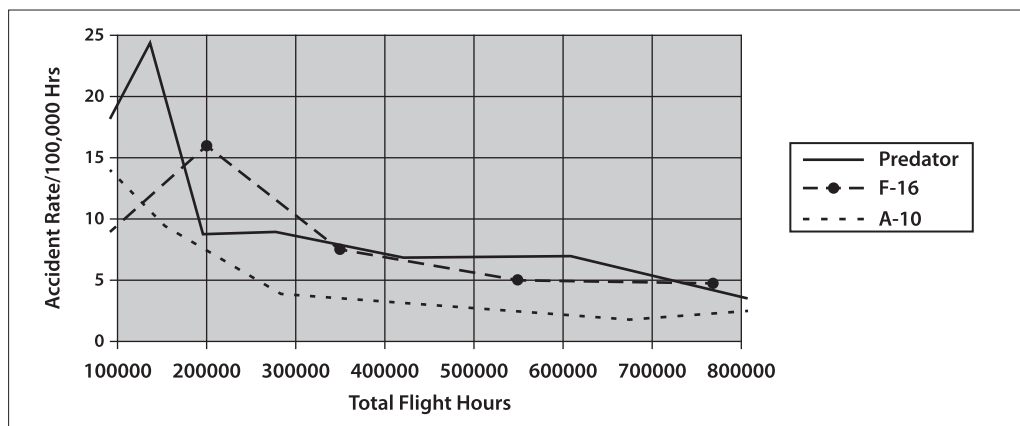
The authors of the 2005 US Department of Defense *UAS Roadmap 2005-2030* compared the accident rates of early UAVs with the manned F-16 and U-2.³⁵ They concluded that, as of 2004, 'the mishap rates of the recent, larger [UAVs] track closely with that of the F-16 fleet at a comparable point in its career'.³⁶ The more recent USAF *UAS Flight Plan 2009 to 2047* also compared Predator and F-16 accident data, agreeing that UAV mishap rates were reducing but stressing that they remained absolutely higher than their manned equivalents.³⁷ *The Flight Plan* also referenced earlier reports that UAV reliability was a 'critical' factor, and stated that, as of the middle of the decade, inadequate resources had been expended in resolving 'root' reliability issues.³⁸ This analysis can now be extended by incorporating a greater number of manned and unmanned types and by expanding the period of analysis to the end of 2010. The results of such expanded analysis support the findings and emphasis of the *UAS Flight Plan* over those of the earlier *Road Map*. While year-on-year reduction trends in UAV accident rates remain comparable to those of a selection of manned jet aircraft at similar stages of their service

history, the *absolute* accident rates that these trends represent remained intrinsically higher throughout the decade to 2010.

The expanded data adds the Reaper, Global Hawk, A-10 and F-22 to the sample of types that are compared, in addition to the earlier F-16, Predator and U-2 (the latter is considered here only briefly; relevant USAF records for this aircraft did not start until 1970, well into the U2's service history and so making meaningful equivalent comparison impossible). This data concentrates on the most meaningful measure of comparative accident rates, based upon annual accident rates plotted against accumulated flight hours, thereby continuing the methodology of the earlier *Road Map* and *Flight Plan* studies. Statistics are taken from official USAF accident data and refer to 'Class A' accidents, defined as those that cause 'a fatality or total permanent disability, loss of an aircraft, or property damage of \$2 million or more.'³⁹ The data used in this section does not relate specifically to operations in Afghanistan and Iraq; clearly, the first ten years of service for many of these aircraft types predated 2001. While many of the UAV accidents in this period occurred during deployed operations, it is important to note that this data *excludes* combat losses.⁴⁰

Comparative analysis up to the first 100,000 flight hour mark has already been published for Predator and F-16 in the *UAS Roadmap 2005-2030*.⁴¹ The first set of data presented here extends this earlier study, modified to include the A-10 as a second manned type (which has proved much less accident-prone than the F-16, which has suffered by far the highest accident rate of any manned fighter/attack aircraft that remains within the active US inventory) and now incorporating statistics up to the end of 2010. By that date, the Predator had accumulated approximately 800,000 flight hours. A comparison of each of these aircraft between 100,000 hours and 800,000 hours service therefore gives a clear idea of annual accident rate trends as each aircraft type became increasingly established in service. The results are depicted in Figure 1.

Figure 1: Annual Accident Rate Trends 100,000 to 800,000 Hours: Predator, F-16 and A-10

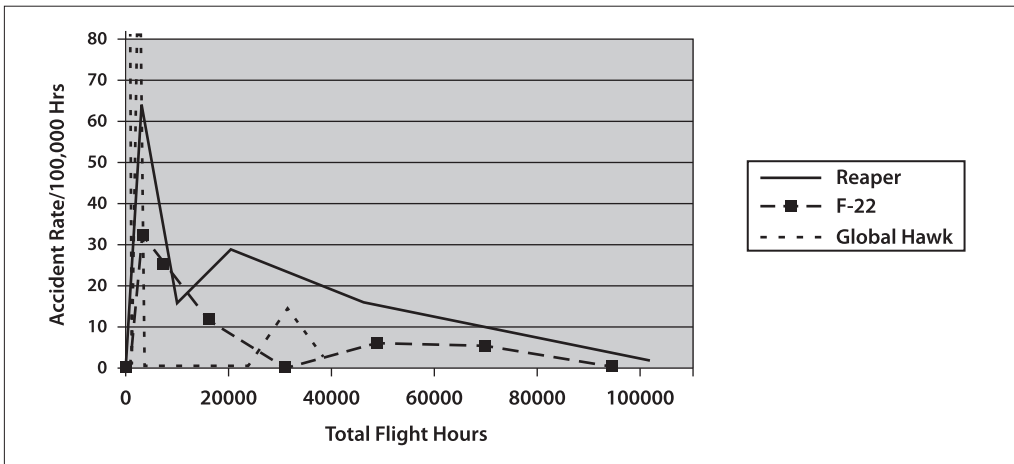


Source: USAF Air Force Safety Centre

This extension of scope essentially supports the findings of the earlier studies. The Predator accident rate continued to show a broadly similar reducing trend to each of the manned types. In fact, the reduction is of greater overall magnitude, having started from a position far higher than either of the manned types. This is noteworthy, as it suggests that UAV accident rates may indeed become comparable to those of manned aircraft as they mature in service. However, it would be easy to overstate the significance of this observation. The graph shows that *absolute* Predator accident rates remained higher than those of F-16 for most of the period overall, and they were significantly higher than the A-10 throughout. Again, the averaged accident rate taken across the entire period supports this, with Predator returning a mean rate of 7.4 accidents per 100,000 hours compared with 6.9 for F-16 and a much lower 3.6 for the A-10. The mean rates for the entire first 800,000 hour period (including the initial 100,000 hours analysed by the earlier *Road Map* study) were 9.3 for Predator, 8.1 for F-16 and 4.4 for the A-10.

It is also possible to now run a similar comparison involving more modern manned and unmanned aircraft types. An initial comparison between Reaper and F-22 is straightforward. The data shows that each aircraft had accumulated approximately 100,000 flight hours by 2010. The speed at which accident rates reduced is depicted graphically in Figure 2 below, with Global Hawk's lifetime total to the end of 2010 (approximately 40,000 flight hours) added for further comparison.

Figure 2: Annual Accident Rate Trends Over First 100,000 Hours: Reaper, F-22 and Global Hawk



Source: USAF Air Force Safety Centre

The erratic “spikes” on the far left hand side of the graph in Figure 2 show the effect of even a very small number of accidents on the apparent trends of aircraft with very low annual flight hour totals. Early criticism of high UAV accident rates may have been influenced by such “spikes”. The longer term data is more representative of how accident rate trends settled as

aircraft became established, and again these results, here for cutting edge platforms, effectively corroborate the findings of the *Road Map* and *Flight Plan* studies that compared the Predator, F-16 and U-2 over the same equivalent period of their service history. The Reaper exhibited a broadly comparable trend of accident rate reduction to that of F-22 over its first 100,000 flight hours. However, and as with Predator versus F-16 and A-10, Reaper tracked along a line that represented consistently higher *absolute* accident rates, reflected in total accident numbers of 11 during the first 100,000 flight hours compared to 6 for F-22. Thus Reaper remained significantly more likely to suffer Class A accidents than F-22, even as the average accident rates of both types reduced.

Reliability and Design: The *Why* Behind High Accident Rates

Accidents, of course, have causes. Summary causes of mishaps can be found in the results of official UAV accident investigations during the period, of which the USAF published fifty-two between 2001 and mid-2011.⁴² Of these, at least thirty-four occurred in Afghanistan and Iraq. In thirty-three of the accidents malfunction or physical failure was identified as the primary cause of the accident. In seventeen cases human error was to blame. On two occasions the cause was attributed clearly to maintenance error.

To first consider the most prevalent group of causes, the thirty-three cases of malfunction and component failure revealed some of the design and operating limitations of this generation of UAVs. These included significant problems with engines and flight control systems and these persisted throughout the period. A September 2010 report into the crash of a Predator that suffered engine failure in Afghanistan noted that a decrease in vital engine oil levels 'frequently occurs in [Predators] due to the design of the oil system'.⁴³ Moreover, unmanned aircraft were susceptible to physical malfunctions caused by environmental conditions, with several crashes attributed to icing or flight in cloud. Susceptibility to such environmental influences did not have to result in aircraft loss to compromise mission effectiveness. Areas of poor weather that might have been penetrated by manned aircraft would limit the possible operating areas of a UAV, or even necessitate it to abort its mission, during operations in Afghanistan and Iraq.⁴⁴ Some of these issues were addressed by manufacturers and operators as the decade progressed. For example, modified systems added to later variants of Predator included 'weeping wing' chemical anti-icing technology, although in a further indication of limitation-driven compromise, this was often removed on operations to allow the carriage of more fuel or weapons.⁴⁵ Overall, however, general and airframe-specific problems of design and reliability continued to be evident in accident reports right up until 2010.

Human error, identified in seventeen of the accident reports as the primary cause, was frequently evident as basic errors in handling skills or airmanship that might as easily have occurred among crews of manned aircraft. However, a significant number of accidents were caused or exacerbated by design issues with the ergonomically-poor ground control stations from which the crews remotely operated the unmanned aircraft. One mid-decade accident occurred when a Predator pilot inadvertently shut down the engine instead of raising the gear,

a result of a control system where the switches for both functions were virtually collocated and easily confused.⁴⁶ Still other accidents were attributed to poor situational awareness caused by a limited sensor field of view and a lack of perceptual cues when “flying”, including losses incurred when attempting to land. These problems were acknowledged by the USAF to represent ‘an inherent design flaw.’⁴⁷ Such issues present a significant challenge to future UAV operations, as the restoration or replication of such visual and tactile cues will require more advanced solutions than the relatively easy modification of switch positions within a ground-based “cockpit”.⁴⁸ The evidence of unmanned operational performance over the past decade in these areas of design and reliability demonstrates the size of the task facing UAV developers if they are to meet some of the bolder forecasts regarding the extent to which their creations might replace traditional manned aircraft.

At the Technological Edge: Datalink Reliability and Security

The phrase ‘lost link’ is commonly encountered within accident report summaries and Predator operator testimony. Failure of these datalink systems, loss of signal and a subsequent inability to control the aircraft, was the primary cause of at least three of the investigated accidents, and was a contributory factor in several more. For example, the investigation into a Predator crash in Afghanistan in December 2003 while supporting Operation Enduring Freedom found that the datalink could not function at extreme aircraft attitudes, encountered in this instance during an attempted recovery from a stall.⁴⁹ Another Predator crashed in Afghanistan in January 2005 following a system freeze at its remote ground control station, and the subsequent loss of all satellite communications with the aircraft. Despite flying the ‘lost link’ profile for more than 12 hours, control could not be restored and the UAV was lost.⁵⁰ A failed datalink also brought about the demise of a Reaper that had to be shot down over Afghanistan in 2009 by a USAF F-15. Even a simple power surge at a ground control station would invariably mean a temporary loss of control of the associated UAVs.⁵¹ Such fragility undermines forecasts that UAVs might undertake dynamic missions such as offensive counter-air and air defence, even in the mid-term.

It was not only the serviceability of UAV datalinks that appeared uncertain between 2001 and 2010. The possibility that UAV links may be jammed or severed, or that critical operating systems and networks may be compromised, was and remains a continuing concern.⁵² AVM Professor Tony Mason pointed out in a recent RAF study that: ‘any system which depends on electronic control is vulnerable to electronic disruption.’⁵³ General concerns of cyberattack seem increasingly well founded. In 2010 the Stuxnet virus attacked specific technologies that were largely associated with the Iranian nuclear programme.⁵⁴ Threats of this nature were referenced by US Deputy Secretary of Defence William Lynn in a cautionary 2010 debate on cyber warfare.⁵⁵ Specific questions of UAV datalink security, and of the information that is transmitted by them, were raised in response to one particular, and spectacular, occurrence in 2009. A US raid on Shiite militia in Iraq found evidence that the insurgents had been hacking into the real-time video feeds transmitted by Predator aircraft.⁵⁶ This imagery was transmitted via unencrypted signals, and the insurgents were able to tap into the video using

simple, cheap commercial software. The US military subsequently admitted that this had been a known weakness since the 1990s, but it had been 'assumed [that] local adversaries wouldn't know how to exploit it'.⁵⁷ Finally, although this article deliberately avoids detailed discussion of the supposed Iranian downing of a RQ-170 in 2011 due to the ambiguous unclassified information that concerns that event, the very possibility that the aircraft was lost as a result of either failure or adversary "hacking" does little to inspire confidence in how robust these systems have become. These persistent uncertainties, associated with the reliability and security of the control technologies that are vital to UAV operations, question the assumption that near-term unmanned platforms might undertake missions truly critical to national defence. Significant advances will be required from the aerospace industry in this area, and it should be noted that the same industry has struggled to deliver the next generation of *manned* combat aircraft, the F-35, on time, under budget, and with all promised capabilities.⁵⁸

Global Hawk and U-2: A Short Case Study in Replacement

Technology must deliver, not merely promise to deliver, the same level of competence in [UAVs] that we have learned to [expect] in manned aircraft.⁵⁹

This question of the ability of the aerospace industry to deliver on capability promises can be explored with a brief consideration of Global Hawk as a specific and recent case study. Global Hawk has long been viewed as a replacement for, rather than merely a complement to, the U-2, and it was active in both Afghanistan and Iraq during the decade 2001 to 2010.⁶⁰ As of 2006, the capabilities of the two types were still not analogous, with the Global Hawk's strengths in range and endurance being offset by the U-2's better sensor suite and payload/power advantage.⁶¹ The early Block 10 Global Hawk was subsequently criticised for low reliability rates in 2007, questioning the ability of the manufacturer, Northrop Grumman, to resolve myriad persistent technical issues.⁶² As a result, by 2009 the Air Force had accepted a revised, delayed timeline for the planned process of replacement of the U-2, based on the need for further development to ensure that Global Hawk would more satisfactorily replace the U-2's capabilities.⁶³ The next 'Operational Test and Evaluation Report', carried out for the successor model of Global Hawk, the Block 30, was conducted between October and December 2010. It concluded that 'the RQ-4B Global Hawk Block 30 is not operationally suitable'.⁶⁴ The report cited 'frequent failures of mission-critical air vehicle components' as key factors that 'reduce takeoff reliability and increase mission abort rates'.⁶⁵ These failures were further exacerbated by shortages of critical spare parts, another criticism of the manufacturer's ability to deliver on promised capability. Global Hawk was also identified as being incompetent as a signals intelligence platform due to 'technical performance deficiencies and immature training, tactics, techniques, and procedures'.⁶⁶ In all, the Global Hawk could 'produce only 42 percent of the tasked ISR coverage time due to poor takeoff reliability, maintenance ground aborts, and high air abort rates'.⁶⁷ The somewhat meek USAF response to this report could only claim that Global Hawk aircraft had performed 'quite well' since August 2009.⁶⁸ This brief example clearly questions the suitability of even recently updated UAVs as

replacements for manned aircraft, even when considering an example of a clear and intended programme of specific type-with-type replacement.

The Manned Aspects of Unmanned Air Warfare

It bears noting that Predator and Global Hawk are not unpiloted; their pilots are simply not aboard the aircraft.⁶⁹

The reference in the Global Hawk evaluation report to ‘immature training, tactics, techniques, and procedures’ reveals another important consideration that was highlighted by the experience of unmanned air operations between 2001 and 2010. The technological aura surrounding UAVs threatens to obscure the enduring *human* role in supposedly unmanned warfare. This is not in itself an especially novel observation. Nor is it linked only to UAVs, for an excessive focus on technology has long been an accusation aimed at Western warfare in general.⁷⁰ However, this is an important theme, and it has enormous relevance for ideas of the unmanned “replacement” of traditional air power. This article does not discuss hypothetical scenarios comparing “man in the loop” systems with developments in autonomy.⁷¹ A consideration of the ethical issues surrounding such developments can be found in Wing Commander Nick Tucker-Lowe’s article in the Autumn/Winter 2012 edition of *Air Power Review*.⁷² Rather, the focus will remain upon trends that could be observed in operations in Afghanistan and Iraq between 2001 and 2010, and two trends in particular were evidently problematic during that period. The first of these was the troubled integration of UAV capabilities into existing concepts and procedures of command and control. The second was the uncertain place of remote combatants within contemporary military organisations and ethos. In each case, the employment of UAVs either failed to overcome essential and enduring problems, or raised new issues that military organisations and their personnel were required to face.

To first address issues of command and control, the ‘persistent stare’ and associated real-time imagery that contemporary UAVs provided created a tendency towards a “long screwdriver” interference by commanders as far back as Operation Allied Force in 1999, and that tendency would become more apparent as UAV use increased after 2001.⁷³ P W Singer has labelled this phenomenon the ‘Tactical General’, in an apparent nod to the contrasting idea of the ‘Strategic Corporal’ previously suggested by Marine Corps General Charles Krulak.⁷⁴ Singer offers several illuminating anecdotes in support of this concept. During the initial stages of Operation Iraqi Freedom, General Tommy Franks was reported to frequently command UAV operators directly, effectively removing every mid- and low-level commander positioned in the chain between himself and the UAV crews, in contradiction to extant doctrine that promoted principles of delegated mission command.⁷⁵ One soldier described how his patrol in Afghanistan was interrupted so that a distant commander could discipline soldiers for untucking their shirts and removing their headwear, uniform violations that had been observed via a Predator video feed.⁷⁶ More significantly, the distant involvement of too many officers could lead to operational paralysis and conflicting tasking orders, demonstrating how the ‘persistent

stare' capability that was so beloved of contemporary commanders could in fact represent a drawback rather than a key advantage.⁷⁷

Such command and control issues, in particular the paralysing impact of contradictory tasking imperatives, were also evident in the experiences of the small Italian Predator force that operated in Iraq from 2005. Problems included poor communications between the commanders of the air component and the overall joint task force, and competing pressures to fulfil both strategic and tactical tasking.⁷⁸ On occasion, direct approval from the Defence Chief of Staff in Rome was required to approve the transfer of Predator assets from tactical national missions to international strategic tasks.⁷⁹ Moreover, a lack of familiarity with the limitations of contemporary UAVs, notably in terms of the air power characteristics of speed and reach, led to inappropriate and wasted efforts to 'scramble' Predator aircraft in support of ground forces.⁸⁰ These experiences were in many ways an exaggeration of American problems, exacerbated by the complete novelty of UAV operations for Italian forces. Nonetheless, they further demonstrated the difficulties of integrating remote unmanned technologies, with real-time command visibility of tactical output, into the operating concepts and organisations of established air forces. These significant difficulties were prevalent even within a favourable context, in which UAVs represented participated in only a narrow range of missions, much less across the broad spectrum of military air power activities.

It was not only air power structures that struggled to incorporate novel and remotely operated unmanned aircraft. The integration into existing "manned" ethos of unmanned warfare, and the novelty of pilots and crews who continued to fight and kill while exposed to no virtually no risk to themselves, proved to be contentious and ambiguous as UAV operations expanded. Removing the human "weak link" may resolve problems such as air power's relative impermanence, but it is the man, and not the machine, that remains the vital element when considering the less tangible aspects of warfighting. This, again, is not an especially novel observation. Air Commodore Neville Parton asked in the introduction to a 2009 Royal Air Force study: 'Will the UAV operators be perceived as heroic by the troops they support on the ground, or dissociated technicians with no real understanding of the nature of warfare?'⁸¹ However, one specific example serves this article's argument by casting still further doubt on the imminent readiness of Western air forces, and militaries in general, to undergo a significant process of "replacement" by which the man is first made truly remote, and is then potentially removed altogether, from air warfare.

Brigadier James Bashall commanded 1 Mechanised Brigade during the withdrawal of British troops from Basra city in 2007. While recounting his experiences at a Royal Air Force-sponsored conference in September 2010, he emphasised the critical importance of face-to-face involvement with British fast jet aircrew for both mutual operational understanding and unit morale, in effect allowing his men to put faces to what would otherwise be remote voices offering air support via radio.⁸² In this, Brigadier Bashall suggested the intrinsic human nature of conflict, and the importance of bridging the traditional divide between those

who operate on the ground and those who operate in the air, frequently from a distant location. Brigadier Bashall's anecdote hinted at an important interpersonal aspect of air-land cooperation, and one that was difficult to conduct even within the manned-aircraft dominated conflict in Iraq. Such interaction will surely be even more difficult in an era in which air power might be delivered primarily by remotely involved crews who remain in distant homeland locations. While this anecdote represents only a single example from the campaigns fought in Afghanistan and Iraq over the past decade, it demonstrates the continuing reliance of military forces upon camaraderie and reciprocal confidence that is enhanced by simple human proximity and personal interaction.⁸³ The consequences of removing these, upon operational understanding and raw fighting spirit, are unknown. Such enduringly human issues as those discussed above do not necessarily preclude a "rise of the robots" that replaces manned aircraft with unmanned equivalents. They do, however, demand that any such process be based on well-founded understanding that is based on experience, rather than a superficial appreciation of complex issues that is based on hypothetical forecasts, or hope.

Niche Capabilities, Full-Spectrum Problems

Each of the technical and conceptual themes explored above represented a significant issue for UAV operations in Afghanistan and Iraq between 2001 and 2010. However, it is potentially the *breadth* of these issues, each apparent even within a context that was essentially favourable for UAV operations, that ought to give the greatest pause for thought. A rapid summary of some of the most significant additional limitations and areas of ambiguity that have not been discussed above gives an appreciation of their sheer quantity. Cost, long assumed to be a favourable aspect of removing men and support systems from aircraft, became an increasing issue as the decade progressed. The 2005 *UAS Roadmap* found that the per-pound payload costs of contemporary UAVs were higher than those anticipated for F-35, and by 2008 a sensor-laden Reaper was estimated to cost \$18 million.⁸⁴ Increased data collection enabled by unmanned air operations created problems with both bandwidth and subsequent information exploitation.⁸⁵ In Afghanistan and its sister-theatre of border Pakistan, UAV activity was reliant on intelligence "cueing" derived from very human sources, and indeed at considerable human cost, as apparent in a revenge attack by a Taliban bomber against CIA operatives in Afghanistan in December 2009.⁸⁶

Some studies have suggested that the increased distance from which war may now be waged increases the ease with which decisions to apply deadly force may be reached.⁸⁷ The negative implications of inflicting civilian casualties during the conduct of counterinsurgency operations have been made explicit within the guidance issued to Western forces in recent years, and example from Uruzgan Province in Afghanistan in 2009 revealed a serious number of failures in the judgement of unmanned operators.⁸⁸ While such failures are an ever-present risk for any participant in warfare, the official report of this incident highlighted specific failures in Predator operating and training procedures.⁸⁹ This article has not considered potential legal issues with the application of the Laws of Armed Conflict to remotely involved personnel of ambiguous combatant status, but the surrounding debate is detailed and many issues remain unresolved.⁹⁰

Several reports have highlighted issues of fatigue and stress among UAV crews that were rooted in unrelenting operational tempo, disassociation from theatres of operations, and the mental challenges of remaining collocated with family while fighting a war of remotely inflicted violence.⁹¹ Issues of training, tour length and career progression led to problems with morale, with the commander of the USAF Predator wing, in this case a former F-16 pilot, likening the completion of a UAV tour of duty to being 'a prisoner with a life sentence'.⁹² The 2009 *UAS Flight Plan* recommended as a result that the USAF must 'assess and adjust [UAV] pilot development paths, to include incentive pay and career incentive pay issues' in order to guarantee future force efficiency and retain experienced personnel.⁹³ The *Flight Plan* further lamented personnel management problems that had been created by 'decisions that frequently are fragmented, reflect legacy culture, and limit innovation'.⁹⁴ Finally, domestic training activity remained, and remains, limited by problems that prevent the integration of UAVs into civilian airspace.⁹⁵ The sheer quantity of these limitations, all persistent as the decade progressed, is perhaps the most damning indictment of any proposal that unmanned aircraft stand ready to supplant, rather than supplement, their manned equivalents within Western air forces.

Conclusion: Replacements, or Pretenders to the Throne?

Robots in Iraq and Afghanistan today are sketching out the contours of what bodes to be a historic revolution in warfare... a process that will be of historic importance to the story of humanity itself.

- P W Singer, *Wired for War*, 2009.⁹⁶

The more certain that people are of what the future holds, the more worried and critical a response they should receive.

- Professor Philip Sabin, 2010.⁹⁷

Prior to the UK Strategic Defence and Security Review of 2010, British General Sir David Richards suggested that fleets of UAVs operating alongside light attack aircraft would represent reduced but acceptable capabilities with which to replace modern fast jets.⁹⁸ These remarks seemed to reflect an expectation of the enduring nature of recent conflict, that counterinsurgency and similarly waged 'wars amongst the people' would dominate the coming strategic landscape. However, General Richards did not acknowledge the favourable relationship between capability and context that defined unmanned air operations over the preceding decade, nor the limitations that had clearly endured. Moreover, many observers have increasingly stated, and indeed experience has shown, that future conflict may not resemble the COIN-dominated campaigns in Afghanistan or Iraq.⁹⁹ The successful air campaign over Libya in 2011 did not validate the type of capabilities mix that General Richards forecast and recommended.

The stated aim of this article was to contribute to existing debate by establishing a context-aware understanding of early 21st Century UAV operations. This article has shown that the

most significant advances, made within the specific missions of ISA and, to a lesser extent, attack, were enabled by a favourable context that matched capabilities to requirements within a permissive environment. Individual problems and limitations endured, including intrinsically higher unmanned accident rates, myriad technical difficulties, industrial inability to deliver on capability promises, and conceptual issues that included the potential loss of critical “manned” aspects of joint warfighting processes and ethos. Ultimately, all of these factors combined to present at best a picture of a one-dimensional and imperfect “revolution” and, at worst, a poorly misunderstood phenomenon that threatens the West’s established advantage in combat air power if it encourages premature and far-reaching force restructuring and doctrinal shifts.

Air power matters. It represents a key aspect of the West’s defence against a variety of potential threats. It is therefore important that the strength of Western air forces should be at least preserved or, better, enhanced. To unquestioningly accept views that imply too wide a relevance to the counterinsurgency-bounded achievements of UAVs during the past decade would risk contributing to the creation of a bespoke counter-insurgency force with niche capabilities [that] won’t provide policy-makers or political decision takers with a flexible military lever of power for the mid- to long-term’, a warning issued by Air Chief Marshall Sir Steven Dalton in a statement prior to the 2010 Strategic Defence and Security Review.¹⁰⁰ The history of air power is full of sweeping, technology-induced and promise-led change. However, in order that the current debate is concluded with a beneficial outcome, it is crucial that the pace of change should be appropriate, and based upon observed, and not merely promised, development. It is right to innovate and to stretch for capability advantages. But it would be easy to overreach, and to change too much, and too soon, before capabilities are demonstrably worthy of confident adoption. There is a significant disconnect between what industry-promised future platforms *might* do, and what early generation UAVs *can* do, even within an essentially favourable context. As we move further into the second decade of an uncertain 21st Century, it is far from clear that the replacement of the manned aircraft should be close at hand.

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African Union Intervention Capacity: Implications for Air Power

By Wing Commander Rob O'Dell

This article looks at the contemporary topic of humanitarian, peacekeeping and military intervention in Africa under the auspices of the African Union (AU). Over the past decade the AU has disappointed the international community in its willingness and ability to intervene in times of humanitarian crisis on the Continent despite many opportunities to do so since its inception in 2002. The importance of developing the AU's intervention capabilities, from both an Air power perspective as well as from the wider, strategic viewpoint for the region, are discussed with the author arguing that a more balanced, partnered approach with the UN could have the effect of transforming Africa's approach to managing internal conflicts.

Introduction

*'We are deluding ourselves if we believe that having something on the ground is better than doing nothing. In the absence of the necessary capabilities, such an approach brings a high level of risk, not only of failure but also of raising people's expectations that cannot be fulfilled. Worse still, it undermines the credibility of peacekeeping and weakens the organization that is responsible.'*¹

The creation of the African Union (AU) in 2002 was hailed as a pivotal moment for the Continent. One of the key tenets of the AU's predecessor - the Organisation of African Unity (OAU) - was peacekeeping intervention. However, the performance of the OAU in this role was generally considered to have been poor.² Hopes that the AU would improve the Continent's ability to manage its own affairs and reduce external influences therefore remain largely unfulfilled. The academic Adam Branch argues convincingly that the consequences of Western human rights interventions have not only 'failed to bring about positive change, but also *prevented* such change from occurring...directly and destructively [enflaming, enabling and prolonging wars], displacement and suffering.'³ Accordingly, he suggests that Western intervention should be reduced in favour of greater African responsibility. This demand for a return to regional solutions to humanitarian crises is echoed in the popular press regarding the Syrian crisis. Africa has been subjected to the World's most destructive conflicts since 1945 and increasing globalisation means that we are less isolated from their consequences. The recent French intervention in Mali and ongoing US activity in Africa demonstrate the role of Air power in a region where warfare has been almost entirely land focused since the colonial era. In these cases, Air power allowed a limited and cost-effective but nevertheless influential contribution which avoided the long term commitment of significant ground forces. Given the success of such a relatively limited application Air power in Mali, to what extent are AU aspirations to manage regional tensions realistic? Moreover, what are the implications for Air power?

Implicit to Branch's argument is the need for 'Africanizing coercive intervention' via the AU as a means of avoiding 'neo-colonialism' and the use of humanitarianism as justification for Western aggression.⁴ Branch suggests that such interventions should occur under 2 broad circumstances: to halt or prevent genocide, and where 'tentative...solidarity between Africa and the West' is required.⁵ This narrative seeks to assess the AU's potential to assume greater responsibility for coercive interventions within Africa, with a particular emphasis upon Air power. To achieve this, I will first evaluate the extant architecture supporting such operations before highlighting the principal obstacles to Branch's aspirations. I will then consider the broader implications for Air power. In concluding, I will briefly suggest potential solutions to AU weaknesses and the opportunities they may provide. I define 'coercive intervention' as action taken by the AU to 'authoritatively allocate [acceptable] values'⁶ and behaviour upon actors.

Branch tacitly acknowledges the limitations of his aspirations but asserts that the possibility exists for AU intervention to be made more effective.⁷ However, this narrative indicates that

far greater obstacles exist than are acknowledged. Indeed, not only are such challenges significant, it is argued that the AU has failed to meet capability targets set at the 2002 Durban Assembly regarding specific intervention scenarios despite its claims to the contrary.⁸ Nevertheless, it is suggested that whilst greater realism is required if the AU is to develop a credible intervention capability, the opportunities arising from such an evolution are significant for both the Continent and Air power and deserving of greater examination. Moreover, the implications for Air power suggest the potential for new roles and capabilities to gain traction.

African Peace and Security Architecture

*'Lack of institutional capacity within the African Union Commission remains a significant constraint to the development of a sustainable continental peacekeeping capability.'*⁹

As International Defence Engagement (IDE) and related IDE strategy (IDES) increases in emphasis across UK Defence, it is necessary for Air power to be increasingly framed within regional dynamics and mechanisms. The AU's founding documentation envisaged an intervention capability via the African Peace and Security Architecture (APSA).¹⁰ Routine operational management of the APSA is allocated by the AU's Heads of State and Government to the 15 elected members of the Peace and Security Council (PSC).¹¹ The constitution of the PSC assumes impartial and 'equitable regional representation and rotation with candidates elected from...[all]...regions of the continent' meeting several times per month.¹² However, the disproportionate representation of nations¹³ with dubious democracies or human rights backgrounds has weakened the credibility of the PSC and sometimes resulted in the abrogation of responsibilities, particularly regarding Darfur.¹⁴ Notably, the PSC was forced to adopt a vague definition of 'unconstitutional change' which has arguably diluted the AU's ability to intervene in electoral crises such as those in Zimbabwe. Whilst democratic obscurity is inevitable in such organisations, lack of constitutional rigour initially created a further problem for the PSC regarding Article 4(h) of the AU's Constitutive Act.¹⁵ This specifically covers the AU's right to intervene unilaterally regarding war crimes in possible contravention of the United Nations (UN) Charter's Article 53.¹⁶ Although this has now been addressed, the unease of some member states regarding such ambiguities suggests underlying tensions within AU intervention policy.

The PSC itself is advised by 2 further groups, the 'Panel of the Wise' and the Military Staff Committee but the relationship between the Council and these bodies is indicative of broader APSA fragility. The Panel of the Wise consists of 5 'highly respected African personalities from various segments of society who have made outstanding contributions...[to] the continent.'¹⁷ Tasks include preventative diplomacy and 'advice regarding the promotion of peace, security and stability in Africa' with meetings 'as required' to meet its mandate.¹⁸ However, the Panel meets irregularly and has only 2 professional staff with one administrative assistant supporting its activities. Unsurprisingly, an internal assessment acknowledged that the relationship with the PSC has been 'very limited' despite its important advisory function.¹⁹ The Military Staff

Committee (MSC) meanwhile is established for senior military personnel from PSC member states to provide operational advice to the Council. However, this is similarly ineffective, meeting infrequently and being hampered by limited support from nations who often fail to send Officers or who substitute civilian representation.²⁰ Moreover, the MSC is dominated by Land forces personnel with expertise from the Air and Maritime domains routinely absent. This risks two dimensional defence thinking with Air power's potential for application across to the Continent's enormous physical size largely overlooked.

Underpinning the PSC are the operational elements of APSA architecture. The AU Commission's Peace Support Operations Division (PSOD) is responsible for the planning, coordination and sustainment of all AU operations. However, with only 40 personnel covering the entire Continent, the manpower available is insufficient for purpose.²¹ Such under-manning inevitably hinders AU operational tempo and prevents the APSA maintaining a proactive stance to emerging crises. This problem is exacerbated by similar limitations evident with the AU's Continental Early Warning System (CEWS). The CEWS is not an air or missile defence C2 facility as its name may suggest to Western military personnel. Rather, it is an intelligence facility consisting of a central Situation Room facility in Addis Ababa responsible for the collection and analysis of data from regional personnel and mechanisms.²² Although good progress has been made on this ambitious concept, the commitment of member states regarding funding and manpower has been limited by concerns surrounding spying on national activity. Indeed, only 10 Situation Room personnel are allocated to processing reports from 13 field officers covering the entire Continent.²³ Again, that intelligence collection which is conducted is largely limited to land and economic viewpoints; airborne ISTAR is almost entirely absent. With effective intelligence fundamental to any military deployment, such limitations have inevitably undermined the PSC's decision making processes. During the 2007 Kenyan elections and 2008 instability in Guinea-Bissau the CEWS proved unable to provide actionable intelligence for PSC briefings.²⁴ More dramatically, an airborne surveillance capacity has until recently been almost entirely absent from the principal African conflicts such as that in the Democratic Republic of Congo (DRC).²⁵ Overall, it is feared that CEWS may prove ineffective, despite the expense of the system further dictating external funding.²⁶ This inevitably results in the AU having to rely on intelligence provided by external actors such as US Africa Command (AFRICOM) with AU perceptions and priorities influenced as a direct consequence.

The most visible aspect of the APSA and central to any intervention is the African Standing Force (ASF). The ASF was established to enable the AU to respond to crises via the rapid deployment of peacekeepers in accordance with Article 4(h) and (i) of the Constituent Act. Encompassing 5 regional brigades, each consisting of approximately 4300 troops and 500 light vehicles, the ASF envisaged 6 military scenarios under the auspices of one of the 8 Regional Economic Communities (REC) as follows:²⁷

1. AU/military advice to a political mission. Deployment required within 30 days of an AU mandate.

2. AU/regional observer operations co-deployed with a UN mission within 30 days of an AU mandate.
3. Stand-alone regional AU observer mission. Deployment required within 30 days of an AU mandate.
4. AU/regional peacekeeping force for UN Chapter VI, preventative deployments and peace building operations. Deployment required within 30 days of an AU mandate.
5. AU peacekeeping in 'complex, multi-dimensional...operations' involving low level spoilers. Deployment required within 90 days of an AU mandate.
6. Urgent AU intervention operations (eg genocide prevention) where the international community is not acting promptly. Deployment of military elements required within 14 days.²⁸

In March 2005 the AU declared that the ASF would be capable of deployments up to Scenario 4 by July 2006 with full scenario 5 and 6 capabilities established by July 2010.²⁹ The timelines dictated within the scenarios are ambitious and significantly complicated by the multinational and ad hoc nature implicit in any ASF deployment. This is a key obstacle to any aspiration for the AU to bear a greater burden for intervention operations. The Union incorporates nearly twice as many states as NATO, an established organisation which - despite 50 years of experience - has continued to demonstrate interoperability and political weaknesses in recent operations. Between its inception in 2002 and June 2011, the AU has conducted 9 operations which the Union claims to prove its intervention capacity across the full spectrum of scenarios; however, the UN describes at least one as a 'hybrid [UN/AU] mission'.³⁰ Moreover, examination of these operations highlights significant capability failings and it is suggested that none have been conducted in a truly autonomous manner.

The common factor which runs throughout APSA shortfalls is inevitably financial and budgetary restrictions have repeatedly been cited as having 'undermined multinational efforts of the [Continent] and engendered sub-regional polarization'.³¹ Inevitably, few states can afford many Air power capabilities and most lack the training to seize the asymmetric opportunities available. Unlike bodies such as the UN and NATO, the AU lacks a reliable method of reimbursing the financial penalties of member states' contributions to operations despite the Union's inheritance of the OAU established Peace Fund.³² Even were assets to be deployed therefore, this is yet another disincentive to member states committing scarce financial and military resources to AU interventions; between 2006 and 2011, just 5 AU states have provided 75% of the budget.³³ The fact that 2 of these nations (Egypt and Libya) are experiencing significant turmoil suggests that the financial outlook for AU aspirations remains uncertain. As a result, extant AU operations rely heavily upon external contributions; AMISOM received some \$840M from the UN up to 2012.³⁴ If Branch's concept of Africanized

intervention capacity is to be realised, such funding shortfalls must be overcome, not least to finance the capability demands highlighted elsewhere in this paper. However, implicit in such challenges are opportunities for Air power. As it has done for a century, Air power can provide the asymmetric advantage to financially and resource limited ground forces.

Summary

The APSA exhibits numerous institutional, financial and resource weaknesses which significantly undermine its claimed ability to conduct truly autonomous interventions. In particular, the PSC and its supporting advisory bodies lack dynamism, coherence and an appreciation of the potential of Air power. Such strategic leadership problems are exacerbated at the operational level by a paucity of manpower within the PSOD and CEWS. These are fundamental to effective decision making and such failings ensure that the PSC lacks situational awareness regarding evolving crises. As a result, influence often has to be accepted from external actors such as AFRICOM. However, it is in the ASF that arguably the most significant failings of AU intervention capacity - and Branch's aspirations - are exposed.

Obstacles to Autonomous ASF Intervention

*'...the full deployment of African Union missions has been often limited by a lack of equipment, inadequate transport capacities, and other operational weaknesses.'*³⁵

The importance of a coordinated approach in developing a coherent AU security apparatus was elucidated clearly during the inaugural AU summit in 2002.³⁶ Given the disparate nature of AU nations, doctrine and commonality is essential to the credibility of any military capability. Following subsequent agreement of the 2005 roadmap for ASF intervention capability, responsibility for areas of development was therefore allocated to specific AU regions to address the following:

1. Doctrine.
2. Standard Operating Procedures (SOPs).
3. Command, Control, Communications and Information Systems (C3IS).
4. Logistics.
5. Training and evaluation.

Further effort was allocated to development of those aspects not explicit in the ASF roadmap such as finance, medical and civilian support.³⁷ Initially, promising work was made regarding ASF doctrine and training in particular. However, a more detailed examination of the specific areas listed above in the light of AU operational experience suggests institutional weaknesses. Indeed, it is suggested that the ASF can in no way be said to have a coherent intervention capability for the full spectrum of scenarios as claimed by the PSC.

Doctrine and Standard Operating Procedures

Common, unambiguous doctrine and related SOPs are an underlying principle for any military capability, a lesson particularly relevant to Air power operations within coalitions. Moreover, such doctrine must be coherent with and driven by associated civilian led concepts to avoid the risk of military adventurism. However, key doctrinal weaknesses are evident in AU capabilities at a basic level. Most fundamentally, the APSA has not agreed on a common language to be employed. Whilst Africa has numerous linguistic communities, such a decision is central to interoperability. Although an AU wide common language is arguably unrealistic, such a decision at regional levels must be seen as essential. Aside from doctrinal and operational documentation, lack of a common language has major implications where differing languages may provide a significant barrier to communications and effective coordination. Similarly, even though English remains the official language of aviation around the World, it is common to hear other dialects spoken in African air traffic radios. Related to this is the failure to agree a unified C2 architecture. As a result, each nation is largely persisting with its own C2 procedures and familiarity regarding alternative models is tenuous or absent.³⁸ Such doctrinal weaknesses are particularly damaging as they act as the foundation upon which planning and operational capabilities are constructed and they have been heavily criticised by the UN.³⁹ Inevitably, where shortcomings are offset, it is by external contributors such as AFRICOM.

That ASF doctrine which does exist is also heavily biased towards land operations; little consideration is made of Air power beyond logistics and none is evident regarding maritime tasks. The AU intervention in the Comoros in 2008 and current operations in Somalia highlight the limitations of such an approach. In the former case, AU assets were forced to rely on French amphibious and airborne assets for insertion and sustainment during which the limited understanding of African peacekeepers became evident.⁴⁰ In Somalia, linkages between Al Shabab terrorists and piracy in the Indian Ocean have inevitably seen AMISOM mission creep as it sought to deny this lucrative source of funding to the militias. As a naval dimension has been introduced to AMISOM, lack of AU maritime doctrine and capability has been similarly exposed. AU chartered supply ships have been threatened and the ASF has proved unable to interdict Al Shabab controlled pirate vessels and ports.⁴¹ However, with African nations lacking a credible maritime surveillance capability, policing of sea lanes and the littoral remains elusive. Inevitably, Somali militias are exploiting such weaknesses to circumvent AMISOM land operations. With the AU forced to request Western support, this is a typical example of the second category of intervention envisaged by Branch. Similar doctrinal weaknesses are evident regarding post conflict security sector reform such as policing;⁴² nor is the potential contribution of women to conflict management evident in AU thinking.⁴³ Addressing such asymmetry requires the PSC to adopt a more Joint approach to doctrine which looks beyond the purely military land environment if AU influence – both against enemy forces and within a coalition – is to be maintained.

C3IS

This lack of overarching doctrine and SOPs and the eclectic mix of nations involved in AU operations means that there is little commonality in C3IS, an area of particular relevance to

Air power. Although some use can be made of commercial networks, this may prove expensive and introduces security concerns. Moreover, most commercial systems are unsuited to the austere environments common to deployed operations where air-conditioning may not be available or reliable. The significance of such factors is increasingly evident as global media expands and the numbers of actors with whom the AU interacts increases. Lacking appropriate AU direction, nations continue their own national procurement processes. This inevitably results in incompatible architecture which significantly hinders coordination and the exploitation of information. Although pre-dating the AU, Economic Community of West African States Monitoring Group (ECOMOG) operations in Liberia were significantly hindered by lack of access to appropriate information architecture. As a result, geographical understanding was restricted to photocopied maps provided by the US, or a single 'outdated general political map' at a battalion headquarters. This resulted in ECOMOG forces deploying into the field with deficient or no maps whatsoever and directly contributed to losses of men and materiel.⁴⁴ The situation today is little changed with no agreed configuration or accords regarding common intelligence architecture.⁴⁵ Appropriately applied aerial survey is therefore urgently required for many areas where AU assets are operating on the ground. Arguably, such a product could be applied across a limited – but nevertheless sufficient – area rapidly and effectively by a variety of platforms.

Even where nations are willing to adopt common practices, the widely differing levels of equipment standards and procurement throughout Africa present further obstacles.⁴⁶ A prime example is where contributing nations equipped with former Soviet air traffic control and C2 systems deploy alongside those with Western equipment. In this case, the former utilise metric instrumentation whilst the latter are equipped with imperial displays. This creates obvious dangers in the most basic of flight coordination (eg altitude in metres as opposed to the internationally recognised imperial norms).

The implications for aerospace in this area would be similar to the challenges experienced by NATO forces in the First Gulf War and Balkans. Here, rapid installation of mission essential equipment had to be accomplished to assure interoperability. In 1991, the early lack of Mode 4 IFF from non-US aircraft initially hindered the development of effective RoE and coalition C2. Throughout the Balkan conflicts, lack of common, secure communications was a similar challenge which was ruthlessly exploited by hostile forces. In Africa, the challenges are likely to be more mundane due to the nature of the operations envisaged. However, legacy Soviet ATC systems and avionics – as well as a variety of incompatible communications – illustrate the fundamental challenges remaining.

The lack of indigenous C3IS interoperability within APSA illustrates the inability of the AU to conduct autonomous operations. Moreover, the critical ability to exchange data between RECs and with other actors such as AFRICOM and NGOs is a significant problem. In such operations, 'knowledge is power' and the need to rely on information flow from external sources can inevitably prove damaging.

Logistics

Logistics underpin any military ability to deploy and sustain operations and is arguably the factor which most obviously undermines AU claims that the ASF can meet all envisaged scenarios. Moreover, its significance is magnified by AU emphasis upon rapid interventions to prevent genocide. In both of Branch's envisaged intervention scenarios, logistics are the enabler for entry and the means by which AU forces can be sustained. Lack of logistics capacity dictates that any Africanized intervention potential will remain subject to external influence, veto or premature termination.

The immense distances and poor communications characteristic of Africa dictate that in any deployment, the movement of even small numbers of personnel and military vehicles requires a strategic heavy lift capability.⁴⁷ The preferred option is maritime transport which offers unparalleled capacity to lift an entire brigade in a single voyage. Whilst many commercial vessels are available for charter, these are costly, often unresponsive, and predominantly designed for berthing in well-established port facilities. As in the case of Somali anchorages denied by Al Shebab, such facilities may not always be available with the result that specialised amphibious vessels may be required to conduct landings in unprepared locations. Yet, with the exception of Egypt and Nigeria whose amphibious assets lack the 'blue water' capabilities required for lengthy transits, such capabilities are absent from the inventories of AU member states. The AU is similarly limited in terms of Air Transport. Whilst several nations possess tactical transport types⁴⁸ capable of lifting personnel and small vehicles, none possess the wide-body, heavy lift capability required for armoured vehicles and plant.⁴⁹ As a result, the AU is forced to hire commercial or UN chartered aircraft, or again rely on external military support. The former are extremely expensive and often unavailable in the timelines dictated by rapid intervention whilst the latter are inevitably subject to political influence and alternative priorities.

Once established in a theatre, further logistic challenges are evident in AU aspirations. Whilst tactical air transport will be suitable for some tasks, helicopter support remains at a premium for deployments away from airfields.⁵⁰ Moreover, there is little evidence that the AU possesses the deployable infrastructure such as fuel 'pillow tanks', ground handling equipment, accommodation, catering, environmental health and medical facilities for sustainable operations. A graphic illustration of the dangers of these capability gaps was seen in Somalia. For a 12 month period from April 2009, some 241 AMISOM military personnel were hospitalized suffering from beriberi. This led to 4 fatalities and 52 aeromedical evacuations including 31 who suffered heart failures. This lamentable situation was only diagnosed after AMISOM sought World Health Organization assistance due to a lack of deployed medical expertise. Moreover, the cause of the outbreak was the poor diet and conditions which soldiers were enduring as a result of inadequacies in deployed AU infrastructure and logistics.⁵¹ Without such logistic and sustainment capacity, the AU may be prevented from operating in austere locations. Moreover, inadequate infrastructure forces reliance on local or external support, significantly reduces combat effectiveness and raises serious questions regarding the

duty of care exhibited by AU leadership. Logistics and deployed infrastructure is therefore one key area of Air power expertise which is particularly relevant to supporting AU activity.

Training and Evaluation

Some progress has been made in training the ASF as an entity with several command and field exercises to brigade level.⁵² Notably, policy was established which broadly defined training doctrine whilst some regions designated centres of excellence to enable evaluation and certification of brigade capabilities.⁵³ However, such activity varies significantly and there is little standardisation between regional brigades. Doctrinal and staffing limitations also mean that significant knowledge shortfalls remain, notably in terms of financial, logistics and administrative personnel⁵⁴ and in the quality of specialist skills such as medical, intelligence and engineering.⁵⁵ Nor can such training regimes remain fixed. Rather, they should be dynamic and closely linked to the evolution of AU doctrine and procurement cycles to ensure that emerging threats are anticipated and met. An example is the recent introduction of Improvised Explosive Devices (IEDs) to Somalia by Al Shebab.⁵⁶ IEDs have long been the preferred tactic for insurgents in Iraq and Afghanistan yet few AMISOM personnel have completed mine awareness courses. Moreover, even fewer AU nations have demonstrated an awareness of how Air power can contribute to challenging such asymmetric threats. Similar training deficits are implied by the paucity of night vision goggles, helicopters and communications systems available to the ASF.⁵⁷ At present, there is little evidence that ASF operational experience is either shared or informs training and doctrine via an appropriate learning cycle.

Implications for Air Power

What then are the implications for Air power? Although Africa has traditionally been low down on the UK IDE priority list, this is likely to gradually change. Nations such as Nigeria are expected to grow exponentially in their economic capacity and Africa remains one of the fastest growing regions for IT, particularly mobile phones. Over the next decade, its relevance to the UK's prosperity agenda – of which the MOD and services are inextricably linked – will expand. Simultaneously, Africa has seen a surge of Islamic extremism in recent years which has become the focus for discrete operations by a variety of nations. With focus sharply increased as a result of the Arab Spring in North Africa as well as operations in Mali and CP off the Horn of Africa, it is likely that Air power may see a resurgence in the Continent. As with RAF Sentinel and C-17 support of French operations in Mali, this offers an ability to intervene discretely while gaining significant influence of regional and coalition activity. Moreover, when deployed to appropriate locations, the 'tethered goat' risks so often associated with Land forces are avoided. Examination of the AU's 5 pillars of development provide an appropriate method of considering how Air power can better influence the region:

- a. **Doctrine.** The majority of African militaries are dominated by Land forces and there is little consideration of the asymmetric advantages offered by the third dimension. The mentoring of nascent air forces has become a standard role for Western air forces

in Afghanistan and Iraq and the task remains an underlying tenet of UK IDE. Arguably there remains a doctrinal void within the AU's ability to consider and integrate Air power into its intervention scenarios. Therefore, increased emphasis upon cognitive influence and development will likely prove fundamental to increase Air power's relevance to African stability.

- b. **SOPs.** The potential value of established Western coalition⁵⁸ building mechanisms to the evolution of SOPs is evident in AU capacity development and closely aligned to doctrinal work. Although the challenges of pan-AU SOPs are considerable and most likely unrealistic, those for individual elements of the ASF are attainable. Indeed, there is some success already regarding Land Force SOP development within Economic Community of West African States Monitoring Group (ECOMOG). Again, mentoring and exposure to appropriate capacity building exercises are the most effective way to progress and integrate regional Air power.
- c. **Command, Control, Communications and Information Systems (C3IS).** This area offers significant obstacles due to the limited infrastructure through the majority of the African continent. However, the rapid growth of African telecommunications offers an equal opportunity to integrate basic C3IS architecture for regional operations. This would be relevant to all environments and could serve as a key Joint enabler just as with western nations. Once again, a layered approach concentrating upon regional development with a smaller number of systems retaining compatibility with pan-AU activity and situational awareness. Ultimate connectivity to the Addis Ababa CEWS Situation Room would be a clear priority. However, additional data would require an equal expansion of the J2, J3 and J6 personnel required to act upon increased information flow. From a purely Air power perspective, standardisation of C2 facilities must be seen as a priority for the AU to overcome legacy restrictions of former Soviet equipment standards. As the most technologically minded of services, Air Forces are well placed to take a leading role in any such evolution.
- d. **Logistics.** Arguably the most fundamental to AU intervention aspirations, Air power is particularly relevant to such capacity development. IDE involving increasing exposure to heavy lift and rotary support capabilities would undoubtedly be eagerly received by African states. Disaster response by RAF C-17s, C-130s and rotary assets, exemplified by Op BARWOOD,⁵⁹ illustrate the disproportionate effect available from even limited deployments. Appropriately targeted, such capability may also feed well into the prosperity agenda as key African nations develop economically. South Africa's cancellation of an A400M order has already been discussed. However, such requirements remain extant and the large fleets of increasingly obsolete C-130s and An-12s across the region are indicative of the defence sales prospects for this important European programme. However, the deployment of such assets must be balanced by the development of related air movements capability,

including that for aeromed. Whilst the latter is highly specialised, an increased AU air movements capability is arguably more attainable for the region. Similarly, the expeditionary knowledge which the RAF enjoys after a decade of unparalleled operational exposure is highly relevant to ensuring safe and effective operating environments for AU personnel deployed on operations. Irrespective of such factors, the ability to rapidly deploy the air and surface logistics required for rapid intervention is arguably the most pressing need for AU intervention capacity.

- e. **Training and evaluation.** Implicit in any development of AU capacity is the need for robust training and evaluation. This is an area of long standing if little known importance to UK IDE which benefits significantly from the RAF 'brand'. The CFS remain a particularly sought after method for smaller overseas air forces to measure their flying standards and methods of supervision. Likewise, demand for 22 Gp RAF International Defence Training (IDT) significantly exceeds our capacity to deliver. The increasing move to contractor provisioned solutions such as the Military Flying Training System further remove a degree of agility in supporting IDES as contracts – and capacity – are often set many years in advance. However, it is clear that when such training is provided, it can have long lasting and sometimes strategic benefit which may last for generations. An examination of the discrete influence and access to middle eastern nations secured by the leaders of those nations having completed officer or flying training with the RAF exemplifies such second order benefits. Therefore, IDES should strive to emphasise Air power training capacity and consider it within commercial support contracts.

At a broader level, it is suggested that some re-alignment of Western Air power priorities may also be required when applied in Africa and similar regions. Firstly, procurement may need to increasingly take into account the likely scenarios under IDE which will gain traction and influence. The implication for the UK of this is that Air power capabilities may not be wholly driven by UK requirements. Rather, equipment and procedures may be orientated by the implied demands specified by IDE 'target nations.' In the majority of cases, this will be entirely coherent with extant priorities, not least the ability to deploy to austere or unsupported locations. More controversial however would be the implications for how funding is secured and how subsequent activity is prioritised. Whilst MOD budgetary primacy is assumed, retired senior politicians and officers have previously questioned whether the cost of any Trident replacement should be wholly met from the defence budget. Similar arguments could be made for defence activity which is increasingly influenced by IDES and the prosperity agenda. Where an RAF ISR asset for instance is able to make a major contribution to DfID projects,⁶⁰ should the ring-fenced funding of this department not contribute? The deployment of a Canberra PR9 to the DRC (then Zaire) in 1996⁶¹ provides a salutary lesson in the disproportionate effect available from Air power. Against non-governmental organisation reports of an emerging humanitarian crisis, plans were being drawn up for a major deployment of land personnel. However, within days, PR9 imagery had indicated that reports were hugely

exaggerated and a costly and potentially dangerous intervention avoided. However, implicit in this is how tasking priorities would be affected. Already, Single Service regional IDES priorities sometimes differ subtly from those of the 'fourth floor' MOD community⁶² when observed through the 'air lens'. As IDES increases in importance within Defence, so too will the requirement for increasing coherence across MOD and government departments.

Summary

It is clear therefore that the reality of the AU's ability to conduct autonomous operations is highly questionable. Significant weaknesses are evident in all of the ASF's key areas of development. Despite sound early progress, doctrine remains incoherent across the AU's RECs with a lack of even fundamental frameworks such as common language. Moreover, the limited doctrine which is available is insufficient to meet current needs due to being focused almost exclusively on the military land domain. SOPs and C3IS are equally weak with diverse national equipment and data standards largely prohibiting effective and safe interoperability without recourse to external support or insecure commercial means. However, it is logistics and sustainability where the AU's claims regarding autonomy are most flawed. Lacking any credible sea or airborne heavy lift capacity, or the infrastructure to operate from austere locations, the ASF remains entirely reliant upon support from local nations or external actors such as AFRICOM. Where local support is sought, the danger of AU contracts actually financing 'parochial rebels'⁶³ is a real possibility, thereby perpetuating conflicts in an identical manner as Western nations are accused of having done by Branch. In terms of Air power, it could be argued that a generation of expeditionary operations has secured an unsurpassed level of operational knowledge within the RAF. Lessons and institutional knowledge therefore ensure the Service is ideally placed to drive AU capacity forward should UK IDE be so prioritised. Indeed, the agility and asymmetric benefits which have proved so beneficial to Land Operations in the Balkans, Iraq and Afghanistan could potentially revolutionise the largely land centric AU intervention capacity. As the UK looks beyond Afghanistan and 2015, such benefits promise to facilitate a genuinely versatile overseas engagement capacity within Sub-Saharan Africa. Moreover, if enabled by Air power, regional sensitivities regarding the role of militaries⁶⁴ could be avoided as could the expense of large standing commitments. In this sense, the enormous physical size – and diverse security challenges – presented by Africa could be more effectively addressed.

Conclusion

*'The complexity of modern peacekeeping means that no single organization is capable of tackling the challenge on its own.'*⁶⁵

Adam Branch is correct to highlight the dangers of external interventions in Africa. Diverting focus from areas of genuine need, they sometimes aggravate or perpetuate underlying problems. Africa can undoubtedly do more to assist its own cause and nowhere is this more evident than in developing resolute and credible coercive intervention capabilities, particularly for humanitarian reasons. If this is to be successful, the AU offers the most appropriate organ

for success. However, Branch's hypothesis of Africanization of such activity is deeply flawed. Despite the AU possessing an evolutionary framework, APSA architecture and capabilities remain wholly unfit for the tasks proposed by Branch. With immature doctrine and enormous capability gaps the ASF will remain incapable of mounting autonomous intervention operations for the foreseeable future. Nowhere is this more evident than in the almost complete lack of logistic and sustainment capacity; a basic requirement for an organisation responsible for so large and geographically diverse an area. That AMISOM soldiers have succumbed to disease in a manner more reminiscent of the Crimea than a 21st Century peacekeeping mission due to simple lack of medical and other welfare considerations speaks volumes. Even were a significant increase in finances to be made available, it would likely be at least a decade before this mandate gap can be even partially remedied. Nevertheless, such an evolution is supported by the UN 'Prodi Paper' quoted throughout this narrative and offers significant potential for the Continent as a whole. Working alongside the UN just as the European Union and NATO routinely does, the AU could use funding for ASF expansion as a catalyst for social, technological and political benefits.

A sympathetic expansion of the APSA could significantly increase intra-Continental economies of scale, trust, operational legitimacy and understanding via mutual cooperation and dialogue. The supporting C3IS for such activity could facilitate dual use improvements in communications access across the Continent for a variety of security, education and health causes. Meanwhile, joint procurement of a balanced logistics capability with sustaining and deployable accommodation, health, power generation and other essential infrastructure would be equally beneficial to civilian uses and disaster relief efforts. Perhaps most importantly from an African perspective, such procurement would potentially generate and maintain a large number of high technology jobs across the continent via offset agreements. Moreover, it would allow the AU to become a contributor to global disaster relief and humanitarian operations in its own right, thereby increasing the Union's influence and credibility.

From an Air power perspective, the opportunities are manifest and arguably present significant benefits for UK foreign policy activity, post 2015 defence posture, and the prosperity agenda. After generations of Land centric activity, many security challenges have become moribund. Conflicts associated with vast regions such as that presented by the DRC continue to be addressed by AU and UN land forces largely using methods little changed for decades. Should the agility and asymmetric advantages of Air power be applied in support of the AU and UN, many of these issues could undoubtedly be more effectively challenged. Moreover, numerical and funding efficiencies could be secured for those land forces responsible for such enormous and often inaccessible areas.

If backed by the funding profiles and private sector options suggested in recent UN discourses,⁶⁶ such possibilities are intriguing and worthy of further investigation as part of a potential long term UK IDES policy. In summary therefore, it is suggested that Branch's vision of almost autonomous AU intervention capabilities is unrealistic. However, a more

balanced partnered approach with the UN could potentially transform not only Africa's ability to manage internal problems, but also the Continent's own place on the world stage. The relevance of Air power in benefiting such aspirations is significant for the continent, UK IDES and the prosperity agenda.

Notes

¹ Prodi, R, *Report of the African Union-United Nations panel on modalities for support to African Union peacekeeping operations*, United Nations, 2008, p.8.

² Biswaro, JM, *Perspectives on Africa's Integration and Cooperation from OAU to AU*, Tanzania Publishing House Limited, 2005, p.56.

³ Branch, A, *Displacing Human Rights: War and Intervention in Northern Uganda*, Oxford University Press, 2011, p.4.

⁴ Ibid, p.248-249.

⁵ Ibid, p.248. The second case may be where influence is required beyond traditional AU areas of responsibility. An example would be African and Western cooperation in counter-piracy operations in the Horn of Africa and Indian Ocean.

⁶ Evans, G and Newnham J, *Dictionary of International relations*, Penguin 1998, p.281.

⁷ Branch, A, *Displacing Human Rights: War and Intervention in Northern Uganda*, Oxford University Press, 2011, p.249.

⁸ Makinda, SM and Okumu, FW, *The African Union: Challenges of Globalization, Security and Governance*, Routledge Taylor and Francis Group, 2008, p.160-185.

⁹ Prodi, R, *Report of the African Union-United Nations panel on modalities for support to African Union peacekeeping operations*, United Nations, 2008, p.22.

¹⁰ Biswaro, JM, *Perspectives on Africa's Integration and Cooperation from OAU to AU*, Tanzania Publishing House Limited, 2005, p.232.

¹¹ Williams, PD, *The African Union's Conflict Management Capabilities*, Council on Foreign Relations, October 2011. Accessed on 24 February 2012 via: <http://www.cfr.org/region/african-union/ri208>, p.4.

¹² Ibid, p.7.

¹³ Id.

¹⁴ Autesserre, S, *The Trouble with the Congo: Local Violence and the Failure of International Peacebuilding*, Cambridge University Press, 2010, p.256.

¹⁵ Akonor, K, *Assessing the African Union's Right of Humanitarian Intervention*, *Criminal Justice Ethics*, Vol. 29, No. 2, August 2010, 157-173 Accessed on 2 March 2012 via: <http://heinonline.org>, p.157-158.

¹⁶ Williams, PD, *The African Union's Conflict Management Capabilities*, Council on Foreign Relations, October 2011. Accessed on 24 February 2012 via: <http://www.cfr.org/region/african-union/ri208>, p.4.

¹⁷ Makinda, SM and Okumu, FW, *The African Union: Challenges of Globalization, Security and Governance*, Routledge Taylor and Francis Group, 2008, p.172.

¹⁸ Ibid, p.173.

¹⁹ Williams, PD, *The African Union's Conflict Management Capabilities*, Council on Foreign Relations,

October 2011. Accessed on 24 February 2012 via: <http://www.cfr.org/region/african-union/ri208>, p.12.

²⁰ Ibid, p.13.

²¹ Ibid, p.9. In contrast, the broadly equivalent UK Permanent Joint Headquarters has well over 120 personnel for the coordination of current UK deployed operations alone.

²² Makinda, SM and Okumu, FW, *The African Union: Challenges of Globalization, Security and Governance*, Routledge Taylor and Francis Group, 2008, p.173-174.

²³ Williams, PD, *The African Union's Conflict Management Capabilities*, Council on Foreign Relations, October 2011. Accessed on 24 February 2012 via: <http://www.cfr.org/region/african-union/ri208>, p.9. In comparison, AFRICOM allocates several hundred personnel to such tasks.

²⁴ Ibid, p.9-10.

²⁵ However, the UN has recently gained funding to establish a limited RPAS surveillance capability based on a Line of Sight system.

²⁶ Tiruneh, BT, *Establishing an Early Warning System in the African Peace and Security Architecture: Challenges and Prospects*. Kofi Annan International Peacekeeping Training Centre, 2010. Accessed on 23 February 2012 via: <http://www.kaiptc.org/Publications/Occasional-Papers/Documents/Occasional-Paper-29-Birikit.aspx>, p.19.

²⁷ Williams, PD, *The African Union's Conflict Management Capabilities*, Council on Foreign Relations, October 2011. Accessed on 24 February 2012 via: <http://www.cfr.org/region/african-union/ri208>, p.10. RECs are Arab Maghreb Union (UMA), Common Market for Eastern and Southern Africa (COMESA), Community of Sahel-Saharan States (CEN-SAD), East African Community (EAC), Economic Community of Central African States (ECCAS), Economic Community of West African States (ECOWAS), Intergovernmental Authority on Development (IGAD) and the Southern Africa Development Community (SADC).

²⁸ Cillers, J, *The African Standby Force: An update on progress*, ISS Paper 160, March 2008. Accessed on 27 February 2012 via: <http://africacenter.org/2009/07/the-african-standby-force-an-update-on-progress/>, p.2-3.

²⁹ Ibid, p.4.

³⁰ Prodi, R, *Report of the African Union-United Nations panel on modalities for support to African Union peacekeeping operations*, United Nations, 2008, p.10.

³¹ Kent, V and Malan, M, *THE AFRICAN STANDBY FORCE*, African Security Review, 2003, 12:3, 71-81. Accessed on 27 February 2012 via: <http://dx.doi.org/10.1080/10246029.2003.9627237>, p.74.

³² Williams, PD, *The African Union's Conflict Management Capabilities*, Council on Foreign Relations, October 2011. Accessed on 24 February 2012 via: <http://www.cfr.org/region/african-union/ri208>, p.12.

³³ Id.

³⁴ Ibid, p.16.

³⁵ Prodi, R, *Report of the African Union-United Nations panel on modalities for support to African Union peacekeeping operations*, United Nations, 2008, p.2-3.

³⁶ Alusala, N. *African Standby Force*, African Security Review, 2004, 13:2, 113-121. Accessed on 27 February 2012 Via: <http://dx.doi.org/10.1080/10246029.2004.9627291>, p113.

³⁷ Cillers, J, *The African Standby Force: An update on progress*, ISS Paper 160, March 2008.

Accessed on 27 February 2012 via: <http://africacenter.org/2009/07/the-african-standby-force-an-update-on-progress>, p.161.

³⁸ Alusala, N. *African Standby Force*, African Security Review, 2004, 13:2, 113-121 Accessed on 27 February 2012 Via: <http://dx.doi.org/10.1080/10246029.2004.9627291>, p.120.

³⁹ Prodi, R, *Report of the African Union-United Nations panel on modalities for support to African Union peacekeeping operations*, United Nations, 2008, p.12.

⁴⁰ Svensson, E, *The African Union's Operations in the Comoros: MAES and Operation Democracy*, Accessed on 14 March 2012 via <http://www.foi.se/upload/projects/Africa/foir2659.pdf>, p.21.

⁴¹ Binnie, J, *Details of AMISOM Expansion Revealed*, Janes Defence Weekly, 22 February 2012, p.17.

⁴² Prodi, R, *Report of the African Union-United Nations panel on modalities for support to African Union peacekeeping operations*, United Nations, 2008, p.10.

⁴³ Ibid, p.16.

⁴⁴ Nass, Major, IA, *A Study in Internal Conflicts: The Liberian Crisis and West African Peace Initiative*, Fourth Dimension Publishers, 2000, p334-337.

⁴⁵ Mathiasen, Lieutenant Colonel, F, *The African Union and Conflict Management*, US Army War College, 2006, p.7.

⁴⁶ Hoyle, C, *World Air Forces Special Report*, 2011/2012, Flight International, 2011. Accessed on 2 March 2012 via: http://www.flightglobal.com/airspace/media/reports_pdf/world-air-forces-2011-2012-90190.aspx, p.9-30.

⁴⁷ The definition of heavy lift differs between nations. For the purpose of this narrative, it is considered to be items which are indivisible and of weights exceeding 1 ton, or of dimensions greater than 100 meters. By way of illustration, a lightly armoured Snatch Land Rover weights approximately 8900 pounds while a typical mine-resistant 4x4 vehicle such as the RG-32 weighs over 4 tons.

⁴⁸ Eg the C-130 Hercules or AN-12.

⁴⁹ South Africa cancelled an order for 8 Airbus A400Ms in 2009 which could otherwise have provided such a capability to the AU.

⁵⁰ Williams, PD, *The African Union's Conflict Management Capabilities*, Council on Foreign Relations, October 2011. Accessed on 24 February 2012 via: <http://www.cfr.org/region/african-union/ri208>, p.10. RECs are Arab Maghreb Union (UMA), Common Market for Eastern and Southern Africa (COMESA), Community of Sahel-Saharan States (CEN-SAD), East African Community (EAC), Economic Community of Central African States (ECCAS), Economic Community of West African States (ECOWAS), Intergovernmental Authority on Development (IGAD) and the Southern Africa Development Community (SADC), p.22.

⁵¹ <http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0028345>.

⁵² Williams, PD, *The African Union's Conflict Management Capabilities*, Council on Foreign Relations, October 2011. Accessed on 24 February 2012 via: <http://www.cfr.org/region/african-union/ri208>, p.10. RECs are Arab Maghreb Union (UMA), Common Market for Eastern and Southern Africa (COMESA), Community of Sahel-Saharan States (CEN-SAD), East African Community (EAC), Economic Community of Central African States (ECCAS), Economic Community of West African States (ECOWAS), Intergovernmental Authority on Development (IGAD) and the

Southern Africa Development Community (SADC), p.6.

⁵³ Cillers, J, *The African Standby Force: An update on progress*, ISS Paper 160, March 2008.

Accessed on 27 February 2012 via: <http://africacenter.org/2009/07/the-african-standby-force-an-update-on-progress/>, p.159-160.

⁵⁴ Prodi, R, *Report of the African Union-United Nations panel on modalities for support to African Union peacekeeping operations*, United Nations, 2008, p.22.

⁵⁵ Williams, PD, *The African Union's Conflict Management Capabilities*, Council on Foreign Relations, October 2011. Accessed on 24 February 2012 via: <http://www.cfr.org/region/african-union/ri208>, p.10. RECs are Arab Maghreb Union (UMA), Common Market for Eastern and Southern Africa (COMESA), Community of Sahel-Saharan States (CEN-SAD), East African Community (EAC), Economic Community of Central African States (ECCAS), Economic Community of West African States (ECOWAS), Intergovernmental Authority on Development (IGAD) and the Southern Africa Development Community (SADC), p.22.

⁵⁶ Gelfand, L, *Kenyan Army Hit by New IED Attack*, Janes Defence Weekly, 30 November 2011, p.17.

⁵⁷ Williams, PD, *The African Union's Conflict Management Capabilities*, Council on Foreign Relations, October 2011. Accessed on 24 February 2012 via: <http://www.cfr.org/region/african-union/ri208>, p.10. RECs are Arab Maghreb Union (UMA), Common Market for Eastern and Southern Africa (COMESA), Community of Sahel-Saharan States (CEN-SAD), East African Community (EAC), Economic Community of Central African States (ECCAS), Economic Community of West African States (ECOWAS), Intergovernmental Authority on Development (IGAD) and the Southern Africa Development Community (SADC), p.22..

⁵⁸ Such as NATO and Partnership for Peace.

⁵⁹ The deployment of RAF Pumas and other assets in support of humanitarian relief operations following floods in Mozambique in 2000.

⁶⁰ Such as an assessment of hydrology or transportation requirements.

⁶¹ Op PURPOSEFUL.

⁶² NATO and European Policy (NEP) and International Policy and Planning (IPP) departments.

⁶³ Reno, W, *Warfare in Independent Africa*, Cambridge University Press, 2011, p.206.

⁶⁴ Due to generations of sometimes questionable political intervention by African militaries.

⁶⁵ Prodi, R, *Report of the African Union-United Nations panel on modalities for support to African Union peacekeeping operations*, United Nations, 2008, p.7.

⁶⁶ Prodi, R, *Report of the African Union-United Nations panel on modalities for support to African Union peacekeeping operations*, United Nations, 2008, p.23-25.

The Troublesome 1930s: General Unrest, Intense Activity and Close Cooperation

By Colonel Andrew Roe

The precipitous and insecure North-West Frontier of India experienced a rapid advancement in the use of air power in the 1930s. It became increasingly evident, despite inter-Service rivalries, that there was plenty of room for both the RAF and Army on the frontier; their capabilities were not exclusive, but complementary and mutually beneficial. The best results in tribal management could only be obtained when both worked in close and constant cooperation with each other and this quickly became the *modus operandi* through necessity. Planning became local, with the air and ground planners sitting next to each other using a common map. And, by the late 1930s, the air and ground could talk directly with each other with reliable radios. This article looks at the growing 'cooperation' between the RAF and the Army on the frontier in the 1930s and 40s.

Introduction

By the early thirties there was discernable a certain complacency about the North-West Frontier, a general and almost reluctant belief that the scales were by now so heavily loaded on the Government's side that the Frontier was not what it used to be, and Regular troops were most unlikely ever to suffer any more serious setbacks.

The Looker-on, 'The North-West Frontier in the Thirties – II'

The 1930s were characterised by an evolution in the use of air power along the rugged North-West Frontier. Hard-won lessons, combined with experimentation and trial, proved the growing necessity for Army Cooperation (A.C.) squadrons to integrate more fully with ground forces, particularly in support of slow-moving Army columns. This 'cooperation' between the RAF and the Army allowed for more precise targeting and greater effect by the integration of air assets in support of planned ground operations. It called for a sympathetic understanding of each other's powers, limitations, methods and requirements. The period was also influenced by several notable individuals, ranging from T.E. Lawrence, through Mizra Ali Khan – a religious firebrand known as the Fakir of Ipi – to Adolf Hitler; all of whom, directly or indirectly, affected the way that air power was used along the troublesome frontier. However, it was Europe's unavoidable march towards war with Nazi Germany that ultimately challenged the frontier's pre-eminence, relegating its magnitude to an almost peripheral but permanent headache.

The Lawrence Canard

The successful evacuation by air of 268 men, 153 women and 165 children from Kabul in 1928-29 had one attention-grabbing footnote.¹ On 8 January 1929 a curious airman, known as 338171 Aircraftman Thomas Shaw, departed Miranshah Fort.² Located deep in the Upper Tochi Valley, just ten miles from the Afghan border, the lion-coloured mud fort was enhanced by a dusty L-shaped airstrip (its two arms running along two sides of the fort). Shaw was in fact Colonel Thomas Edward Lawrence – better known as 'Lawrence of Arabia' – the eccentric amateur and unorthodox leader of the great Arab uprising in the Arabian Desert.³ In September 1928 unfounded news in the press claimed that Lawrence was spying for Britain in Afghanistan, conducting a secret mission. This came to a head in January 1929 when unsubstantiated reports asserted that the Afghan authorities had ordered the capture of Lawrence. This time his alleged crime was assisting Afghan rebels to cross the frontier. 'Many newspapers reproduced prominently a report that the Afghan Government had ordered the arrest of Colonel Lawrence for complicity in the revolt. The *Vossische Zeitung* devoted half its front page to this report, and considered that the suggested implication of Colonel Lawrence "does not sound incredible." The *Börsen Zeitung*, whose readers, one must hope, are less credulous than itself, says: "It has long been known that Lawrence is the leader, or at least the organizer, of the revolt."' ⁴

Lawrence was supposed to have dressed in the disguise of a holy man, wearing a turban and robes, in order to disseminate political propaganda across the border. The *Deutsche*

Allgemeine Zeitung went a stage further: '... the possibility that Lawrence has had his hand in the Afghan game is completely established,' suggesting that his next book should be titled 'Revolt in Afghanistan.'⁵ However it was the made-up connection between the Shinwari revolt in the Khyber area and Lawrence which ultimately made his position untenable. With rumours gaining momentum, due to the suspicious combination of circumstances, an official *communiqué* cautioned:

The Government of India had hoped that no credence would be given to fabrications so patently wicked, and that, if ignored, they would die a natural death. In view, however, of the increasing currency which they seem to be obtaining, the Government of India has instructed the local Governments to consider forthwith the prosecution of the principal offenders.⁶

Rumours remained rife and became gradually more colourful. Uncomfortable with Lawrence's coincidental presence so close to the Afghan border, Sir Francis Humphrys, the Minister, asked for his removal away from the frontier, due to the embarrassment being caused to the British Legation in Kabul. Not wishing to send him home, Salmond telegraphed Trenchard for his views and counsel. Trenchard suggested that a transfer to Aden, Somaliland or Singapore was appropriate, and asked Salmond to find out Lawrence's preference. Salmond wrote in reply:

January 10th, 1929

Poor Lawrence! The whole thing is a tragedy. Directly I received your telegram I ordered him down by air to Lahore and sent up Colonel Turner with a personal letter from me explaining all the circumstances. He was very much upset ... However, he understood the necessity. He felt it was no good going to Singapore as, as soon as there was some row there, it would be put down to him. He said he would always be hounded about wherever he went. He did not think it would be any good going to Aden or Somaliland as these places were too close to his former activities. He therefore decided on coming home.⁷

An official despatch stated simply that: '... in view of the currency obtained by the unfounded and preposterous rumours connecting the name of Aircraftman Shaw with events in Afghanistan, the Government had decided to transfer him from Miranshah.'⁸ On 8 January 1929 Lawrence flew to Lahore and four days later boarded the P&O steamer S.S. *Rajputana* from Bombay bound for Plymouth.⁹

The New Cry – 'Cooperation'

The schoolboy once birched does not become a reformed character for life.
Violent crime continues in spite of Dartmoor and the gallows.

Sir John Slessor, *The Central Blue*

As Lawrence knew only too well, the North-West Frontier was rarely calm for more than a few days at a time. The near-peaceful days of the late 1920s were to become a distant memory for those operating in hostile tribal territory. Unrest, violence and insurrection were to become the hallmarks of the 1930s. Large-scale operations and intense activity were frequently necessary, involving several brigades supported by aircraft from the Frontier Squadrons to quell general unrest. More regularly, the trouble was localised and called for a sliding scale of violence to control and subdue sporadic tribal disturbances. Political officers, dealing with the tribesmen on a man-to-man basis, were often able to manage these situations under the cover of armed force overhead or in the background. Regular support to small-scale disturbances, unopposed by enemy aircraft or effective anti-aircraft weapons, ensured that Frontier Units and Squadrons were ready and primed for larger outbreaks of tribal hostility.¹⁰ Nonetheless, in order to maintain collective proficiency, all Bomber Squadrons in India competed annually for the Ellington Bombing Trophy, an impressive and highly sought-after prize, presented by Air Chief Marshal Sir Edward Ellington. Seen as the culmination of the year's training, each Squadron entered three crews: one to carry out high level bombing from 12,000 feet, a second to undertake medium level bombing from 6,000 feet, and the third for dive bombing. The competition tested both the pilot and air gunner over Peshawar bombing range, which was seen as 'neutral' by all Squadrons.¹¹

Despite initiatives to enhance bombing accuracy and proficiency, the real advancement on the frontier in the 1930s was 'cooperation' – the balanced use of all arms and services in frontier warfare. The tribesmen had become accustomed to the old biplanes flying high above their tribal lands and bombing disobedient villages. The psychological effect had largely worn off and aircraft were no longer a novelty or an unfamiliar threat. Determined *lashkars* (tribal armed forces) learned to cope with air attacks and tribesmen became accustomed to protecting their bases from aerial bombardment by siting them in remote caves.¹² Other well-developed tribal techniques such as moving at night, exploiting ground shadows, moving through precipitous and broken country, utilising woods and taking advantage of urban cover afforded ample concealment from air observation.¹³ Although the RAF remained relatively effective at encouraging wavering tribal sections into making a settlement, deterring tribal banditry and preventing tribesmen concentrating in unauthorised groups, it was becoming apparent that air power alone was increasingly insufficient to achieve an agreeable solution. Despite this reality, one flight commander based on the frontier in the 1930s boasted:

If they went on being troublesome, we would warn them that we would bomb an assembly of people. An assembly was normally defined as ten people ... indeed, in my case I can remember actually finding nine people and saying 'That's within ten per cent and that's good enough,' so I blew them up.¹⁴

Such an approach rarely had any enduring effect. However, combining traditional frontier methods with close support offered the most effective means of countering tribal rebellion. In direct support of the Army, instead of mere reconnaissance, aircraft were able to act on

intelligence and take direct action against errant tribesmen in support of ground forces. Of equal significance in an often-strained relationship, the RAF provided the expertise in its own area of speciality and was no longer seen as subordinate to the Army. One commentator noted:

Perhaps the biggest development in Frontier warfare in these [operations in the Lower Khaisora Valley, Waziristan, 1937] and subsequent operations has been the great strides made in close liaison between troops and the Royal Air Force, particularly in the matter of really efficient close support by aircraft. As the infantry advanced on the 29th April and flushed the enemy from successive positions it was a wonderful sight to see the aircraft overhead take him on and add to his discomfiture. Reports coming in from the flanks of enemy movement were communicated to the aircraft in a few moments, either by radio-telephony or the Popham Panel, and off went the machine to deal with it. All this was done by the Air Force Officer standing beside the Brigade Commander and in the closest touch with him, and knowing exactly what was in his mind. When a withdrawal was about to take place, a fresh aircraft was usually ordered up, which kept a vigilant watch on the rearmost troops and the flank piquets and, on several occasions, prevented the enemy getting too close by machine gunning or bombing them.¹⁵

Air control, the replacement of land forces by air power alone, was fast becoming a dated concept on the frontier. Few, even among the RAF, trumpeted it as the optimum solution to tribal control. Airpower was not the answer to controlling the frontier. However, against the grain, the Government of India's Tribal Control and Defence Committee recommended in 1931 that greater reliance should be placed on air control, describing the tactic as 'an offensive weapon of the greatest importance ... even against the most inaccessible tribe.'¹⁶

To provide more efficient cooperation the RAF improved and consolidated its various airfields throughout the frontier and enhanced available meteorological information, which proved a great advantage to pilots who were embarking on a long cross-country flight. Without repressive financial constraints, adequate supplies of spare parts and other essential items became increasingly available.¹⁷ It also upgraded its long-serving and obsolete aircraft. In February 1931, No. 5 Squadron started to transfer from Bristol F.2Bs to Wapitis, completing its conversion by May. No. 31 Squadron also received its first Wapitis in February and was fully equipped by mid April. Other detachments followed suit, with the final Squadron completing its conversion in April 1932. Concurrently, Nos. 11 and 39 Squadrons converted from Wapitis to Hawker Harts.¹⁸ 'The Hart offered its crews higher cruising and maximum speeds than the Wapiti, coupled with increased range, though armament and bomb load capacity remained the same.'¹⁹ The arrival of modern, twin-engined monoplane bombers quickly followed, with improved power, performance and offensive load. The first squadron to convert to Blenheim I's in India was No. 11, beginning in July 1938. 1939 saw the next two units begin conversion and No. 60 Squadron followed suit from March to September.

To complement new and improved aircraft, the RAF introduced enhanced communications systems to facilitate greater cooperation and situational awareness – both between air and ground and between column headquarters and the airfield. This included the employment of better wireless transmission (W/T) and radio telegraphy (R/T) sets and, when employed, two Air Force operators with a pack wireless set were attached to the headquarters of the column the aircraft were supporting. However, while W/T, utilising Morse Code, proved relatively successful in the mountains, R/T procedures proved less effective. Apart from the technical difficulties and limited range of airborne R/T, air gunners found R/T sets too bulky, unreliable and cumbersome to operate. Moreover, ground operators faced technical problems, atmospheric interference, and the reality that sets had to be unloaded and erected before they could transmit messages, thus limiting their effectiveness.²⁰ Many regarded these new radio sets with suspicion and loathing. Experience suggested that for close support duties, the quickest and most reliable methods of ground-air communication were the tried and tested procedures of ground strip codes, message dropping and the Popham Panel, which if practised carefully beforehand was a most comprehensive code.²¹ This was to be challenged in the late 1930s with the arrival of the Hawker Audax. This aircraft possessed a reliable two-way radio allowing the pilot to keep in regular contact with his base and the ground forces he was supporting. The airframe offered other benefits:

In many ways this type of machine was far more efficient in Frontier warfare than the heavier, faster aircraft like Spitfires and Tempests used ten years later. The Audax could turn and twist in a small space and fly slow enough to allow sufficient time for detailed observation of the terrain. At the same time it had a good enough turn of speed to make it a difficult target for snipers. From the Audax the crew might get glimpses of lurking tribesmen and the pilot would drop down on them in a power-drive to release a couple of bombs while the observer raked the ground with his machine-gun.²²

In addition to modern aircraft and communication upgrades, tactics, organisational structures and control systems were also enhanced.²³ Acknowledging that the sealed-pattern 'Aldershot model' of cooperation, devised for conventional European warfare, was for the most part ineffective in mountainous terrain, the development of cooperation theory was carried forward by experienced frontier pilots. Through growing know-how and experimentation they recommended best practice and novel solutions to everyday challenges:

We recommended the standardization of a system whereby reconnaissance areas should be sub-divided into lettered zones bounded by easily identifiable features such as deep *nullahs* [ravines], and said that if aircraft were to be able to intervene immediately in an emergency they must be already in the air, capable of being called down by signal when required – a foretaste of the 'cab-rank' system of later years.²⁴

Others also recognised the utility of airpower and wished to exploit its usefulness. The Army Medical Service requested aircraft for aeromedical evacuation in 1937. The RAF agreed to the

back-loading of casualties on Valentia Bomber Transport aircraft brining in troops and supplies. The aeromedical flights reduced a hazardous journey that could take days to less than a five hour flight; casualties who would not have survived a gruelling journey by other traditional means reached better medical facilities safely.²⁵ Furthermore, thought was given to writing cooperation doctrine and producing a combined manual of frontier warfare, recognising the radical change to cooperation used on the frontier in India. In 1930 Slessor authored the *Manual of Army Cooperation*, stressing the importance of good communications between the RAF and Army, the need for timely and accurate intelligence, and the ability to communicate in a well-timed manner. Regrettably, as such an instruction was long overdue for the A.C. Squadrons, the manual was not implemented. But, by 1935, the Air Staff released clear instructions that RAF training should be directed towards efficiency in tribal warfare, pending formal written doctrine on the subject.²⁶ To cover the gap *Close Support Tactics – Provisional* was distributed to Frontier Squadrons to supplement a draft chapter of the *Frontier Operations Manual*. This was followed by an approved version of the manual in 1937 that stated that:

For a land operation in frontier warfare, army co-operation aircraft will be placed under the command of the force commander in the field, and an air force officer will be appointed to the headquarters of the force to advise the force commander regarding their employment.²⁷

However, it was not until 1939 that the comprehensive *Frontier Warfare (Army and Royal Air Force)* was published. This provided unambiguous and up-to-date written guidelines to both Services, containing a detailed description of all methods of frontier warfare. It also underlined the increasing interdependence between the Army and RAF.

Despite a deficiency of written doctrine, routine activity continued unabated throughout the period. Tribal reconnaissance, usually undertaken by a flight of three aircraft, was a welcome duty for many. So too were demonstration flights. 'For the purpose of showing the flag and ensuring that the tribes remained constantly aware of the presence of British forces, all the Frontier Squadrons participated in a regular series of demonstration flights, planned to cover the whole Frontier at frequent intervals.'²⁸ Each route was carefully planned to ensure that tribes and villages well-known for disturbances were covered; aircraft would often descend to lower altitudes to leave a village in no doubt that they were being watched. Likewise the more isolated posts and garrisons were circled by one or more of the aircraft to instil confidence. Reconnaissance flights were often lengthy undertakings – frequently three hours or more in duration.²⁹ Aircraft were fitted with cameras to enable photographs of any unusual activity, such as damage to a landing ground or the construction of a new road. Aircraft were also used to conduct photographic surveys of specific areas or villages in an attempt to accurately map the frontier and to update the 'Tribal Directory'. Requiring constant revisions, the directory was a detailed account of the resources, population and other data of every known village in the frontier region.

Many of the villages were virtually unapproachable by road or on horseback, either because they lay in inaccessible areas or because the inhabitants were known to be hostile. The obvious way to reconnoitre such villages was to fly round them, assess their size and count the houses, haystacks, cultivated areas and note any fortified towers etc.³⁰

When not conducting tribal reconnaissance, crews spent time maintaining familiarity with the equipment, armament and general flying characteristics of the aircraft under their charge. Routine flights included dropping practice bombs on designated ranges, firing the aircraft's guns, taking vertical and oblique photographs and practising forced landings. More advanced flights included night-flying practise, employing makeshift flare-paths to border the runway to assist with landings.

Column protection was a routine task. It was normal for any column of men, horses and vehicles to receive 'continuous' or 'in readiness' support from one of the Frontier Squadrons. For example, it was more often than not the responsibility of Miranshah to look after columns operating from Razmak and Wana. Air Chief Marshal Sir David Lee recalls: 'To ensure good communication and understanding between the column and aircraft overhead, we nearly always sent a junior officer out with the column as a Liaison Officer.'³¹ The liaison officer's responsibilities were to sit at the elbow of the Brigade Major providing timely advice, planning support, communication assistance and technical know-how. He also supervised the exchange of messages by Popham Panel and message bag and provided instruction on this form of communication. Experimentation proved the importance of RAF Liaison Officers at column headquarters. In addition to this, a small number of farsighted officers also attached pilots to ground formations:

An essential part of [training crews for cooperation flights] ... was to give my officers a really practical idea of the soldier's job, the sort of things he had to do and what he was likely to want from the man in the air. To this end I arranged for my pilots to be attached each for a month to a battalion or battery, on the understanding that they really did have an executive job to do and did not merely sit about on shooting sticks watching other people do it. The soldiers co-operated most nobly in this – so much so that one young officer, Flying-Officer Lees, who was unfortunately killed in action in the air later on, actually led a platoon of Indian Infantry in action (no doubt under the benign tutelage of his Havildar [sergeant]) in a minor show in Waziristan.³²

'TEWTs' (Tactical Exercise Without Troops) were also undertaken to enhance cooperation procedures and to exchange best practice. Pilots, under the close supervision of their Squadron Commanders, studied the challenges of close support in mountain warfare from the point of view of the soldier on the ground.

However, prior to any column, a preliminary conference was attended by the Squadron Commander, his Air Intelligence Liaison Officer (AILO) and the RAF Liaison Officer (RAFLO)

accompanying the column. Also present at the conference, to enable integrated planning, was the column commander and his staff. It was acknowledged in the 1930s that mutual trust and understanding between the Services was key to success.³³ The conference discussed the time and nature of the support required and the objectives and the route that the column was taking, including a rough picqueting plan. Any pertinent information about the tribesmen and special areas to observe were also discussed. Owing to the difficulties of communication, once a column had left its base, daily operational orders sent to the RAF were short and to the point.³⁴ It fell to the AILO to brief the pilots on:

- The time his 'sortie' begins and ends.
- Where the column is going, and where he may expect to find column headquarters, picquet positions and advanced and rear guards.
- Information about the tribesmen and any special areas to watch.
- Details with regard to 'call signs' and frequencies.

Once over the area, the pilot formally relieved the on-station aircraft and informed column headquarters that he had done so. The aircraft was then responsible for circling over the column at a height of 2-3,000 thousand feet, scanning the mountainous terrain approximately two miles on both sides of the planned route for unusual activity. Picquets, denoted by an 'X' on the ground, were noted and annotated on the pilot's map. If all was well then reports to column headquarters occurred every half-hour. Anything untoward was reported immediately. Moreover, air photographs were often taken of each attack at the end of the day's activities. These were used to gauge the effect of air power on the tribesmen and allowed the RAF to be first with the truth. Compensating for a lack of human (local) intelligence in some cases, such detailed information proved invaluable over the coming years.

Political Agitation and Widespread Tribal Unrest – 'Everyone Flew Like Mad'

Troubles started in late April 1930 when Mahatma Gandhi's Civil Disobedience Campaign, instigated in 1929 and supported by the well-known anti-British agitator Abdul Ghaffar Khan, reached the administered area of the Vale of Peshawar, a focal point in the commerce of the day.

An educated intellectual Pathan giant, Abdul Ghaffar Khan of Utmanzai, had interested himself in provincial politics for years and was already known as a staunch supporter of the Hindu Congress. In 1929 he organised his own Frontier Youth League, a semi-military body whose programme aimed at complete independence for India and unity with the Hindus. Many young city-bred Pathans saw in it an opportunity for lettering off steam and donned its red uniform with eagerness. They were organised into companies at various centres where they were drilled and given military training. These Khudai Khidmatgars – 'Servants of God' – [or known sometimes as the Red Shirts] even had their own bands and a drill-book which laid down the badges to be worn by various ranks.³⁵

While inciting anti-government hatred during a large rally in Peshawar, Abdul Ghaffar Khan was arrested along with nine other leading figures in the movement on 23 April.³⁶ A serious disturbance followed for the next eight days, which was only subdued once the army had taken full control of the city. Aircraft from No. 20 Squadron cooperated with the troops during the re-occupation of the City. The squadron also undertook a series of reconnaissance flights due to an unsubstantiated report of a planned Afridi attack on Peshawar. The operation to reassert security in Peshawar resulted in 30 civilians killed and 33 wounded.

Further unrest followed in Kohat, particularly in the Mian Khel quarter and other population centres, resulting in the arrest of six congress leaders on 12 May after a successful raid on the Congress building in Kohat. General unrest followed, fuelled by fallacious rumours of atrocities committed by British troops, the imminent evacuation of the whole North-West Frontier and the general downfall of British Rule. As a result, the whole tribal territory became restless. Telephone and telegraph wires were cut, roads were blocked and tribal mobs dominated the countryside. The frontier squadrons were involved in operations against the various centres of unrest, mainly attempting to disperse tribal *lashkars*. One such illegal gathering occurred in early May, controlled by Badshah Gul. Estimated to be 700 strong and on the move, the RAF began frequent reconnaissance to monitor its progress. No offensive action was taken, but on 7 May reports suggested the movement of the *lashkar* towards the border. Since the situation appeared to be deteriorating, a demonstration of 41 aeroplanes was carried out over the area to check the advance of the *lashkar* and to deter neighbouring Mohmand sections from joining the gathering.³⁷ This had limited effect and offensive operations were deemed necessary. The normal procedure of bombing the villages from which the *lashkar* came could not be followed as the war party was drawn from such a large area. Air attacks were therefore confined to the *nullahs* and caves in which the tribesmen were located. After due warning air operations commenced on 11 May. Attacking by day and night, the aim was to harass the *lashkar*, causing casualties and preventing the gathering from assembling for hostile action. 'During these operations, all personnel seen were bombed or attacked by machine-gun fire, and, although targets were few, casualties began to mount up. The *lashkar* by this time had scattered to avoid losses and now occupied caves in an area approximately 11 miles deep and 2 miles wide.'³⁸ It was during an afternoon attack on 17 May that Flying Officer P.W.A. Stroud, descending to a low altitude in order to use his rear gunner effectively, was shot from the ground and died almost immediately.

July provided little respite for the squadrons. Pockets of unrest persisted across the frontier, but this time the torch of rebellion was held aloft by the Mahsuds in the tribal homelands of Waziristan. On 6 July a *lashkar* mounted a loose and unproductive investment of Sorarogha Post. The following day a *lashkar* totalling 1,500 tribesmen attacked Ahnai Post (five miles south of Sorarogha) without success, although a neighbouring *khassadar* (tribal levy or police) post was severely burnt. On 8 July a reinforced *lashkar* of 3,000 tribesmen attacked Sorarogha Post again. Equipped with scaling ladders and supported by a home-made gun, the tribesmen succeeded in putting the water pumps which supplied the post out of action.³⁹

'Bombed and strafed daily from the air for the next six weeks, these Mahsuds eventually scattered to the hills and their leaders were imprisoned. Only the Badinzai Mahsuds remained hostile and these held out against continuous bombing until their final surrender on 27 July.'⁴⁰

August experienced a second Afridi incursion into Peshawar. With between 4,000 and 5,000 tribesmen attacking the city, the situation required drastic measures and martial law was declared in Peshawar District on 15 August. Despite repeated bombing, almost continuous reconnaissance aerial flights and skilful cooperation, it was not until the end of the month that the uprising fizzled out. The official despatch notes:

The exceptionally enclosed nature of the country, round Peshawar, with its numerous villages, large gardens, standing crops and intricate *nullahs* and water channels, was an immense assistance to the Afridis. When, combined with this, they had the assistance of the local population who concealed and fed them, while tribesmen could hardly be distinguished from presumably peaceful villagers, it is no wonder that the odds were heavily in favour of the Afridi gangs in their game of hide and seek with the troops and air force.⁴¹

Widespread rebellion occurred across the frontier throughout 1930-31, calling for close cooperation, reconnaissance and demonstration flights, re-supply drops and propaganda flights. Matters were made worse in March 1931 when Abdul Ghaffar Khan was released from prison. At once he set about inciting further civil unrest by reintroducing his civil disobedience movement. Having achieved only limited success, he was re-arrested on 24 December and was immediately deported with four of his chief lieutenants.

1932 brought more unrest and revolt, with operations against recalcitrant tribesmen becoming an almost everyday occurrence. This was compounded by a localised uprising led by the Fakir of Alingar, while elsewhere action had to be taken against the Nawab of Dir's forces in the Milan Kalai area. Both disturbances were countered by focused bombing raids. These actions were followed by an inter-tribal dispute between the Upper and Lower Mohmands, with the frontier squadrons supporting the latter tribe.⁴² September also saw the regular bi-annual relief of Chitral, an Army outpost in the eastern hills of the Hindu Kush.⁴³ 1933 was equally troublesome and challenging. This time the location was the Tochi valley, where supporters of the ex-Amir of Afghanistan, Ammanullah, attempted to incite Mahsud and Wazir tribesmen to conduct a shock attack on the Afghan capital. Focused bombing quickly dissuaded the tribesmen from the proposed course of action. However, within weeks, further uprisings occurred in the same region, 'where a pretender to the Afghan throne sheltering with the Khan of Kotkai was attempting to raise the tribes to depose Nadir Shah, the incumbent Amir, who immediately requested action by the Indian authorities.'⁴⁴ Offensive air actions resulted in the Khan submitting to government terms, which included banishing the pretender. Nevertheless it was during these operations that inter-tribal feuding between the Lower and

Upper Mohmand transitioned into open conflict. The Lower Mohmand had agreed a road-building initiative and as such received government support. Government ground forces and air support were used to inflict heavy casualties on the Upper Mohmand, resulting in a cessation of hostilities.

1934 was less troublesome, with a greater emphasis on training, familiarisation and reconnaissance patrols. Nonetheless, the following year, trouble erupted again in Mohmand territory. Under the guidance of the Hadji of Turngzai, a *lashkar* of 2,000 tribesmen gathered with the intention of destroying a recently completed military road. Having warned the *lashkar* to disperse, a 38-aircraft demonstration was executed over the area. Following little observable change in the *lashkar's* behaviour, a phased bombing programme commenced on 20 August in support of ground operations. However, close support was restricted throughout the period. Both Nos. 27 and 60 Squadron had a Flight each at the Hill Depot, reducing aircraft availability considerably. More significantly, a severe earthquake, consisting of two main shocks, struck the native city of Quetta and the nearby RAF Station on 31 May 1935, causing widespread devastation to aircraft and infrastructure alike. Air Chief Marshal Sir David Lee recalls:

... as we began to taxi [sic] slowly towards the tarmac it soon became clear that the station [Quetta] had suffered immense damage. Hangers were still standing but the other buildings appeared to be heaps of rubble with clouds of the choking dust still floating upwards. An airman with a bandage round his head came limping out to meet me as I turned into line with about a dozen other aeroplanes which had arrived before us. While undoing my straps, I looked around; every airman in sight had some part of his body bandaged and, in fact, I don't think I saw a single airman without some injury during our brief stay.⁴⁵

Immediate relief was transported by air assets, with doctors, nurses and urgent supplies arriving in short order. Ultimately the RAF Station was abandoned: No. 5 Squadron relocated to Chaklala and No. 31 Squadron moved to Karachi.⁴⁶ It was to be months before the RAF could be declared fully operational again.

1936 was to see the frontier erupt once again, but not before the first reinforcement flight to Singapore occurred. Based on a new policy that required Indian-based units to reinforce British forces in the Middle and Far East in the event of war, No. 60 Squadron despatched its 12 Wapitis, accompanied by two transport aircraft, to the Far East on 7 February. Only 10 Wapitis reached their destination in Singapore on 13 February; two crashed *en route*.⁴⁷ Nonetheless, the real headline of 1936 was an outwardly insignificant clash of religions. The abduction of a Hindu girl, re-named Islam Bibi in accordance with Islamic custom, by a young Moslem student for marriage was the catalyst for a series of events that would reach to India's independence and beyond. The authorities returned the girl to her Hindu parents but, since Islam Bibi was now a Moslem, the tribesmen took exception and the Fakir of Ipi (Mizra Ali Khan) called for a

Jihad or Holy War against the British.⁴⁸ His religious influence quickly galvanised the tribes in Waziristan, who put aside their ages-old differences to unite under the Fakir's banner as the Champion of Islam. As the fighting abandoned all thought of systemic opposition in favour of guerrilla warfare,⁴⁹ the government would have been wise to heed Major General Sir Charles Edward Caldwell's hard-won lesson: 'Guerrilla warfare is what the regular armies always have to dread, and when this is directed by a leader with a genius for war, an effective campaign becomes well-nigh impossible.'⁵⁰

With conditions rapidly deteriorating, Major General Sir John Coleridge, General Officer Commanding Northern Command, took over military control of Waziristan on 29 November, a clear sign of the severity of the situation. The first major clash with the Fakir's forces occurred in November, resulting in the death of 24 government soldiers and over 100 others wounded. Supported by Nos. 5 and 27 Squadron, in air supply roles, the combined force succeeded in forcing the Fakir into the surrounding hills. By late December the Fakir was located in Arsal Kot, a remote and inaccessible village, some 20 miles south of Miranshah. After customary warning by coloured leaflet, his hideout – measuring 132 yards by 66 yards – was bombed and destroyed by No. 60 Squadron over the New Year. Taking heed of the warning, the Fakir had moved to nearby caves.

With the Fakir still instigating widespread trouble, operations against his determined followers reached a peak in April 1937. There were some 45,000 regular (Indian and British) and scout units, supported by the frontier squadrons, engaged in operations. Open and bloody conflict ensued. Despite the British initiative, tribal attacks on scout posts, convoys and army formations continued apace. The difficulties for all air crews in locating and accurately bombing a target proved challenging:

Unfortunately no one knew exactly what the situation was, nor where the forward troops of 2/2 Punjab were. It was therefore impossible to give the Air clear orders very quickly, or to put on the panel more than an indication of the range; and to avoid risk of hitting our own troops, a range was given which was actually considerably longer than it need have been. Also there was an unfortunate delay in drawing the pilots' attention, owing to the first two smoke candles failing to ignite. The close reconnaissance pilot was ordered by R/T to attack enemy in square 1937, and eventually both pilots attacked at about 1445 hours; they could neither of them see the enemy, but they put down their fire about where the shells were bursting.⁵¹

Routine air-dropped re-supply was equally complicated. With targets often surrounded by towering ridges and strong air currents, parachutes were prone to drifting into tribal hands. However, there were other more profound dangers: 'One lightly loaded parachute instead of dropping on the Plain was carried 3,000 feet *above* the aircraft before finally coming to the ground.'⁵² More routinely, aircraft were shot at and engine failures and crashes resulted in a number of deaths and casualties. The RAF suffered four killed and three injured between

January and September 1937 alone.⁵³ Routine operations continued throughout 1938, despite the detachment of a complete squadron to Singapore.

The region's affairs became even more complicated with the arrival of Muhammad Saadi al Kailani, better known as the 'Shami Pier',⁵⁴ who claimed direct descent from the Prophet and was a member of the Gilani clan. He was also the first cousin of ex-Queen Souriya, Amir Amanullah's wife, who had abdicated in 1929. A 34-year-old revolutionary of Syrian extraction from Damascus and purportedly pro-Nazi, he attempted to persuade the tribes of South Waziristan that it was their duty to restore Amir Amanullah to the Afghan throne. Raising a *lashkar* of 3,000 tribesmen in Kaniguram, the tribesmen advanced towards Afghanistan on 23 June. Despite clear warning, which was duly ignored, the *lashkar* continued on course and was bombed and attacked repeatedly by military forces predominantly from the Ghazni District. Following these actions, Kailani sought a peaceful outcome. With a sizable payment (£25,000) to guarantee his removal from the frontier, Kailani was deported back to Syria, leaving India on 4 July in an Imperial Airways flying boat.⁵⁵

In the meantime the Fakir, who refused stubbornly to support Kailani's invasion of Afghanistan, continued to incite insurrection. As a result, operations against Mizra Ali Khan and his supporters took place in the burning heat of July 1938, during which a number of troops (both British and Indian) became heat exhaustion casualties. Executed by the Razmak Column, the 3rd Indian Brigade, several platoons of Tochi Scouts – with their invaluable local knowledge – and No. 20 Squadron, the all-arms grouping was known collectively as 'Wastrike Force'. The force was commanded by Brigadier Maynard, a seasoned frontier veteran, and the aim of the operation was the destruction of the Fakir's isolated headquarters in a cave in the wild Kharre Mountains of North Waziristan. With the prospect of a military assault against the Fakir's lair highly likely, but the exact timing unknown, a large number of his hardened supporters formed in a *lashkar* and prepared robust defensive positions, stockpiling food, water and ammunition. Major J.S.G. 'Foghorn' Branscombe recalls in a letter to his wife: 'I must say that the secret had been well kept (at any rate from us) and I hear that Ipi didn't know we were going for him until we set off.'⁵⁶ With strong intelligence regarding the exact location of the Fakir's headquarters in caves at Burman Sar, about 9,000 feet above sea level and hidden by thick pines, No. 20 Squadron set about providing aerial photographs of likely approach routes, air reconnaissance of water sources and continuous close support for columns moving to the large concentration area in the plain at Degan.⁵⁷

By 12 July, with all troops located in the concentration area, the Squadron Commander and his small staff moved to Degan with a supply convoy and formulated the air plan for the move to Kharre. Advancing in two columns, with a jumping-off point at Wuzhgai, about 10 miles north-west of Degan, they planned that both ground formations would be given continuous close support during their move forward to the objective and withdrawal, and that separate aircraft would 'deal with any tribesmen approaching the column after the "Closed H" had been displayed.'⁵⁸ This meant that once instigated by ground signal, aircraft could take action

against anyone within two miles of the forward troops or picquet positions. In addition, a dedicated reserve was kept on the landing ground in a high state of readiness in order to relieve those who had run out of ammunition or for any emergency. On the afternoon of 12 July the two column commanders were flown over their objectives from Miramshah, returning to Degan in armoured cars. On 14 July the force left the concentration area to evict the Fakir from his hideaway while concurrently dispersing his following of hostile tribesmen and destroying his supply dumps.

All went according to plan, despite incessant sniping and sporadic indirect fire from two homemade field artillery pieces. Numerous 'Vs' (indicating that enemy forces were in the direction in which the apex of the V was pointing) provided excellent target indications to the circling aircraft above. During a local withdrawal a 'T' (a call for help when a position is likely to be overwhelmed or a sign that the enemy are following up a withdrawal so closely that it is impossible to get away) was displayed when approximately 50 tribesmen tried to rush a small party. As usual, the tribesmen collected in force during any retirement and were quick to bring accurate fire to bear on the retiring troops. The attack was thwarted by an immediate 'V.B.L.' (Vickers, Bomb, Lewis) attack, which deterred further attempts, allowing the column to continue its advance. That evening, with fierce fire from over 100 tribesmen holding up the operation, it became clear that the force would have to remain in situ for the night in hastily-constructed battle positions, known as stone *sangars*. In response, the number of close support aircraft was increased to four to provide additional top cover. These watched the *nullahs* and approaches to the picquet positions until dark and prevented concentrations gathering to attack at nightfall.

The objective was finally secured the following day and the Fakir's headquarters destroyed, including a cache of food and ammunition. The tribesmen followed-up Wastrike's planned withdrawal to Degan half-heartedly and aircraft were able to locate parties of long-range snipers by means of well directed 'Vs.' The speed and precision of the withdrawal, combined with the effective integration of close support aircraft, kept casualties to a minimum. 'A.I.L.O.' summarises: 'The valuable assistance rendered, and the excellence of the results obtained by air attack were mainly due to careful planning, good co-operation and the fact that both troops and pilots had worked together and had gained considerable experience of the close support code throughout the summer.'⁵⁹ However a number of factors, including the difficulty of the terrain, resulted in a less than successful operation. Despite killing many tribal malcontents and scattering the Fakir's remaining followers deeper into the mountains, no doubt across the Afghan border, the raid failed to achieve surprise and Mirza Ali Khan slipped effortlessly across the border into Afghanistan. Once again the Fakir had managed to escape a two-pronged movement closing in on him. On this occasion, the troops that cleared his cave found food still cooking in pots over a fire. He had fled with a few of his followers approximately thirty minutes before the leading troops arrived. For many years this was to be the pattern of the Fakir's efforts in eluding his pursuers.

The combined efforts of the Army (Indian and British) and RAF won a series of hard-fought skirmishes throughout 1938 and beyond, but failed to pacify the region to a standard expected by the government. With greater problems elsewhere, the frontier was increasingly relegated in importance as events in Europe started to influence India. For example, the defence of the naval base in Singapore gained primacy, resulting in the transfer of some RAF assets from the frontier during 1939-40. However, with the growing prospect of hostilities, the government decided to put an end to the Fakir's rebellion once and for all, even offering him a free pardon in September 1938, which the Fakir flatly refused. Despite multiple attempts to kill or capture the Fakir, he continued to spread and support rebellion, although his influence started to ebb, a trend that continued throughout World War II. Fortunately for all the allies, Mizra Ali Khan remained aloof from major Axis initiatives, preferring to sit on the sideline. He finally died in April 1960⁶⁰ and was accorded a long obituary notice in *The Times* of 20 April 1960. His passing brought to an end one of the great acts of drama on the frontier.

With the tribal situation steadily improving in the late 1930s, frontier assets were relocated to theatres of greater priority. Squadron Leader A.J. Young, who served in No. 60 Squadron on the frontier from 1936-1938, recalls: 'August 1939 saw the beginning of the end of the Royal Air Force "Watch and Ward" duties on the North-West Frontier; for Nos. 11 and 39 Squadrons flew to Singapore, No. 27 Squadron became a training unit for British and Indian volunteers and other units prepared for World War II. The one Indian Air Force Squadron was rapidly expanded into several more squadrons and the Indian Air Force took over responsibility for the North-West Frontier.'⁶¹ When India gained its independence on 14 August 1947, with the partition of the sub-continent, the North West Frontier Province became a part of a newly-created Pakistan. On the same day the Pakistani Air Force assumed joint responsibility for the troublesome frontier with the Pakistani Army and political authorities, implementing an indirect approach to control that was unsurprisingly well-received by the educated *maliks* (tribal leaders or elders), who immediately grasped its religious significance. However, it took somewhat longer for the full meaning of partition to become apparent to the average tribesman.

Harmonious Interconnection

There was plenty of room for both the RAF and Army on the frontier; their capabilities were not exclusive, but complementary. The best results could only be obtained when both worked in close and constant cooperation with each other and this quickly became the *modus operandi* through necessity. General Sir Sydney Muspratt, referring to the North-West Frontier, suggests: 'I should say that nowhere else in the British Empire, except possibly in Palestine at the moment [1939], is the ordinary day-to-day work in the two Services so closely and harmoniously interconnected.'⁶² Planning was local, with the air and ground planners sitting next to each other using a common map. And, by the late 1930s, the air and ground could talk directly with each other with reliable radios. Nevertheless, the RAF was unique in preventing widespread rebellion and unrest. Only the frontier squadrons had the ability to see thousands of square miles of tribal territory and possessed the means to react effectively to tribal disturbances in a timely manner. Air reconnaissance allowed the strength, composition

and routes of hostile *lashkars* to be identified. It also assisted in identifying which villages were giving shelter to hostile tribesmen. Aerial demonstrations, propaganda flights or targeted bombing could quickly follow. It fell to the Army to put 'boots on the ground' to help pacify and control areas, so that roads could be built, political officers could be protected and tribal difficulties could be addressed.

While the A.C. Squadrons had an increasingly jack-of-all-trades role under the charge of the force commander, bomber squadrons possessed less flexibility, remaining under RAF control. This resulted in an atmosphere of superiority in the A.C. Squadrons and a good deal of leg pulling when in the company of 'bomber boys':

Army co-op people not only do as much bombing as you bomber boys do, they have this relationship with the army. We patrol roads to keep them clear of road blocks, we cover picquets when a regiment withdraws. We keep accurate logs of our sorties on a knee pad. We keep touch with the people on the ground by picking up messages. All this is Greek to you, I'm afraid ...⁶³

This was not strictly true. Bomber Squadrons engaged targets that the Army or Scouts could not tackle and acted as a wide-ranging aerial fire brigade across the frontier. They also assisted in the evacuation of dangerously sick cases and the delivery of serums and medicines. Throughout the operations of 1937, 5,000 men were transported by the RAF in Waziristan, many of them casualties taken to hospital.⁶⁴ In addition to their principal role, bomber squadrons also provided assistance with photographic reconnaissance and the delivery of limited supplies by parachute. During the surprise advance on the Sham Plain in 1937, when it was impracticable to employ pack transport, the RAF dropped 13,000 pounds of supplies in loads of approximately 100 pounds each.⁶⁵ However, the line between peace and war on the frontier was ill defined, and the duties of the A.C. and Bomber Squadrons were often blurred by requirement. Pragmatism routinely trumped frontier doctrine – demonstrating the flexibility and growing maturity of air power. The theory of air control of the tribes died in the 1930s, but was replaced by a growing realisation of the need for true air-ground operations – a concept that would expand in the coming war.

Nevertheless, events on the world stage were to weaken hard-won frontier relations and operating procedures. The growing Indianisation of the RAF (and creation of the Indian Air Force (IAF)), the coming of the Second World War and Indian's march towards independence all challenged Britain's accountability for tribal control. When the Union flag was lowered for the last time on the frontier, '... the tribesmen in the northern provinces were frankly bewildered, unable to fully understand why their traditional fighting opponents, the British Army, was now relinquishing territories it had occupied, bloodily defended, and never been decisively defeated in for more than a hundred years.'⁶⁶ In its place fluttered the large dark green and white flag of the new Dominion of Pakistan. As the flag broke from masthead shouts of '*Pakistan zindabad*' ('long live Pakistan') erupted. However, such euphoria was to be

short lived and the frontier was not quiet for long. Unrest, rebellion and open conflict were just round the corner.

With a unanimity dear to patriot hearts
All those hairy gentlemen out of foreign parts
Said: 'The good old days are back – let us go to war!'

What Happened

Notes

¹ Air Power Review Volume 15 Number 1, *Evacuation by Air: The All-But-Forgotten Kabeel Airlift of 1928-29*, Lieutenant Colonel Andrew Roe, p21.

² D. Garnett (Ed), *The Letters of T.E. Lawrence* (London: Jonathan Cape, 1939), 609-10, 626, 633.

³ For an overview of T.E. Lawrence's role in the great Arab uprising see J. Barr, *Setting the Desert on Fire: T.E. Lawrence and Britain's Secret War in Arabia, 1916-18* (London: Bloomsbury, 2006).

⁴ 'False Reports Published in Germany,' *The Times*, 7 January 1929.

⁵ 'German Interest,' *The Times*, 11 January 1929.

⁶ 'Great Britain and Afghan Rising,' *The Times*, 7 January 1929.

⁷ A. Baker and R. Ivelaw-Chapman, *Wings Over Kabul: The First Airlift* (London: William Kimber & Co. Ltd., 1975), 119-120.

⁸ 'Afghan Rising,' *The Times*, 9 January 1929.

⁹ Ibid.

¹⁰ A.G. Dudgeon, *The Luck of the Devil: Air Vice-Marshal A.G. Dudgeon CBE DFC an Autobiography 1934-41* (Shrewsbury: Airline Publishing Ltd., 1985), 74.

¹¹ R. Lee, *Never Stop The Engine When It's Hot* (London: Thomas Harmsworth Publishing, 1983), 168-75.

¹² A. Warren, *Waziristan, The Faqir of Ipi, and the Indian Army* (Oxford: Oxford University Press, 2000), 285. Lieutenant Colonel de Watteville notes that: 'A peculiarity of very many of the Wazir villages is their close proximity to large caves, to which the tribesmen have recourse as dwelling-places in winter for the sake of obtaining greater warmth. These caves were to form admiral "air raid shelters" during the aerial bombardment of the country.' H. de Watteville, *Waziristan, 1919-1920* (London: Constable & Co., 1925), 20.

¹³ 'The Action of the 1st (Abbottabad) Infantry Brigade Near Damil on the 29th March 1937,' *Journal of the United Services Institution of India* 68, no. 290 (1938), 34.

¹⁴ R. Cross, *The Bombers: The Illustrated Story of Offensive Strategy and Tactics in the Twentieth Century* (New York: Macmillan, 1987), 70.

¹⁵ D.A.L. Mackenzie, 'Operations in the Lower Khaisora Valley, Waziristan, in 1937,' *Journal of the Royal United Service Institution* 82, no. 528 (1938), 820.

¹⁶ C. Townshend, *Britain's Civil Wars: Counterinsurgency in the Twentieth Century* (London: Faber & Faber, 1986), 152-3.

¹⁷ B. Hoffman, *British Air Power in Peripheral Conflict, 1919-1976* (The Rand Publication Series), 22.

¹⁸ The Hart was designed in 1926 as a high performance bomber to replace the D.H. 9A, which

had been in use in the RFC/RAF since 1918 both as a fighter and light bomber. It had a top speed of 184 mph.

¹⁹ C. Bowyer, *RAF Operations 1918-38* (London: William Kimber & Co. Ltd., 1988), 210.

²⁰ A. Warren, *Waziristan, The Faqir of Ipi, and the Indian Army*, 107.

²¹ Air Intelligence Liaison Officer, 'Close Support by Aircraft on The North West Frontier,' *Journal of the United Service Institution of India* 74, no. 16 (1944), 21.

²² F. Leeson, *Frontier Legion: With the Khassadars of North Waziristan* (Ferring: Selwood Printing, 2003), 92.

²³ In the 1930s, the RAF began the process of 'Indianisation' of the Service. As a result, the Indian Air Force (IAF) came into being on 8 October 1932. Its first operational deployment occurred during the Waziristan operations of 1937. Based in Miranshah, the detached IAF Flight carried out a record number of operational flying hours during the period September-November 1937.

²⁴ J. Slessor, *The Central Blue: Recollections and Reflections* (London: Cassell & Coy Ltd., 1956), 129.

²⁵ M. Hudson, 'A History of Military Aeromedical Evacuation,' *Air Power Review* 11, no. 2 (2008), 78-80.

²⁶ Doctrine: the means by which guidelines for military action are articulated, providing tactical confidence and intellectual consistency. It is derived from a combination of history, theory and technology. It is refined by practice and experience, and thus is always evolving.

²⁷ AIR2/2065 *Frontier Operations Manual*, 1937, 57.

²⁸ R. Lee, *Never Stop The Engine When It's Hot*, 46.

²⁹ Sorties were used to locate and monitor hostile *lashkars*. Information from these patrols enabled column commanders to site protective picquets and to direct long-range artillery fire. It also assisted in identifying forming-up places and lines of departure for an attack.

³⁰ R. Lee, *Never Stop The Engine When It's Hot*, 108.

³¹ *Ibid.*, 116.

³² J. Slessor, *The Central Blue*, 126.

³³ Liaison was also maintained by army officers attached to A.C. squadrons. They acted as operational staff officers to the Air Force commander, dealing with demands for air photographs and distributed daily intelligence summaries.

³⁴ A.M. Roe, *Waging War in Waziristan: The British Struggle in the Land of Bin Laden, 1849-1947* (Lawrence: University Press of Kansas, 2010), 137.

³⁵ F. Leeson, *Frontier Legion*, 78.

³⁶ A.M. Roe, *Waging War in Waziristan*, 100.

³⁷ H. Le M. Brock, 'Air Operations on the N.W.F., 1930,' *Journal of the Royal Central Asian Society* 19 (1932), 27.

³⁸ W.R Birdwood, 'Disturbance on the North-West Frontier of India from 23rd April to 12th September, 1930' (Army Headquarters, India, 14 November 1930), 8.

³⁹ *Ibid.*, 27.

⁴⁰ C. Bowyer, *RAF Operations 1918-38*, 205.

⁴¹ W.R Birdwood, 'Disturbance on the North-West Frontier of India from 23rd April to 12th September, 1930', 41.

⁴² C. Bowyer, *RAF Operations 1918-38*, 210.

⁴³ This operation involved a five-week march for about 1,500 men (and approaching 1,000 animals) with an even larger escort. As the 1930s progressed the RAF's participation in this enterprise steadily increased, starting with the daily air dropping of provisions in 1930. In 1936 the Army was able to make limited use of motor transport and some of the men were moved by air. In 1938 about 20 percent of the exchange was carried out by air and in 1940 it was done by air alone.

⁴⁴ C. Bowyer, *RAF Operations 1918-38*, 211.

⁴⁵ R. Lee, *Never Stop The Engine When It's Hot*, 161.

⁴⁶ A.J. Young, 'Royal Air Force North-West Frontier, India, 1915-39', *Journal of the Royal United Service Institution* 127 (1982), 62.

⁴⁷ The policy worked both ways. By the 1930s the Empire was suffering from a serious case of imperial overstretch. It was virtually impossible to defend and certainly far too big to garrison on a permanent basis, so reliance began to be placed on inter-regional air reinforcement. Thus while this concept was exercised by deploying squadrons from India to Singapore, units from Egypt went to Iraq, and *vice versa*, and even as far as India. For example, in January 1937 No. 45 Squadron flew its 12 Vincents from Egypt to India where they flew patrols over the tribal areas and took part in bombing exercises from Kohat to Miranshar.

⁴⁸ M. Hauner, 'One Man Against the Empire: The Faqir of Ipi and the British in Central Asia on the Eve of and During the Second World War', *Journal of Contemporary History* 16, no. 1 (1981), 374-404.

⁴⁹ This included: sniping, sudden small raids, constant harrying of rearguards and convoys, the cutting of telegraph and telephone wires, the re-routing and poisoning of water sources, and the destruction of culverts and bridges.

⁵⁰ C.E. Caldwell, *Small Wars: Their Principles and Practices* (London: Harrison & Son, 1906), 105.

⁵¹ J. Slessor, *The Central Blue*, 658.

⁵² C. Bowyer, *RAF Operations 1918-38*, 224; N.H. Bottomley, 'The Work of the Royal Air Force on the North-West Frontier', *Journal of the Royal United Services Institute* 193 (1939), 778.

⁵³ A.J. Young, 'Royal Air Force North-West Frontier, India, 1915-39', 63.

⁵⁴ A 'Pier' is a holy man.

⁵⁵ A.M. Roe, *Waging War in Waziristan*, 180-1.

⁵⁶ R. Chapman, 'Afghanistan and The North-West Frontier: The Green Howards During the Third Afghan War 1919, and the Waziristan Campaigns of 1936-1937, 1937-1939', *Friends of the Green Howards Regimental Museum Newsletter*, no. 14, September 2002, 16.

⁵⁷ Very little water was available in the area, and the water that could be found was a pale brown-grey colour with a disagreeable taste. This was a regular difficulty in Waziristan. In order to prevent cholera, dysentery and minor ailments, all local sources had to be 'treated.' It was the combined responsibility of the sappers and doctors to pronounce a source fit for use.

⁵⁸ 'A.I.L.O.', 'Close Support by Aircraft on the North West Frontier', *Journal of the United Service Institution of India* 74, no. 16 (1944), 23.

⁵⁹ *Ibid.*, 24

⁶⁰ A.M. Roe, *Waging War in Waziristan*, 190.

⁶¹ A.J. Young, 'Royal Air Force North-West Frontier, India, 1915-39', 63.

⁶² N.H. Bottomley, 'The Work of the Royal Air Force on the North-West Frontier,' 780.

⁶³ G. Morley-Mower, *Flying Blind*, 124.

⁶⁴ N.H. Bottomley, 'The Work of the Royal Air Force on the North-West Frontier,' 778.

⁶⁵ Ibid.

⁶⁶ C. Bowyer, *RAF Operations 1918-38*, 235

Viewpoints

Military Momentum – Increasing Velocity to Offset Reducing Mass

By Air Commodore Paddy Teakle

Act Swiftly and with Resolve - Chinese Proverb

Introduction

The global financial crisis and other complementary factors have forced western governments to examine defence expenditure and many western armed forces now face a quantifiable reduction in overall numbers of assets and personnel. On average, military expenditure amongst European nations has fallen almost 2% annually during the past decade.¹ The largest cuts have been introduced in the smaller European Union (EU) member states, with rates above 20 %; for example Latvia cut its defence budget by 21% in 2009 and Lithuania its by 36% in 2010. The majority of middle-sized countries have, on average, implemented military spending cuts of 10 to 15%; Portugal cut its defence budget by 11% in 2010; Romania cut its by 13% in the same year and the Czech Republic cut its defence budget by 10% in 2011. Larger EU countries like Germany and the United Kingdom will cut their defence budgets by about 8% between 2011 and 2015.² The implications for our armed forces are obvious and we must examine all aspects of our business so that we can determine how best to organise, train and equip ourselves for an uncertain future. One approach is to reconsider more fully our thinking on military momentum.

Defining Momentum

Momentum can be defined as “the impetus gained by a moving object or the driving force gained by the development of a process”;³ alternatively, in the field of physics, momentum is

defined as a “measure of movement equal to the product of the body’s mass and velocity”.⁴ Whilst the former definition is useful to express the capacity for progressive development, or in other words, the power to increase or develop at an ever growing pace, it is against the latter definition that this article will concentrate. In doing so, we must also understand what we mean by velocity, which is “the speed of something in a given direction”.⁵ The distinction between speed and velocity is critical because speed alone is unlikely to compensate for a reduction in military mass.

Against our definition, it is clear that a stationary mass has zero momentum. We must recognise this fact as we re-enter the “contingency space” following our prolonged exposure to expeditionary operations. As we reset, we must develop our understanding of how we move from a graduated readiness posture with little or no momentum into an employment phase where we will need all the momentum we can generate. The Defence Joint Operating Concept⁶ provides the conceptual underpinning of how we will do this.

Critical Mass

In his seminal work, “Ten Propositions regarding Air Power”⁷ Philip Meillinger stated that “precision air weapons have redefined the meaning of mass” and in many ways he was correct. Nevertheless, he would also likely concede that there is a compelling need to be alive to the concept of critical mass. A critical mass is defined as “the minimum size or amount of resources required to start or maintain a venture”.⁸ This means that there is an irreducible minimum military force level (critical mass) below which no increase in military velocity can compensate. This critical mass includes not only the fighting element but also supporting elements particularly in the areas of mobility/lift, sustainment, training and education.

National Strategy provides the foundation for the determination of critical military mass, in other words, national strategy describes what the government wants its armed forces to do. Two documents, the National Security Strategy⁹ and the Strategic Defence and Security Review,¹⁰ articulate UK strategy. Although it would be a fascinating exercise, it is beyond the scope of this article to suggest what the critical military mass for the UK should be. However, these documents provide crucial context and it is important to examine a number of the key deductions. Firstly, we must consider the complex range of threats that we face; secondly, we must understand the global nature of UK interests and thirdly we must be aware of the need to decide and, if necessary, act quickly.

The National Security Strategy defines two core security objectives; ensuring a secure and resilient UK and shaping a stable world. It prioritises the areas of counter-terrorism, cyber, international military crises and disasters and highlights the importance of understanding. It also seeks greater integration across government and with the private sector. The National Security Strategy is set against the notion of no “strategic shrinkage” or loss of national influence, thus alongside diplomacy, aid and cultural influence, credible, capable armed forces of the correct size are a mainstay of our national strategy.

Both the National Security Strategy and the Strategic Defence and Security Review reflect the establishment of the National Security Council, which was one of the first actions of the current coalition government in May 2010. The government established the National Security Council to coordinate and deliver the Government's international security agenda and it is the highest-level government forum for collective discussion of the Government's objectives for national security. In essence, the National Security Council should set the strategic vector for defence and the other elements of the national security apparatus. However, although established to provide a strategic perspective, the Council has recently been criticised for focusing on operational matters and short-term imperatives rather than long-term strategy.¹¹

So armed with the National Security Strategy, the Strategic Defence and Security Review and guided by the National Security Council we should be able to answer the question - what does the government want us to do? Firstly, we must defend the UK homeland and its overseas territories; secondly, we must conduct forward engagement in support of government objectives and thirdly we must project military power in support of national interests. These defence functions provide the departure point from where we can determine our critical military mass.

As military mass invariably comes at a price, there is a danger that budgeters will seize on the concept of military momentum as a driver for force cuts. But before they do, they must first understand the highly dynamic nature of military velocity. Velocity is subject to a great many variables and these may conspire to create situations where it is impossible to generate sufficient velocity for a given mass. Consequently, military momentum will be sub-optimal and we may be unable to match or out-strip the military momentum of an opponent. Nevertheless, military velocity can mitigate some reduction in military mass and this article will examine how we, as militaries and air power practitioners in particular, can generate velocity to deliver the same or greater momentum at a time when our military mass is reducing.

Many already recognise that we must recast our consideration of military mass. Referring to the Royal Marine Lead Commando Group in an interview with Jane's Defence Weekly,¹² Brigadier Martin Smith, Commander, 3 Commando Brigade, Royal Marines stated "SDSR decided that we would be optimised for intervention, which is something we have specialised in for some time. However, it has caused us to modernise the way we operate. To an extent, we are substituting mass, for tempo, accuracy and understanding. This demands a range of capabilities and competencies beyond what was common 30 years ago". As we move forward, it is increasingly likely that others will express similar views.

Setting the Velocity Vector

"If you cry 'Forward', you must without fail make plain in what direction to go. Don't you see that if, without doing so, you call out the word to both a monk and a revolutionary; they will go in directions precisely opposite?"¹³

Speed, along with reach and height, is one of the abiding strengths and core characteristics of air power. Speed allows the rapid projection of military power. Our ability to complete missions quickly and generate tempo allows us to exploit time, the fourth dimension.¹⁴ Thus any employment of airpower inherently comes with one element of the velocity equation satisfied. However, speed applied in the wrong direction or for its own sake will not deliver the velocity or momentum we need. It follows, therefore, that if we are to generate military velocity and momentum we must apply air power's inherent speed in a set direction. We must therefore design, organise and train all of our air command and control structures, mechanisms and processes to ensure that the direction set by the Commander is the direction travelled.

Before we move on to some considerations on command and control we need to explore our understanding of tempo. Tempo is "the pace of an activity or process"¹⁵ it follows, therefore, that if we can dictate tempo then we can control the momentum of a given mass. In military terms we need to view tempo as the ability to operate at the speed of the problem and thus it is entirely dependant upon the complexity of the problem set. The current and future battlespace can be characterised in many different ways, for example, the UK's Future Character of Conflict pamphlet¹⁶ describes the future battlespace as congested, cluttered, contested, connected and constrained. Whether or not we all agree with these characteristics, it is true that two abiding characteristics are, and will continue to be, uncertainty and chaos. Faced with uncertainty and chaos, our Commanders must seek to bring greater degrees of certainty and order and for this to happen we must be able to develop our situational understanding rapidly.

Our level of understanding at any given moment will determine the degree to which we can operate at the speed of the problem and consequently exercise control over campaign tempo. At the outset of a campaign, a Commander's understanding is unlikely to be sufficient to control tempo fully and a degree of operational and tactical patience will be required. As their understanding builds, Commanders throughout the joint force, will be better able to control tempo to their advantage. To do so they must continuously frame and reframe the problem in order to maintain their understanding. To achieve this we must apply tools and processes that place information in the correct context, at the right place and at the right time. Both information and context will flow from various sources and we must therefore ensure that every level of the joint force feeds and is fed by the others. This will allow commanders and the joint force to move from a position of situational awareness (knowing **that** something is happening) to one of situational understanding (knowing **why** something is happening).

Understanding

Surveillance and reconnaissance from the air and space can provide much of the intelligence and information that can lead to shared situational understanding. Air and space's unique vantage point allows sensors an almost unimpeded view of the battlespace and across the electromagnetic domain. Thus air and space sensors can aid in the provision of strategic intelligence, can assist in the integration of joint action at the operational level and can enable tactical manoeuvre. However, whilst air and space sensors will provide much of the

information required, we can miss nuance and complexity because of the stand-off nature of our perspective. Quite simply, the human and social aspects that provide the context for understanding are not as readily or easily mapped as physical capabilities, objects, movement or terrain. Consequently, we must fuse information from multiple sources, not only air and space, to accomplish the transition from awareness to genuine understanding.¹⁷

Between now and 2014 we will see a reduction in our military commitment to Afghanistan. At the same time we must regenerate our contingency forces. As we do so, there will be an increasing premium on the responsiveness of air and space assets to generate sufficient understanding of emerging, unanticipated contingencies rapidly. We cannot derive this understanding purely through a saturation of collect sensors, instead we must match investment in sensors with parallel development of our ability to direct, analyse, process and disseminate an increasing volume of data. We must adopt new processes that allow us to identify adversary intent more readily. Advances in technology, automation and data processing may offer some solutions but investment in human analysis will be equally important.¹⁸ The rewards from investment across this area are high, as increased understanding will bring with it a concomitant improvement in the quality of our decision-making. This, as we will discover, is a fundamental aspect of command.

Command and Control - the Blending of Art and Science

*The quality of decision is like the well-timed swoop of a falcon which enables it to strike and destroy its victim.*¹⁹

In their paper on re-conceptualising Command and Control, Pigeau and McCann assert correctly that command is a human activity and control is the establishment of mechanisms and processes to accomplish the mission effectively.²⁰ Military command at all levels is the art of decision-making and the direction of assigned forces to accomplish given missions. Over the years, there has been a tendency to conflate Command and Control, especially in the air environment, indeed some commentators speak of C2 as if it were a single function. It is not. Command and Control are two separate but inter-linked activities and to better frame our thinking we should refresh our understanding of command as an art and control as a science. When speaking of command in the late Nineteenth Century Moltke stated: *"Thus war becomes an art – an art, of course, which is served by many sciences. In war, as in art, we find no universal forms; in neither can a rule take the place of (a commander's) talent"*.²¹ Moltke uses the word talent carefully to describe a Commander's ability and capacity to exercise his initiative, creativity and judgement to succeed in his mission. This is challenging for airmen as the nature of our business means that we are easily seduced into focussing on the processes and procedures of control and we sometimes forget the enduring principles of command.

The key to effective command is an unambiguous understanding of superior Commander's intent. Intent sets the velocity vector against which we apply our speed and mass to create military momentum. A Commander must determine both the mass and velocity required

to achieve his objectives and then apply his control mechanisms to deliver them. Thus, we must design our headquarters structures, mechanisms and processes to maximise military momentum; overly bureaucratic or unwieldy Headquarters will create inertia and friction that will reduce our velocity and hamper effective military momentum. The Joint Force Commander's role in orchestrating the integration of the separate war-fighting environments to deliver momentum will be crucial.

Air Command and Control

An air force is, by reason of the nature of its work, extremely sensitive to any misdirection.²²

The speed, endurance and operational perspective of air assets places great importance on the accurate coordination of the air plan. To maximise the operational impact of air power, we must allocate tasks and missions in a highly responsive and flexible manner. It is therefore unfortunate that air command and control is so widely misunderstood. In many ways the command and control of air assets is one of the most integrated, adaptable, flexible and high tempo military processes, yet to many it remains shrouded in mystery. Moreover, I would argue that over time, we have allowed the control function (science) to dominate the command function (art) and we have introduced complexity where we need simplicity. We must reverse this trend else we risk eroding the agility we need to best deliver military momentum.

Responsive and effective Air Command and Control is critical to the effective and efficient delivery of air and space power. It provides the means to capitalise on air power's inherent agility to react and respond more quickly to contingencies than any other lever of national power. It must be capable of synchronising its activities and effects with those of the other four environments to generate momentum through tempo rather than mass. We simply must think integrated as opposed to purely joint. Situational understanding and decision superiority will remain our fundamental enablers. We must harness and continuously adapt our network architectures and processes to ensure that we have the right information at the right place at the right time to make the right decision to deliver the right effect to bring about the right outcome.²³

Traditionally, Air Command has used a model of centralised control, decentralised execution. The increased volume and velocity of information and our growing ability to access it and contextualise it offers the promise of shared understanding. We cannot ignore the huge opportunities that this brings, not least of which is an ability to adopt a more flexible, adaptable and agile approach to Air Command and Control.²⁴ At the pinnacle is unified command which provides a single commander with the appropriate and necessary authorities to direct his assigned forces in pursuit of a common objective. Unified command ensures coherence of intent and unity of effort. Below this sits the centralised control level with which we are familiar. Centralised control is still the most appropriate model as it provides the continuum of the intent and unity of effort set by the command level. Centralised control allows us to allocate and apportion inevitably scarce air resources to best effect in pursuit of the common

objective. The greatest change occurs below the centralised control level where adaptive, rather than decentralised, execution will become the norm. It is here that the contemporary and future information environment allows Commanders to choose to centralise or decentralise execution authority according to the circumstances of the campaign.

A greater degree of decentralised execution will be possible when all coalition participants are adequately trained, comfortable with the concept of mission command, and technically able to plug into the command network. This allows certain command responsibilities, such as air-weapons release authority, to be delegated and enables tactical self-synchronisation. In this way the force can generate increased tempo and momentum through significantly reduced decision cycles. Decentralised execution may also be the only feasible option for complex, large-scale air campaigns with many assets in play. Crucially, decentralised execution allows an Air Commander to concentrate on command and avoid the distraction caused by a necessity to control. It should therefore remain the ideal.²⁵

However, the future air command environment will also enable a greater degree of centralised execution to be undertaken if required. This may be more appropriate for small-scale missions, missions conducted by the highest-value assets or missions where the stakes are particularly high. It may also be appropriate where there is better situational understanding available in the Air Headquarters (or above) rather than in the cockpit or at the console. Importantly, we could use this construct if the participation of unfamiliar or less capable coalition partners means that it would be inappropriate or unwise to decentralise execution authority.²⁶

These two recent examples illustrate both the strengths and weaknesses of centralised execution.

On 20 Oct 2011, Colonel Qaddafi, who had been holed up with his remaining loyalists in a makeshift command bunker in Sirte, tried to flee the city as rebel forces moved in. Up to a hundred vehicles prepared to leave, at their heart were five cars containing Qaddafi and key loyalists. Their plan was for his snipers and his few remaining heavy weapons to cover the departure and to use the ensuing confusion to mask the movement of the key cars. To add to the confusion the vehicles would split into a large and small convoy in the hope that any response would target the larger group. So the convoy took two routes, seventy-five vehicles in the main body took the main road out and the smaller package stuck to side roads before making a break for the desert roads heading south. Aerial surveillance detected this activity but only Senior Commanders had the intelligence (understanding) to know the importance of the smaller group. Therefore, only they could direct the correct response. Consequently, it was the Combined Air Operations Centre at Poggio Renatico in Italy which exercised the principle of centralised control to orchestrate the end-game. Firstly, they ordered a Reaper hellfire strike into the first vehicle in the smaller convoy. Simultaneously they ordered NATO AWACS to direct two French Mirage aircraft to proceed to Sirte. The Commander then passed his authority for the engagement to his CAOC staff and onwards to the French aircraft through the AWACs. The rest, as they say, is history.

However, centralised execution can, if not carefully employed, reduce tempo and have unfortunate operational implications. In October 2001, the operators of an armed Predator pinpointed the location of the supreme leader of the Taliban, Mullah Omar, in a convoy of cars fleeing Kabul. Neither the Predator controllers nor the Commander in-theatre could authorise a strike. Commander US Central Command (CENTCOM) in Tampa, Florida personally held the authority for such a strike. Consequently, the in-theatre commander contacted HQ CENTCOM for approval to conduct an attack. Such was the delay in developing the right level of understanding within CENTCOM HQ that by the time a strike was authorised Mullah Omar had long since escaped to safety.²⁷

These examples clearly demonstrate that commanders must exercise discretion when applying this new model. Considerations will include; the nature of the conflict; the military and political appetite for risk; the scale and complexity of the air operation; the number, type and capability of the participants and the level of communication connectivity required. The guiding principle is that we should direct execution authority to the point at which the best level of understanding is available. This may be in the cockpit or at the console (decentralised execution) or at the Air Headquarters, or above (centralised execution). Clearly, the principles of unity of command and the ethos of mission command will endure as the cornerstones of Air Command and Control. However, we should use a model of unified command, centralised control and adaptive execution as the basis for our approach to Air Command and Control in the information age.²⁸

The Air Commander

*He who wishes to be obeyed must know how to command.*²⁹

The success of adaptive Air Command will depend on preparing air commanders with a mature understanding of air and space power, and the circumstances of its employment. The analysis of command requirements and processes in the air estimate must be crystallised into an absolutely clear and unambiguous statement of Commander's intent. Developing Air Commanders at ease with the demands of information-dominated warfare and full-spectrum targeting may be difficult if their experience is rooted in a different paradigm of combat and decision-making. As we shift from control-based methods of air operation to a greater emphasis on command, we must ensure that our commanders have a fundamental understanding of national and multinational doctrine. Moreover, they will not only need to grasp developing technology, but more importantly, they will need to possess the mental dexterity and skill to exploit the information it delivers.³⁰

Having established his Command and Control structures, mechanisms and processes a commander will use Mission Command to generate and control tempo. The three enabling attributes for successful mission command are understanding, intent and trust. Understanding underpins mission command and we have covered this aspect already. Intent takes this understanding and fuses it with the assignment of a mission and the articulation

of direction to subordinates. The assignment of a mission and articulation of direction sets the velocity vector against which the unit's speed and mass is applied. The third pillar is trust and this is arguably the hardest pillar to establish. Trust is required at every level of the force but it can be fragile. Firstly, we must earn it and then we must nurture and sustain it. Combined and joint education, training and dialogue are the key building blocks. And here, with little additional effort, we can help. Nelson Mandela famously said, *'If you talk to a man in a language he understands, that goes to his head. If you talk to him in his own language, that goes to his heart.'* As airmen, we use a language with which we are comfortable but which others find confusing. We have a duty and moral obligation to explain ourselves better; for instance, an Air Ops Directive is nothing more than a Fragmentary Order (FRAGO), and an Air Tasking Order (ATO) is but a set of mission type orders. If others understand us and we them, trust and respect will invariably follow.

Defining Mobility

Having set the velocity vector through commander's intent we need to look more closely at speed. Speed is about movement and mobility is an expression of how easy it is to move something.³¹ Thus, mobility is one of the fundamental considerations of any strategist. Moreover, mobility and that much-used term – agility – go hand in hand. The definition of agility is the ability to move quickly and easily.³²

There is a considerable library of literature dealing with air superiority, information superiority and decision dominance but less has been made of mobility superiority. However, I would argue it is an equally valid concept. In every case, it is important to understand the relative ability of opposing sides to move in time and space. Our aim should be to achieve mobility superiority by protecting our own mobility and by identifying ways to deny mobility to an opponent. If we are able to reduce our opponent's mobility relative to our own, we can partially mitigate a parity or inequality in mass. By fixing an opponent in time and space, we can create conditions where he has insufficient resources to concentrate his force quickly enough for the defence of an objective. In such circumstances, our mobility can quickly overwhelm him. Artful positioning of an attack can force the enemy to defend in more than one place. This will expose weaknesses and provide opportunities. Conversely, there may be times when we can gain positional advantage through the temporal sacrifice of space. On occasion, we should be prepared to cede time and space to allow windows of opportunity to open. Once open we need to be able to exploit them rapidly through agility and mobility. Thus the mobility of a unit is a deciding factor in its efficiency, and mobility is a high criterion by which to judge the merits (or demerits) of its operations.

Mobility, agility (mental and physical) and understanding allows us to adopt a manoeuvrist approach to operations.³³ Air Power is inherently manoeuvrist and highly mobile as a look at its basic qualities shows. The application of a manoeuvrist approach to air operations allows the employment of air power to achieve a position of decisive advantage by rapidly bringing a concentration of force to bear anywhere in the battlespace. Although we can undertake

manoeuvre operations alone, they are far more effective when we integrate and synchronise them fully with land, maritime, space and cyber activity. With careful joint and integrated planning the speed and precision provided by air systems can be linked to surface manoeuvre, fires and disruption activities thereby increasing the available combat power available to be employed against an enemy's weak point.

Conclusion

In conclusion, this article has attempted to shift our thinking from a focus on military mass towards the concept of military momentum. Mass will always be important, especially as it forms one element of the momentum equation, but we now need to view military velocity as an equally important consideration. Fundamental to this latter aspect is the identification and setting of the velocity vector against which military speed and mass are applied. And the key to setting the velocity vector lies in the art of command supported by the science of control. Investment here will pay rich dividends. We need to appreciate the linkages between mobility and speed – the more mobile and easy to move something, the quicker we can apply it to the problem. We need to raise our sights from situational awareness to situational understanding or from knowing that something is happening to knowing why something is happening – a focus on C4ISTAR will help but we need to take care to look across the spectrum and not be seduced into a myopic focus on collect. And finally, we need to integrate across all five environments to generate optimum momentum. We will only achieve this if every element of the military machine trusts and understands the others and the key to that particular puzzle lies in education and training.

Notes

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² Brookings: Trends within the EU; Molling; (July 2012)

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⁷ Meilinger, Philip S; Ten propositions regarding Airpower (1992)

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¹² HIS Jane's Defence Weekly (28 November 2012)

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Book Reviews

The Strategic Bombing of Germany: A Review Essay

Reviewed by Colonel (Ret'd) Phillip Meilinger

Introduction

Much had been written regarding the bomber offensive by the Royal Air Force and the US Army Air Forces (USAAF) during World War II, but new material and unusual interpretations continue to emerge. Below are three recent books that take a fresh look at the air offensive but have not received much notice. The first reviewed, written by a former RAF officer, deals with intelligence. The second, also the work of a retired RAF Officer, looks at leadership, direction and legitimacy in Bomber Command. The third is a volume in the German official history of the war. I will discuss these books and draw out some of their unique and interesting aspects.

John Stubbington is a retired Wing Commander and during his 24-year career was an Intelligence Officer and Electronic Warfare Officer, which included a tour with Bomber Command. His experiences led him to examine intelligence efforts at Bomber Command during World War II, but he asks questions that most historians do not ask and examined records that most historians do not examine. The result is a very interesting study. His title says much regarding his thesis: ***Kept in the Dark: The Denial to Bomber Command of Vital Ultra and Other Intelligence Information During World War II*** (Barnsley: Pen & Sword, 2010).

Stubbington charges that Bomber Command was deliberately, for political reasons, denied high-level intelligence, specifically, Ultra decrypts that were crucial to an effective bombing campaign.

First, we are given a useful overview of signals intelligence that culminates with a description of the German code machines termed Enigma and whose intelligence was labeled Ultra. The Poles had been working on these complex rotor machines since the late 1920s, and in March 1939 elected to share all they knew with Britain. A special facility was established at Bletchley Park outside London whose personnel improved and enlarged on the Polish work and eventually were able to decode Enigma ciphers throughout the war. Stubbington covers the organization at Bletchley, homing in on Hut 3 where signals relevant to the bomber offensive were decoded and forwarded to the Air Ministry.

This is where the plot thickens. For reasons not clear, the Ultra decrypts were forwarded to the Air, Navy and Army ministries, but not to individual commands. After complaints from the War Office, distribution was widened to include “overseas commands.” This made imminent sense: a Theater Commander in North Africa, for example, had an immediate need for accurate, high-grade intelligence like Ultra in order to fight effectively. Routing intelligence through the War Office before it was sent on to the theater was wasteful and time consuming. However, because Coastal Command, Fighter Command and Bomber Command were not “overseas,” they were not given Ultra intelligence. Instead, the Air Ministry received decrypts from Bletchley and then forwarded what it thought relevant to the home commands—without revealing the information’s source. The absurdity of this decision—and Stubbington is unable to put a finger on precisely who it made it—was revealed in 1943 when the Americans joined up. At that point, 8AF, headquartered at Bushy Park outside London, was provided Ultra because it was designated an overseas command. In consequence, Bomber Command and 8AF (later combined with 15AF to form the US Strategic Air Forces, USSTAF), were located a few miles apart in the London suburbs but did not receive the same intelligence even though both worked for the Combined Chiefs of Staff and had similar directives for the conduct of their respective strategic bombing campaigns. By the end of the war, there were 25-30 analysts at 8AF headquarters working with Ultra intelligence—there were none at Bomber Command.

Stubbington then introduces the Ministry of Economic Warfare (MEW). Officially stood up in September 1939, there had been little study of economic intelligence before that. This is important. Certainly, intelligence agencies had existed for centuries, but air warfare introduced new demands that were previously unnecessary. Armies required tactical intelligence on the strength and disposition of the enemies confronting it; they also needed detailed information on its foes’ weapons, defenses and capabilities. Although air warfare also required such information regarding an enemy air force, air leaders needed far more. Airpower allowed the routine attack of an enemy nation’s heart—its centers of military, industrial and political strength. This was a unique ability never before possible in war. At the same time, however, this meant that if an aircraft could now strike at, say, an armaments industry, it would need specific intelligence on where that industry was located, what was its capacity, schedule, resource flow, labor force, output, etc. These were new details that had not previously been required in war simply because armies and navies had no way of striking at them directly. The MEW was to study the organization and operation of the German war economy and

attempt to answer these questions. The MEW, like the Air Ministry, received Ultra intelligence. It would then massage this information and pass on suggestions to Bomber Command without telling them where the intelligence came from. Stubbington notes that the relations between Bomber Command and both the Air Ministry and MEW were strained throughout the war. ACM Arthur Harris, the Commander-in-Chief of Bomber Command, had an especially low opinion of the bureaucrats in Whitehall who could theorize about air warfare and give free advice, but who had no responsibility for results. Stubbington implies this strained relationship was the reason enemies in the Air Ministry deliberately withheld vital intelligence.

Another key issue discussed is bomb damage assessment. It has been my belief that the key to air warfare is targeting; the key to targeting is intelligence; and the key to intelligence is the assessment of results. Bomber Command and USSTAF needed detailed intelligence on the German economy so as to determine appropriate targets. There were tens of thousands of factories, transportation nodes and power facilities in Germany and its occupied territories: which few hundred were the most important? Once the list of specific targets was amassed and the bomber commands began to strike them, it then became necessary to analyze whether or not the targets were actually destroyed, and then what effect that destruction was having on the German economy or morale as a whole. Stubbington discusses the office in Whitehall, RE8, which was responsible for bomb damage assessment, concluding that then, as now, such analysis is as much an art as a science. One may determine that a tank with its turret blown off is dead, but what effect would the destruction of an oil refinery or marshaling yard 200 miles behind enemy lines have on the enemy's offensive capabilities? Astoundingly, damage assessments were classified as Ultra intelligence and therefore not forwarded to Bomber Command.

The various ideas, theories and statistics regarding targeting for Bomber Command came to a head in early 1944 when two major target options presented themselves: oil and the enemy's transportation system. There is a good discussion here: the MEW and USSTAF were firm believers in the importance of oil; whereas, the Allied Expeditionary Air Force and the deputy supreme commander for OVERLORD, ACM Arthur Tedder, were in the transportation camp. Stubbington states that Ultra revealed Hitler and the German high command were more concerned about the breakdown of transportation, especially the rail lines, than they were about oil refineries. Although oil, and for that matter coal, were crucial resources, the delivery of those resources to factories was more fundamental. Because oil and coal traveled largely by rail and river/canal, the destruction of these transportation arteries would pay the greatest dividends. Additionally, the disruption of rail lines would also prevent reinforcement of Normandy once the invasion started. To General Dwight Eisenhower, that was key.

This is an important debate for intrinsic reasons—military planners must know the value of various target sets—but also because of the intelligence flow at the time. Stubbington states that much of the data supporting the preeminence of the transportation plan was derived from Ultra—but that data was not available before early 1944 because prior to then the railroad

industry had relied on land lines. As these became increasingly devastated by air attack, train personnel began using Enigma. Bletchley then discovered the precarious nature of the German transportation network. In October 1944 it reported that 30-50 percent of all factories in western Germany were at a standstill due to the sustained attacks on transportation. Because this intelligence was deliberately withheld from Bomber Command, however, Harris and his staff were unable to make informed targeting decisions. When presented with the transportation plan, he argued it was simply another “panacea target” dreamed up by someone in the Air Ministry, while at the same time being a difficult target to hit precisely, a concern in France where the resulting collateral damage could be enormous. Had Harris been an Ultra recipient, it might have changed his mind and induced him to support the transportation plan and see it as a war-ending target set. Stubbington concludes, correctly, that “it is impossible to understand why the USAAF should have had that high-grade intelligence support but that Bomber Command did not. . . . We will never know how much damage was done by the non-disclosure of that Ultra material to the Air Commander [Harris] who had most need for that information.” (pps. 273, 350)

Another perspective on Bomber Command during the war is presented by Peter Gray, a retired air commodore with a PhD in military history. While on active duty he was the RAF’s Director of Defence Studies, and then headed the Defence Leadership and Management Centre. These posts, combined with his academic credentials and operational experience, give him unique insights into the history of the bomber offensive. His effort, ***The Leadership, Direction and Legitimacy of the RAF Bomber Offensive from Inception to 1945*** (Birmingham War Studies Series. London: Continuum International Publishing, 2012), takes an unusual approach: Gray looks at the three factors in his title to view the air campaign through a different prism.

Leadership is a major academic field, and we are given an overview of the various schools of thought. Gray concludes there is no formula for good or bad leadership. Success is determined by success, as is failure by failure. In other words, beyond the typical list of desirable leadership characteristics: intelligence, physical and moral courage, loyalty, etc., people with radically different personalities, abilities and styles often succeed or fail for reasons not always obvious.

Gray’s aim is to focus on leadership at the highest level—between Harris and the Chief of Air Staff, ACM Charles Portal, between Harris and the Air Ministry, and between Harris and his peers in the RAF, other services, and the Americans. In other words, leadership is here defined as Harris’s vision of strategic bombing, the role of Bomber Command, and his relationships with other Senior Officers. As for direction, Gray defines that as the various policies, orders and directives that emanated from Bomber Command Headquarters to implement the vision. Gray’s question: what if the vision of one commander, Harris in this case, is at odds with the vision of his superior, Portal, or others with whom he has to work? It is these conflicting visions and their means of implementation that form the core of the book. Before getting to this matter, Gray prepares the reader.

One chapter is devoted to the intellectual foundation of strategic bombing as it evolved in the RAF. Hugh Trenchard was a believer in the psychological effects of airpower, stating that these effects outnumbered the physical impact of bombing by twenty to one. Although Trenchard retired in 1929, the RAF was then led by his intellectual descendants. More to the point, the belief that the best defense was a good offense because it had a strong moral (psychological) effect took firm root in the RAF: the bomber was deemed the premier weapon in the air arsenal. Gray traces this evolution through the writings of air leaders, the lectures given at the RAF Staff College that educated the generation of airmen who would lead the service in World War II, and by looking at RAF doctrine.

There is also a fine chapter on the organizational roots of Bomber Command. The RAF was founded in the Great War as a response to a specific threat—German bombing attacks—and a strong desire among the British populace for revenge. When the war ended, it was not foregone that the RAF would continue to exist; indeed, the Navy and Army sought to strangle that baby in its cradle. Trenchard realized that to justify an independent status, the RAF would have to claim an independent mission—strategic bombing of an enemy nation. In the short term, however, the RAF throughout the 1920s relied on the mission of air policing the Empire. It was not much of a mission, but it kept the funds flowing and the RAF going.

Regarding legitimacy, Gray quotes senior officials in the Air Ministry and the CAS himself that indiscriminate bombing was inappropriate and illegal. All targets must be of a narrowly defined military nature—troop concentrations, barracks, armories and the like. The RAF operations manual (AP 1300) of February 1940 stated that the civilian populace was not a legitimate target. Area bombing was rejected: “all air bombardment aims to hit a particular target” and in every case “the bombing crew must be given an exact target and it must be impressed upon them that it is their task to hit and cause material damage to that target.”

This was not just a moral stance. Gray notes that expediency was also a determining factor. President Franklin Roosevelt made a speech in September 1939 as war broke out over Poland that called upon all belligerents to refrain from indiscriminate bombing of civilian areas. The British were keen to remain in the good graces of the US, and so it seconded the president’s plea. In addition, British civilian and military leaders realized that London—the center of the empire’s political, economic and social infrastructures—was far more vulnerable to German attack than was Berlin at the mercy of RAF bombers. The result was a decision to “not take the gloves off” first: as long as the Luftwaffe refrained from bombing British cities, the RAF would desist as well.

The war would bend and twist these beliefs. When the Luftwaffe began bombing British cities the people reacted—as they had in the Great War—by demanding retaliation. Winston Churchill was of a similar mind and Portal agreed with him. It is important to recall, given later condemnations, that Harris did not take over Bomber Command until *after* his civilian and

military superiors had already determined that area bombing of German cities would be the focus of the strategic bombing offensive.

Harris's job was to carry out this city-busting strategy. This he did with remarkable determination bordering on stubbornness. What of legitimacy? This is an old debate, and Gray covers it without drawing a conclusion.

The core of the book centers on how Harris reacted when confronted by dissent from his superiors and peers. Precision bombing (granted, a relative term) was increasingly possible as pathfinders and electronic bombing aids like *Gee*, *Oboe* and radar became widely used. Although Churchill and the RAF made an effort to convince the Americans to adopt a similar strategy, they would have none of it. Harris strenuously rejected alternative targeting strategies as "panacea mongering." Gray concludes that either Harris did not listen to alternatives, did not understand them, or simply did not care. He clung adamantly to an area bombing strategy, and by the end, it is apparent that Harris was stubborn to the point of foolishness, and that Portal was a veritable saint in putting up with his cantankerous subordinate. Gray concludes this was a sign of inspired and patient leadership on Portal's part.

As for getting along with peers, Harris had trouble—as did many others—with ACM Trafford Leigh-Mallory. The latter was a hero during the Battle of Britain and in early 1944 was named Commander-In-Chief of the Allied Expeditionary Air Force for the invasion. It soon developed that this was not an auspicious choice. Few RAF officers were close to Leigh-Mallory, who was seen as irascible and contrary. Worse from Harris's point of view, it was suggested that Leigh-Mallory would actually have the power his title indicated—he would be in charge of *all* airpower for OVERLORD. For Harris this was out of the question: he would not release control of his bombers to a tactical airman. His American counterpart, General Carl Spaatz, felt similarly. A command crisis—and the resulting political furor—were averted by Eisenhower naming Tedder as his deputy: he was well respected by both Harris and Spaatz. In consequence, all matters dealing with strategic targeting would go through Tedder—Leigh-Mallory was effectively cut off at the knees. It is debatable whether or not this melancholy situation demonstrated good leadership by any of the participants.

An important subject concerns effects. Yes, Harris had a clear vision of what he wanted his command to achieve and was resolute in his direction towards that vision. As for legitimacy, he was not alone in arguing that civilian workers were part of the German war-making machine as were soldiers in the field and therefore legitimate *military* targets. He also pointed out that the British starvation blockade of the Great War had killed nearly 800,000 German civilians and no one seemed eager to ban the weapon of blockade. This is fine as far as it goes—and such debates continue seventy years later—but one must then ask how did Harris know if he was achieving his vision despite its cost—was the area bombing campaign effective? Was it decisive in destroying the Nazi will or capability to carry on the war?

These are crucial questions, but it is not clear how Harris answered them. Rather, he believed the destruction of 40 to 50 percent of the principal German cities would have a devastating effect on the economy. What lead him to believe this? The “blue books” are famous for revealing how Harris measured results: these were large books containing detailed photographs of major German cities that were overlaid with acetate sheets. Following each raid, staffers would dutifully color them in with a blue pencil to show how many city blocks had been converted into rubble the night before. Was that the extent of Harris’s analysis? Is destruction synonymous with effectiveness? It would seem the blunt instrument of Bomber Command was supported by an equally blunt measuring stick.

The final book is also important: Horst Boog, Gerhard Krebs and Detlef Vogel, ***Germany and the Second World War: Vol. VII: The Strategic Air War in Europe and the War in the West and East Asia 1943-1944/5*** (Oxford: Clarendon Press, 2006). Although this volume in the official history series was published seven years ago, its daunting price—around £200—ensured it did not receive a noisy reception. That is unfortunate because Horst Boog, the author of the extensive section on the strategic bombing campaign, gives great insight into the story from the German point of view.

The major theme of the book is to describe the decline and fall of the Third Reich: “There is evidence of the inescapable wearing-down of the German ability to fight in the air. In both quantity and quality the Luftwaffe had long lagged behind its enemies, who from the spring of 1944 onward enjoyed, at least in daylight hours, mastery of the skies over Germany.” (p 5) The ensuing account is marked by a pervasive sense of doom giving way to despair as it became increasingly obvious to German military leaders that the war was lost, but they would be compelled to fight to the end anyway. Boog notes that Hitler and his senior leadership had expected a short war and not planned for an extended war of attrition on multiple fronts. As a result, the economy was not pressed into a maximum effort. When Albert Speer was appointed as Minister of Armaments this began to change, but these efforts were too little and too late. Allied production far outstripped that of Nazi Germany, despite the fact that it occupied much of Europe and could draw on the resources, factories and labor of its conquered territories. RAF’s Bomber Command, for example, nearly quintupled in size from 1942 on, and its tonnage delivered grew as well. Moreover, the German hierarchy was “amazed” at how precisely Bomber Command could sometimes be in bad weather when using Oboe or other navigation aids.

The damage done to the German economy grew gradually but inexorably beginning in the spring of 1943. By then, “Germany’s industrial base was being seriously threatened from the air.” (p 159) From this point on the Luftwaffe began shifting its emphasis from offensive bombers to defensive fighters. General Adolph Galland, Commander of the fighter defenses, remarked that Germany was “a house without a roof,” and his pilots were having difficulty in stopping Allied bombers. There would remain great victories for the Luftwaffe—the missions over Schweinfurt in August and October 1943 would almost break the 8AF, and it would forego

deep penetration strikes into Germany for several months thereafter. Still, Goering resisted Galland's pleas to centralize the interceptor force. Galland wanted to pull his aircraft back to German airspace and thus mass his forces to hit the bombers, but Goering insisted that the defenses remain forward: the German people needed to see the fighters overhead, and not simply unimpeded streams of enemy bombers.

The discussion of German fighter defenses, both in the air and on the ground, is one of the book's strengths. Boog gives statistics on the numbers of antiaircraft artillery (AAA) built and deployed, as well as single-engine fighters available. Regarding AAA, by November 1943 fully one-third of Luftwaffe personnel—1 million men—were in the flak arm, 800,000 more were employed building AAA weapons, and one-third of all gun barrels produced were for AAA. During the war, the AAA arm grew five-fold. The aluminum used to produce AAA munitions was enough to build 40,000 fighter planes. Yet, statistics showed that the gun batteries were not efficient in shooting down attacking bombers. By the end of 1943 it took 4,000 rounds of AAA to bring down a single bomber. At night, the accuracy was even worse due to the use of chaff—aluminum strips dropped by the bombers to blank German radars. And yet, Hitler insisted on the continued production of AAA weapons in ever increasing numbers. He believed the guns had a great psychological effect on the German populace: they needed to see the guns firing day and night against Allied bombers, even if they were not hitting much. (Actually, says Boog, far more bombers were damaged by AAA than interceptors, but once injured by flak, the bombers were usually downed by the fighters moving in for an easy kill.)

The story for the fighter defenses was also grim, and here Allied bombing played an increasingly symbiotic role in depleting German defenses. In August 1943 there were approximately 600 day fighters, but the bombing of aircraft and engine factories was already cutting production by 25 percent. At the same time, the bombing of the German oil refineries and disruption of transportation facilities was having a marked effect as new Luftwaffe pilots were denied fuel for training—by spring 1943 training fuel had been cut by 60 percent. As pilots began flying operationally with barely sixty hours under their belts—and almost none at night or in bad weather—they became easy prey for the more experienced Allied fighters.

Boog scores the German high command for poor planning: the Luftwaffe was not producing sufficient pilots early in the war because they were not thought necessary. When the problem was finally realized and pilot output was increased, it was too late. Fuel was insufficient and instructor pilots had already been sent to operational commands where they were desperately needed. As for aircraft, even though production increased dramatically in 1944, the results were muddled. Aircraft were destroyed at the factory before they could be shipped; they were destroyed en route to operational units; or they were cannon fodder in the air when confronted by more experienced pilots flying better aircraft. The overwhelming superiority of the Allies became evident in February 1944 when during "Big Week" the Luftwaffe lost hundreds of planes and pilots, while also seeing the airframe and engine factories—along with the oil refineries—severely damaged. By D-Day there were nearly 30,000 Allied aircraft ringing

the Reich, two-thirds of which were in the west and south. To combat them, the Luftwaffe had 600 aircraft to contest the invasion force at Normandy, and only 57 percent of those were serviceable. On D-Day itself, the Allies flew over 12,000 sorties, but the defenders were able to send but a dozen aircraft to the beaches—ten of which dropped their bombs prematurely. The Luftwaffe was outnumbered from then on by more than 20 to 1. In the words of the official history: “There was ... no Luftwaffe combat presence worth the mention in Normandy.” (p 325) In startling examples, Boog notes that of 57 fighters sent from Wiesbaden to Normandy after D-Day, only 3 arrived; of 22 FW-190s sent from Cologne, only 2 made it to their destination.

There are several other factors contained here: rivalry between fighter and bomber pilots was every bit as strong as it was in the RAF and USAAF; Germany lagged behind Britain in electronic warfare, partly because ham/amateur radios were forbidden once the Nazis took power for fear the population would be polluted by ideas from elsewhere. One of the fallouts from this backwardness was the proximity fuze. One postwar US study showed that if the fuze had been available, the USAAF would have suffered 3.4 times more aircraft losses. We are also reminded that Hitler did nothing to quell the in-fighting between his subordinates: if they were busy fighting each other they could not unite against him. Finally, the canard that “if only Hitler had not interfered with Me-262 production, the jet fighter would have been available a year earlier” was rubbish. There were major, complex mechanical problems with the jet and its engines that were difficult to overcome. Regardless of what Hitler decreed, the fighter could not have been available much earlier than it was.

While all was collapsing around them, Nazi leadership—and especially Hitler—reacted in a chaotic and unsystematic manner, moving forces and personnel here and there, changing targets, revising priorities and generally making things worse. Boog compares this to the analytical approach of the Allies and concludes that “we find a great many ad hoc decisions being taken, and matters of opinion on even the tiniest detail being discussed when they should have been dealt with in subordinate bodies and certainly not by the Commander-In-Chief [Goering] of one of the armed services.” (p 175) Micromanagement, lack of trust, and disloyalty were rampant throughout the Luftwaffe and was a major factor in its eventual defeat.

One other issue of note: Boog and his colleagues address the matter of morality in Luftwaffe bombing operations. Daylight raids were too costly, so the Luftwaffe retreated to the relative safety of night. The crews were not trained for such a mission, and navigation was poor. Worse, the equipment they employed was not geared for night operations and bombsights were inadequate even if aircrew could find a major target, such as London. The resulting imprecision—area bombing—was legally and morally justified because the Luftwaffe *wanted* to do better, but limitations in aircrew and equipment prohibited them from doing so. It is an argument that the Allies would use as well.

In total, these three excellent books shed new and important light on a vitally important subject. Intelligence, targeting, leadership and “the view from the other side of the hill” are

worthy topics and are covered by extremely capable historians and practitioners. There is much here for Air Officers to ponder and consider. The debates on these subjects are still as vital today as they were seventy years ago. A final word from the German history is compelling: "Though in modern warfare air power may not be the sole deciding factor, it is a sine qua non for success and its absence leads to failure." (p 333)

Book Reviews

A Fiery Peace in a Cold War: Bernard Schriever and the Ultimate Weapon

By Neil Sheehan

Reviewed by Group Captain Clive Blount

Introduction

A *Fiery peace in a Cold War* is the story of the United States program to develop an ICBM during the fevered early days of the Cold War and uses, as a framework, the biography of one of its key architects, USAF General, Bernard Schriever. It is based on extensive research, including many personal interviews, by award winning journalist, Neil Sheehan. Sheehan was born and raised in Massachusetts and graduated with a BA from Harvard in 1958. In 1962, after service in Korea and Tokyo with the US Army, he joined United Press International, acting as their Saigon bureau chief until 1964, when he joined *The New York Times* as a correspondent. After a spell in New York, he returned to South East Asia, first to Indonesia and then back to Vietnam. In late 1966, he became the paper's Pentagon correspondent.¹ Although well-known by this stage, particularly for his collaboration with David Halberstam in uncovering the corruption of the Diem regime in Vietnam, his name became best known as the journalist who obtained access to the "*Pentagon Papers*" - a secret review of the Vietnam War, initially commissioned in 1967 by then Secretary of State, Robert McNamara, and leaked to Sheehan by Daniel Ellsberg in 1971. The US government tried, unsuccessfully, to halt publication of the papers and the subsequent Supreme Court ruling, rejecting the government's position, became a landmark First Amendment decision.² *The New York Times* earned a Pulitzer Prize for what became one of the most celebrated news stories of the decade.

Sheehan spent some 16 years writing his first major 'Best Seller' *A Bright Shining Lie: John Paul Vann and America in Vietnam*³ which won both Pulitzer Prize and National Book Awards

for Nonfiction in 1989. *A Bright Shining Lie* examined the American war in Vietnam by concentrating on the life of one individual, Lt Col John Paul Vann. Vann was a controversial and troubled character who had leaked information to Sheehan when he was in the press corps in Saigon; Sheehan became fascinated by Vann and befriended him, following his tragic, and often out of control, rise to a General's command - the first civilian to do so - in 1971. Vann was killed in Vietnam in 1972. Sheehan's book is more than a biography. Whilst unusually intimate in his detail of Vann's life, he places that life firmly in the context of the US conduct of the war in Vietnam and Vann's role within it, making some very clear comments about policy and strategy. It is generally regarded as a sophisticated and well-argued history of the war.

In "*A Fiery Peace in a Cold War*," Sheehan attempts the same technique of addressing a broad sweep of history through the life of one man. This time he describes the history of the development of the ultimate cold war weapon, the Intercontinental Ballistic Missile (ICBM), by focusing on the life of Bernard Schriever. However, the power of "*A Bright Shining Lie*" came from two key ingredients; namely, the flawed but charismatic personality of his main subject, Vann, and the deep involvement and emotional investment that Sheehan himself had in the Vietnam War. Sadly, neither was available for this book. Schriever, though a capable and successful officer, is portrayed as a rather bland bureaucrat, and it is obvious in several areas that Sheehan's technical knowledge of missile engineering and the early USAF is somewhat lacking. Moreover, Sheehan obviously got very close to Schriever during the fifteen years or so that it took him to write this book, and there is a tendency towards hagiography in several areas where, as the wider historical record suggests, Schriever may have been less of a central actor than Sheehan credits.⁴ In addition, in an effort to introduce his wide 'supporting cast', Sheehan's prose can be somewhat meandering and slow to get to the key points; also, the lack of a detailed system of referencing his sources is an irritating omission. That said, the book was well reviewed – *The New York Times* described the book as "deeply researched, compulsively readable and important"⁵ – and is an eminently readable account of the technical and political challenges faced during the early cold war years as the US tried to close the perceived 'Missile Gap'.

"*A Fiery Peace in a Cold War*," is, however, far more than an interesting biography or history. In its description of how the ICBM program was devised and driven to success, it provides an intriguing case study in the adoption and development of technical innovation in a government/military bureaucracy and provides a number of thought-provoking areas worthy of further consideration.

First, and this is perhaps unsurprising in a largely biographical work, is that of the importance of the role played by key individuals in successful innovation. It is clear from the book that individuals play a large part in how technical developments are adopted and nurtured (or otherwise) to operational capability. It is clear from the start that this process is eased, significantly, if the project is initiated by a leader who provides a clear vision of the future. In "*A Fiery Peace*" this vision is provided by Gen 'Hap' Arnold, wartime leader of the USAAF and

the man who arguably 'set the conditions' for the success of the fledgling United States Air Force. As Sheehan notes, Arnold's view was that "The First World War had been decided by brawn. . . the Second by logistics. . . the Third World War will be different. It will be won by brains."⁶

Arnold commissioned the renowned aeronautical engineer, Theodore Von Kármán, to produce a far reaching study, eventually entitled *Towards New Horizons*, to assess the impact of emerging and future technology on air warfare. In writing the report, Von Kármán drew heavily on the results of research conducted in Nazi laboratories – both from interrogations of erstwhile Nazi scientists, and from some 3 million documents gathered in a post war trawl and sent back to the US⁷ – and it was his realization that these laboratories had made giant steps in aeronautical science "not the result of any superiority in their technical and scientific personnel. . . but rather due to very substantial support enjoyed by their research institutions in obtaining expensive research equipment, such as large supersonic wind tunnels" that led him to recommend to Arnold the foundation of a permanent Air Force Scientific Advisory Group and an infrastructure of well-equipped research centers. Many advances in USAF capability emerged from these initiatives and Sheehan, rightly, gives Arnold due credit for his leadership and vision.

Schriever clearly identified the influential people who could guarantee success, first in his early career and then in his single-minded pursuit of success for his programs. Throughout the book, Sheehan documents Schriever's consummate skill as a 'politician' in winning over these individuals to his cause. Whether on the golf course or in the corridors of Washington DC, Sheehan credits Schriever with an unerring ability to identify key 'players' (both technical and political) and then to charm them to his will. However distasteful this may seem at first consideration, in a system such as the USAF and DOD, where individuals wield considerable power, such a skill proved invaluable to Schriever. However, the book also documents a number of areas where Schriever's 'charm' was insufficient. Bureaucracies are naturally suspicious of individuality and tend to close ranks against newcomers who try to overturn the established order of things; Schriever's 'golf diplomacy' and attempts to circumvent bureaucratic 'brakes' must have incensed some of the senior officers with which he worked. In addition, bureaucracies are prone to the 'not invented here' syndrome and usually treat attempts to force progress by new techniques and ideas with much distrust. Sheehan documents several such occasions in *A Fiery Peace*. Perhaps the ultimate demonstration of the efficacy of winning key support was the ICBM team's effort at persuading President Eisenhower to put his weight behind the program. However, although Sheehan, rightly, lauds the political triumph of winning over the President, he misses the bureaucratic wrangling that followed. Persuading the President was not enough, and as NSC proceedings show, there was much debate following the briefing described in the book before NSC 1433 was agreed and signed by Eisenhower.⁸

On the other side of the equation to gaining key supporters, it is also clear that individuals can play a key part in *preventing* or *delaying* innovation. The role of 'chief villain' in this respect is

reserved by Sheehan for General Curtis Le May. Schriever's relationship with Le May got off to a poor start with Schriever presenting an 'inane' idea to Le May regarding the water-basing of Strategic Air Command (SAC) bombers on America's rivers.⁹ Le May continues to prove a significant obstacle to Schriever throughout the book. Although the popular legend of Le May as an ignorant, cigar-chewing autocrat is probably well-founded, his judgment and behavior as a senior USAF general was probably more nuanced than the now popular caricatures give him credit for. However, Sheehan's description of his behavior regarding the ICBM program raises some compelling issues for discussion. Le May was against anything that diverted resources from manned bombers and used his authority, and invective, in defense of his cause. Whilst 'commitment' and 'drive' are often widely regarded as positive attributes, Le May clearly demonstrated that, in excess, they can lead to narrow-mindedness and a dogmatic adherence to out dated ideas, thus squashing innovation and delaying progress. In addition, hubris born of success, combined with Le May's forceful persona, made him a vociferous champion of ideas that supported his aims, long after experts had deemed them infeasible. His drive to create a supersonic nuclear-powered bomber, seemingly by the pure force of his own willpower against the laws of physics, provides a case in point.¹⁰

The other area worthy of further consideration is the way Schriever and his colleagues sidestepped normal bureaucratic procedures in order to deliver the program on time. The project was undoubtedly challenging; Simon Ramo, one of the founders of the systems engineering company engaged to provide technical oversight and project management, later said that the ICBM program was, "a crash program of unprecedented size. . . marshaling the resources of industry, government, and science on a broader scale than had ever been attempted in peacetime."¹¹ Historically, weapons, aircraft, and equipment had all been produced separately; the aim with this project was to deliver the full capability, including warhead, delivery vehicle, guidance, support equipment etc - to deliver to the Air Force a complete *weapon system*. It became obvious, very early in the program, that the aircraft company charged with creating the Atlas missile, Convair, was unable to manage the systems engineering requirement (America's aircraft industry was just that – a producer of aircraft – the aerospace industry was yet to develop), so a new system was developed. Schriever was given command of a field office, with wide powers, and engaged the relatively new company, Ramo Wooldridge(R-W) to provide technical consulting services. Sheehan describes how the novel organization was extraordinarily effective, and the project ultimately successful, with systems engineering becoming a fundamental discipline in all modern aerospace companies. However, does this *ad hoc* 'tiger team' approach provide a model for the management of innovation in defense and all acquisition?

The approach adopted by Schriever and his team has a number of advantages; most of which are clearly described by Sheehan in the book. Such an approach enables rapid progress as the project is managed by a small, close-knit team of experts who are all focused on a single outcome. The team is motivated by a 'higher cause' – in this case the race for cold war supremacy – and the lack of baser distractions, such as company profit, enable innovative

thinking and provide flexibility to capitalize on, and incorporate, new ideas. The momentum such teams develop often sidesteps the established bureaucracy to accelerate senior decision-making, gaining rapid approval of project changes. Vested interests, outside of the immediate team, are often sidelined or emasculated, again streamlining progress. This system is ideal for rapid, innovative projects where early operational capability is of a higher priority than longevity.

However, this type of project management approach has significant disadvantages. Traditional procedures and bureaucracies have generally developed over time to establish safeguards – both in terms of safety and quality control, and to ensure legitimate governance. Although it is easy, as Sheehan implies, to criticize the many government and aircraft industry objections, to the way the ICBM program was handled, as self-serving and maliciously disruptive, a disregard for longer-term configuration control (particularly now with software), engineering quality and supportability issues, and financial probity – the very reason for which traditional procedures are developed to prevent – has led to many high profile disasters. The Apollo 1 fire, Apollo 13 cryogenic tank and the Space Shuttle *Challenger* solid rocket booster disaster can all be traced to lack of careful systems engineering management. More recently, and more mundane but no less significant in terms of military capability, efforts to integrate systems, that were introduced rapidly, via unorthodox project teams, to satisfy urgent operational requirements in Afghanistan and Iraq, into core ‘peacetime’ capability and safety management processes have proved expensive and difficult*.

Notwithstanding the issues discussed above, Schriever’s achieved a great deal during his career. Although largely unknown before this book, he was a major contributor to the US rocketry program and, recognizing that his missiles were adapted to form the backbone of America’s space launch capability, the magazine *Space Daily* pointed out on the occasion of the 476th and final launch of the *Atlas* booster family, derived from Schriever’s initial missile, “Schriever was the ‘American Korolev’ – the real brain behind US rocketry in the cold war years.”¹²

“A Fiery Peace in a Cold War” is an entertaining and thought-provoking read that has much to offer students of military innovation. Schriever proved to be exceptionally adept at persuading, recruiting and managing individuals to achieve success in a radical, but vital, program of capability development following the vision of his one-time mentor, Hap Arnold. Perhaps the last word should go to Bernard Schriever himself, who said in a NASA Oral History interview in 1999, “From the standpoint of the Air Force as a service, I think we need to elevate the whole future . . . you need a four star general who’s looking to the future, who fights like hell . . . we need that four star guy who sits at that decision table and says, ‘Damn it to hell, I need this and I’ll argue with you until the cows come home.’”¹³

* This has been a major issue for Defence Acquisition in the UK. I am unsure of the situation in the United States.

† Sergei Korolev – the Soviet Rocket Genius

Notes

¹ W Transcript of Interview with Sheehan, 22 Oct 88. <http://www.booknotes.org/Watch/4284-1/Neil+Sheehan.aspx> accessed 8 Nov 12.

² Correll, John T., "The Pentagon Papers" in *Airforce Magazine*, Vol. 90, No. 2, Feb 2007. <http://www.airforce-magazine.com/MagazineArchive/Pages/2007/February%202007/0207pentagon.aspx>. Accessed 9 Nov 12.

³ Sheehan, Neil, *A Bright Shining Lie: John Paul Vann and America in Vietnam*, (London: Pimlico, 1988).

⁴ For instance, see Dyer, Davis, "Necessity as the Mother of Convention: Developing the ICBM, 1954-1958" in *Business and Economic History*, Vol. 22, No.1, Fall 1993.

⁵ Beschloss, Michael, "Missile Defense" in *The New York Times* Sunday Book Review, 1 Oct 09. <http://www.nytimes.com/2009/10/04/books/review/Beschloss-t.html?pagewanted=all> Accessed 9 Nov 12.

⁶ Sheehan, Neil, *A Fiery Peace in a Cold War: Bernard Schriever and the Ultimate Weapon*, (New York: Random House, 2009) xviii.

⁷ Sheehan, *A Fiery Peace in a Cold War*, 120.

⁸ Foreign Relations of the United States, 1955-1957. Vol XIX, National Security Policy, Document 34. [www.history.state.gov/historicaldocuments/frus1955-57v19/d34 #fn9](http://www.history.state.gov/historicaldocuments/frus1955-57v19/d34#fn9) accessed 11 Nov 12.

⁹ Sheehan, *A Fiery Peace in a Cold War*, 143.

¹⁰ Ibid., 159.

¹¹ Dyer, "Necessity as the Mother of Convention", 195.

¹² Bell, Jeffrey F., "Bernard Schriever's Stifling Shadow" in *Space Daily*, 28 Sep 2004. www.spacedaily.com/news/oped-04zd.html. Accessed 11 Nov 12.

¹³ NASA Oral History. General Bernard A. Schriever, interviewed by Carol Butler. 15 Apr 99.

Book Reviews

The Second World War

By Anthony Beevor

Reviewed by Group Captain (Ret'd) Ian Shields

Introduction

Anyone attempting to capture the sweep, complexity and scale of the Second World War in a single volume has set themselves a considerable challenge. Anthony Beevor, one of the country's best known popular historians, has attempted this in a mammoth book of some 850 pages, and to a large extent succeeds. The great strength of this book is its very scope: by adopting a strict temporal construction and therefore looking at events all around the world in chronological rather than regional order, he demonstrates why World War Two was a truly global conflict. This enables the reader to understand the inter-connection between events in the Pacific with those of the Mediterranean, between Normandy and the Eastern Front. This grand sweep, moreover, highlights the complexities of the political facet of the War and while it cannot go into any great depth of the relationship between the various leaders (indeed, rarely goes into any depth in considering any aspect of the fighting) it does bring together all the various aspects of the Second World War, highlighting its very range and impact.

But this breadth has also to be a limitation, for to tackle the entire Second World War in a single book must mean that some aspects of the conflict receive only scant or no attention, and those seeking deeper insights will be frustrated. There are extensive notes, although these serve more to demonstrate the range of research rather than to point the reader towards other texts and a bibliography would have been useful for those seeking to follow-up certain angles. Then there is the issue of balance: again, in such a bold enterprise there will be many

left unsatisfied with the choice of emphasis, and here there is a justifiable criticism of Beevor for the book does show distinct biases. First, there is little reference at all to the Air war and the critical analysis of the Combined Bomber Offensive comes across as unbalanced and hackneyed. Likewise, the Naval war, while receiving more attention than the Air war, is arguably under-represented: a quick scan of the extensive Index will reveal an overwhelming bias towards the Land campaigns. While it could be argued that that was because the Second World War was primarily a Land war, it also reveals Beevor's own bias as a Land Warfare historian. Moreover, those areas on which he has already worked, in particular Stalingrad, receive extensive coverage: while few could argue that Stalingrad was a, if not the, pivotal event of the European campaign, the coverage it receives is somewhat disproportionate.

All of which sounds somewhat negative, but there is also much to commend in this book that has, rightly, received some high praise. Its coverage of the war in China, which receives little coverage in Western histories of the Second World War, is excellent and highlights the global and inter-connected dimension of the entire War. Bringing together so many themes and capturing the scale of the conflict and the human misery it created in just 850 pages is an immense achievement. This book deserves a place on your bookshelf exactly because it does cover most aspects of a long and lethal War in a single, well-written and informative book. It is highly unlikely that you will finish this book without having learnt something new; as a summary of the Second World War it is an excellent primer and a good stepping-off point for further reading.

Book Reviews

The Sowreys: A Unique and Remarkable Record of One Family's Sixty-five Years of Distinguished RAF Service

By Air Commodore Graham Pitchfork

Reviewed by Chris Hobson

Introduction

In the annals of Royal Air Force history there are several prominent families that spring to mind: the two Salmond brothers, John and Geoffrey, who each rose to become Chief of the Air Staff (albeit tragically cut short in Geoffrey's case); the Atcherley twins, Richard and David; and the three MacRobert brothers, all of whom were killed while flying with the RAF and who were commemorated by a Stirling, a Buccaneer and a Tornado aircraft being named 'MacRobert's Reply'. Another name that stands out is that of the Sowrey family several of whom served with distinction in both World Wars as well as the Cold War period and now Air Commodore Graham Pitchfork has written a comprehensive record of their achievements.

The advantage (and challenge) of writing about two generations of a family which has produced six pilots and a member of the Women's Auxiliary Air Force is the sheer breadth of their collective experience. Remarkably, all three brothers of the first generation, John, Fred and William, made their operational debut in night fighter squadrons in the UK during the First World War and Fred Sowrey became an instant household name when he shot down a Zeppelin near Billericay. The trio later served in reconnaissance, fighter and bomber squadrons

on the Western Front. The usual mixture of home and overseas service (including air policing) followed the end of the War and the three also served in various appointments during the Second World War when the next generation of Sowreys, Johnnie, Jimmy and Freddie, took to the air. These three flew fighters primarily and Jimmy was the only Sowrey to be killed in service when his Hurricane was shot down in the Western Desert in 1941. Johnnie and Freddie both had distinguished post-war careers serving in several interesting roles throughout the Cold War era. This included operational experience commanding Meteor and Javelin fighter squadrons, test flying, and running a Thor IRBM station, as well as staff appointments including commanding the National Defence College, overseeing the withdrawal from Aden, and involvement in high-level RAF and NATO policy and operations.

This meticulously researched and highly readable book is much more than a family history; it is a history of the RAF as seen through the very personal lens of a most remarkable family. The author's extensive and deep knowledge of the Service and its history comes to the fore and is invaluable in giving the reader just the right amount of context in which to place the main subjects of the book. The Sowrey dynasty is almost unique in the annals of the Service and this book firmly places on record the immense contribution made by this one large family to that much larger family, the Royal Air Force.

<http://www.airpowerstudies.co.uk>

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