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Dissertation

Military Aviation's Cyber Challenge; Are Cyber-Vulnerabilities a Credible Threat to a Modern Air Force? Squadron Leader Daniel Lydiate

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High Flying Agents and Mystical Technology: Air Power, Bush Warfare and The Nuers, Anglo-Egyptian Sudan, 1927-1928 Brigadier Andrew Roe

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Foreword

by Group Captain James Beldon

F ollowing our trio of special editions in 2018 to mark the Royal Air Force's Centenary, we return to our traditional format for this edition of *APR*. Consequently, our authors offer a wide sweep over the history, practice and future challenges of air power. It is in the latter realm that Squadron Leader Dan Lydiate's article begins this edition. A recently graduated Chief of the Air Staff's Fellow, Squadron Leader Lydiate reminds us that great capabilities can be accompanied by significant vulnerabilities. His interrogation of potential cyber threats to the Next Generation Air Force and their potential mitigation offers both warning and reassurance, whilst reminding us that complacency presents its own dangers to our security and, therefore, our operational effectiveness. As Lydiate observes, an important step in addressing the cyber threat posed to our capabilities is acknowledging the scale of the challenge – his article therefore provides timely exposure of those challenges to air power leaders at all levels.

Flying Officer Iwan Benneyworth, an intelligence specialist who holds an International Relations PhD from Cardiff, examines the unsung, yet critical role, played by US air power in the Drugs War being played out in the Southern United States and Central and South America. Exploring the relationship between military and civilian organisations and their respective cultures, Flying Officer Benneyworth offers a thoughtful perspective on the utility and potential escalatory effect of employing military forces in support of non-military aims, whilst recognising that the flexibility and reach that military air power offers may exert an addictive influence of its own.

Brigadier Andrew Roe and Group Captain John Alexander look back to the early part of the Twentieth Century to examine the influence of air power in separate campaigns in the Middle East and Africa. Both articles shed light on the development of the understanding of air power's attributes and potential away from the cauldron of the Western Front, which has received the lion's share of historians' attention to the early Twentieth Century. To that end, the authors offer novel insights into campaigns that are little known, or in which air power's contribution has received insufficient historical analysis.

Moving forward to the Second World War, Dr Richard Worrall provides a detailed examination of Bomber Command's raids on Spezia in 1943 at a time when Air Chief Marshal Sir Arthur Harris was concentrating Britain's principal strategic weapon against the heart of Germany's strategic manufacturing hub in the Ruhr Valley. Competing strategic priorities coupled with Bomber Command's unique long-range strike capability, placed unique demands on Harris' command. Dr Worrall provides an important insight into the machinations between the Chiefs of Staff, theatre commanders and political leaders, whilst demonstrating Harris' underrated flexibility in satisfying multifarious and contesting demands. In this edition's final viewpoint, the Reverend (Wing Commander) Dr David Richardson delves deep into the moral component, exploring the concept of 'spiritual resilience'. He presents a compelling rationale for the identification of spiritual resilience as an important element of morale, but just as importantly examines the changing relationship between the serviceman and woman and society, and the important moral foundations upon which military service – and fighting in particular – are hinged.

Our first book review examines the Royal Navy's hate-love relationship with air power in the First World War. 'The Flat Pack Bombers' explores the German Navy's early supremacy in air power terms at the start of the conflict, leading to the Royal Navy's counterstrokes through the targeting of German Zeppelin sheds, arguably marking the genesis of Britain's first ever attempt at strategic bombing. The next trio of books that are reviewed in this edition offer rewarding insights into the lives of three great leaders who found their métiers at the tactical, operational and strategic levels respectively: T. E. Lawrence, General George Patton and Air Chief Marshal Sir Richard Johns. The latter, in particular, should be considered as essential reading; it is also, in places, highly amusing! The final book review covers, amongst other periods, Spitfire operations in India during the last days of the Raj. A wonderfully personal memoire, 'Spitfire Over Everest' delights the reader with an attention to detail written from the heart.

Enjoy reading this edition, and remember that we are always in search of new perspectives that advance the Royal Air Force's conceptual development, irrespective of rank or experience. Additionally, I should highlight our Facebook and Medium pages, with which you can interact directly via the following links:

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https://medium.com/raf-caps



Military Aviation's Cyber Challenge; Are Cyber-Vulnerabilities a Credible Threat to a Modern Air Force?

(Chief of the Air Staff's Henderson Fellowship Dissertation)

By Squadron Leader Daniel Lydiate

Biography: Squadron Leader Daniel Lydiate is a Provost Officer with broad operational experience currently serving within Information Systems and Services (ISS) at MOD Corsham. Having undertaken a MSc with the University of Leicester, and the CAS' Henderson Fellowship to study an MA at the University of Exeter, he is continuing his current focus on cyber-related research by completing an MSc in Cyber Defence with Cranfield University.

Abstract: This article explores military aviation's contemporary cyber challenge by asking whether cyber-vulnerabilities are a credible threat to a modern air force. Following a discussion of the concepts, the question is developed through an analysis of four aspects of air operations: systems, infrastructure, supply chains and personnel. Although cyber-security concerns are identified within all, the article identifies that systems and the supply chain are where considerable cyber-security concern lies. Building on this, the article recommends that the strategic leadership of air forces must invest in reflective in-depth study to understand the problems and identify sources of mitigation. If they do, management of the issues may be possible. If they do not, the strategic relevance of modern air power may be destroyed by the systematic exploitation of military aviation's cyber-vulnerabilities.

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Introduction

The article explores military aviation's contemporary cyber challenge by asking whether cyber-vulnerabilities are a credible threat to a modern air force. Beginning with a discussion of the relevant concepts, the article will highlight the requirement to understand cyber-vulnerabilities within the context of air power. To achieve this, the subject will be examined through an analysis of four key aspects of contemporary air operations: systems, infrastructure, supply chains and personnel.

Initially considering systems, it will be noted that within this complex area the human element is being increasingly supplanted by a reliance on the processing of digital information. To address whether this is of concern, the article will consider two key military aviation systems: Unmanned Aerial Vehicles (UAV) and the F-35's Autonomic Logistics Information System (ALIS). Through identifying mounting evidence that systems such as these are susceptible to cyber-attack, it will be concluded that the vulnerability of systems in modern aviation will continue to be of concern.

Moving next to infrastructure, it will be argued that, unlike its sister Services, the impermanence of aviation makes air forces uniquely dependent on infrastructure. Combined with modern Royal Air Force infrastructure's reliance on information systems, the ability of cyber-attack to circumnavigate traditional security will be discussed. Further, examining specific examples, it will be concluded that the cyber-threat to an air force's infrastructure is important but, due to available sources of mitigation, is not the most pressing vulnerability within military aviation's contemporary cyber-challenge.

In the third area of supply chains, the article will identify an issue of greater concern. Commenting on the complexities created by aviation's modern supply chains, the F-35 will be cited as an example before discussing the standards UK Defence is employing to secure its supply chains. Having done so, it will be concluded that with these standards falling short of the contemporary cyber-threat, supply chains are an area that is placing the viability of modern military aviation at risk.

In the final area – an air force's personnel – the article will comment that this 'beating heart' of an organisation plays an important role in security. Entwined with the delivery of air power at every step, it will be noted that people can cause security breaches either maliciously or, more often, non-maliciously. With the latter resulting from mistakes, errors or hostile actors' social engineering, it will be suggested that there is a troubling trend of avoidable security breaches within UK Defence. As a result, the strategic leadership of air forces will be recommended to work towards understanding and managing the problem. If they fail to do so, the article will warn that their own people's non-malicious breaches will inevitably result in incidents which may damage the operational effectiveness of military aviation.

Following this exploration of the four key areas of aviation delivery, the article will, within the final section, review the discussion. Having done so, it will be concluded that whilst significant cyber-security concern exists within all four areas, the strategic leadership of air forces should, on balance, focus their priorities on systems and the supply chain where the most acute contemporary concerns exist.

Building upon this analysis, the article will recommend that the strategic leadership of air forces must invest in reflective in-depth study to understand the problems and identify sources of mitigation. If they do so, management of the issues may be possible. If they do not, the strategic relevance of modern air power may be destroyed by the systematic exploitation of military aviation's cyber-vulnerabilities.

Concepts and the Research Requirement

The meaning of 'cyber' differs depending on perspective. At its source, the term's etymology reaches 'back to the Ancient Greek meaning of governing'.¹ Translated in today's vernacular to an adjective relating to 'the culture of computers, information technology and virtual reality',² its contemporary understanding is founded on its employment as a prefix. 'A linguistic tool that technologists aren't shy about using',³ the approach began with Weiner's 1948 coining of cybernetics.⁴ Adopting an 'artificial neo-Greek expression to fill the gap'⁵ in communications terminology, this prefixing of cyber to describe a technology related concept is commonplace.

In response, those engaged in securing technology searched for a term that would define their role. Labelled by some as Information Assurance (IA) or Information Security, the popularity of the aforementioned linguistic tool led to the catchall of 'cyber-security'. Noted by Von Solms and Van Niekerk as now used 'in most literature...as an all-inclusive term',⁶ it has been broadly accepted as the singular reference point for the protection of electronic systems, networks, data and information.

Concurrent to the adoption of cyber-security, nations also began to recognise the 'rapid technological developments...[which were introducing] unprecedented threats'.⁷ Acknowledging the need to protect national assets and information from global threat actors

¹ Jovan Kurbalija, "Different Prefixes, Same Meaning: Cyber, Digital, Net, Online, E-, Virtual", *The World Post* (17 March 2015) http://www.huffingtonpost.com/jovan-kurbalija/different-prefixes-same-m_b_7073758.html, accessed 22 December 2017.

² Oxford Dictionaries, Definition of Cyber (2015).

³ Paul McFedries, "The (Pre) Fix Is In", *IEEE Spectrum* (1 August 2004) http://spectrum.ieee.org/at-work/education/the-pre-fix-is-in, accessed 3 January 2018.

⁴ Norbert Weiner, *Cybernetics: or Control and Communication in the Animal and the Machine* (MIT Press, 1948) 11. 5 Ibid.

⁶ Rossouw Von Solms and Johan Van Niekerk, "From Information Security to Cyber Security", *Computers and Security*, 38, (2013) 97-102: 97.

⁷ IT Governance, *What is Cyber Security*? (2015) http://www.itgovernance.co.uk/what-is-cybersecurity.aspx, accessed 4 January 2018.

in the digital environment, more than 50 nations had by 2013 created a 'cyber-strategy'.⁸ Summarising their cyber-security initiatives, these documents flag the strategic importance cyber has attained.

Although, as demonstrated by these cyber-strategies, governments and industry were comfortable with the catchall of 'cyber-security', it was not prescriptive enough for the military vernacular. Requiring greater clarity of purpose to be incorporated into military strategic planning, the term Defensive Cyber Operations (DCO) was introduced. Recognised by the UK's National Cyber Security Strategy as essential because of the military's dependence 'on information and communications systems', DCO is defined by the UK's Cyber Primer as the 'active and passive measures to preserve the ability to use cyberspace'.¹⁰ Encompassing a broad range of activities, the intent of DCO is to reduce the likelihood of an adversary degrading a nation's military capability through the cyber-domain.

To ensure DCO effectively protects military capabilities, there is a requirement to understand where vulnerabilities in operational delivery may lie. For modern air forces which are committed to operating fifth generation aircraft in a fifth generation environment, this is magnified. To illustrate this, it is necessary to understand the terms and the unique challenges they encompass.

Initially when considering 'fifth generation warfare', scholars view modern warfare as an evolution of five stages. In the first and second stages warfare was defined by technological advances. Whether the smoothbore musket or machine gun, the common theme was an ability to harness greater firepower.¹¹ Developing into a combination of technology and tactics in the third stage, one epitomised by the concept of 'blitzkrieg', the intent was to embrace manoeuvre over attrition.¹² Enduring throughout the mid-twentieth century, the evolution of a fourth generation was not seen until the 1980s. Characterised as no longer battlefield focused, warfare began to 'take advantage of the political, social, economic, and technical changes since World War II'.¹³ Specifically, the approach emphasised 'bypassing an opposing military force and striking directly at cultural, political, or population targets'.¹⁴

Whilst some argue that today's conflicts continue to be defined by the asymmetric nature of fourth generation warfare, others contend that we are seeing the advent of a fifth generation.

¹⁰ Ministry of Defence, Cyber Primer 2nd Ed (2016) 52.

⁸ Von Solms and Van Niekerk, From Information Security to Cyber Security, 97.

⁹ HM Government, National Cyber Security Strategy, 2016-2021 (2016) 38.

¹¹ W. S. Nightengale, "The Changing Face of War: Into the Fourth Generation", *Marine Corps Gazette* (October, 1989) 22-26: 22.

¹² Ibid.

¹³ Thomas X. Hammes, "Insurgency: Modern Warfare Evolves into a Fourth Generation", *Strategic Forum*, 214 (January 2005) 2.

¹⁴ Jason Vest, "Fourth Generation Warfare", *The Atlantic* (December 2001) https://www.theatlantic.com/magazine/ archive/2001/12/fourth-generation-warfare/302368/, accessed 9 May 2018.

Defined by Liang and Xiangsui as an unrestricted warfare 'using all means, including armed force or non-armed force',¹⁵ it is ultimately, in Reed's assessment, one that can 'take any form, kinetic or non-kinetic'.¹⁶

Within this multi-dimensional nature, a key driver has been the concept of cyber and an extensive use of digital networks.¹⁷ With information technologies now unextractable from the modern battle, Layton concludes that this latest generation has in practice created a fifth domain of operations alongside the traditional landscapes of land, sea, air and space.¹⁸

Though a concern across Defence, the impact of fifth generation warfare is particularly acute for air forces. Reliant in the operation of modern aircraft on protecting the Confidentiality, Integrity and Availability (CIA) of information,¹⁹ it is feasible that a successful non-kinetic attack on an air force through the cyber-domain could impact upon the effective projection of air power. Because of this, air forces must understand areas of delivery within the context of fifth generation conflict and the vulnerabilities which may challenge the provision of effective DCO.

With the introduction of fifth generation aircraft this conclusion has attained increasing relevance. The culmination of a century of aviation development, it builds upon advances including the 'zeroeth' generation's first use of jet engines²⁰ through to the fourth generation's improvements 'in avionics...and optimised aerodynamics'.²¹ Led by the F-35 which first entered service with the US Marine Corps (USMC) in 2015, and soon to be followed by China's J-20²² and Russia's Su-57,²³ the defining characteristic of the generation is a significant advancement in information systems and associated software.²⁴

Offering advantages in 'maintaining the edge against evolving threats',²⁵ its informationreliant nature presents incredible operational opportunities. In equal measure, however, it also

¹⁵ Qiao Liang and Wang Xiangsui, *Unrestricted Warfare: China's Master Plan to Destroy America* (Pan American Publishing Company, 2002) xv.

¹⁶ Donald Reed "Beyond the War on Terror: Into the Fifth Generation of War and Conflict", *Studies in Conflict and Terrorism*, 31(8) (2008) 684 – 722: 693.

¹⁷ Peter Layton "Five Fifth Generation Warfare Dilemmas", *The Strategist*, (25 July 2017) https://www.aspistrategist.org. au/five-fifth-generation-warfare-dilemmas/, accessed 7 May 2018.

¹⁸ Ibid.

¹⁹ Parker, D. B. Information Security (Springer, 1995) 153.

²⁰ Globalsecurity.org, *Fighter Aircraft Generations* (2018) https://www.globalsecurity.org/military/world/fighteraircraft-gen-1.htm, accessed 20 July 2018.

²¹ Fighter World, *Five Generations of Jets* (2018) http://www.fighterworld.com.au/az-of-fighter-aircraft/five-generations-of-jets, accessed 22 July 2018.

 ²² Franz-Stefan Gady, "China's First Fifth Generation Fighter Jet is Operations", *The Diplomat* (2 October 2017) https://thediplomat.com/2017/10/chinas-first-5th-generation-fighter-jet-is-operational/, accessed 9 May 2018.
 ²³ RT, "First Russian 5th Generation Su-57 Fighter Jets to be put in Service 'Very Soon'", *RT Online* (5 January 2018)

https://www.rt.com/news/415166-su-57-russian-army-soon/, accessed 10 June 2018.

²⁴ Fighter World, *Five Generations of Jets*.

²⁵ Ibid.

introduces vulnerabilities. A concern encompassing fifth generation aircraft from inception to operation, potential attack-vectors can include targeting of the design phase²⁶ through to the exploitation of long supply chains²⁷ and the introduction of malicious software (malware) to aircraft systems.²⁸ Taken collectively, there is credible concern that the targeting of fifth generation aircraft throughout their lifecycle could have serious operational impact.

Considered in the context of vulnerabilities in the delivery of DCO, there is a requirement to explore the areas of threat which fifth generation aircraft operating in a fifth generation environment are exposed to. If such reflective study is not conducted, the strategic leadership of air forces will be unaware of how their adversaries might degrade the advantages assumed to have been gained by technological advancement. It is this research requirement, and more specifically assessing the credibility of the cyber-threat to modern military aviation, that the article will explore and address.

Systems

In discussing military air operations, including their potential cyber-vulnerabilities and other inherent threats, the most intuitive starting point is systems. In broad terms, a system is a combination of hardware and software which can receive inputs, process data and create information for storage and output.²⁹ Whilst the concept's manifestation can become increasingly complex, the fundamental principles remain unchanged.

Within aviation, as with other industries, bodies have overlaid this basic interpretation with standards that define the roles of specific system types. Aeronautical Radio, Incorporated (ARINC) 811, for example, divides aircraft systems into domains including Aircraft Control and Airline Information.³⁰ As aviation develops, however, structures will be increasingly difficult to chart.

One manifestation of this increasing complexity is the introduction of Next Generation (NextGen) technologies to aircraft. Entwining multiple systems to create e-enabled aircraft,³¹ a shift epitomised by the military concept of fifth generation aircraft,³² the development is moving aviation away from traditional methods of operation. Evident across the industry,

²⁶ Reuters, "Theft of F-35 Design Data is Helping U.S. Adversaries – Pentagon", *Reuters Market News* (19 June 2013) https://www.reuters.com/article/usa-fighter-hacking/theft-of-f-35-design-data-is-helping-u-s-adversariespentagon-idUSL2N0EV0T320130619, accessed 10 May 2018.

²⁷ R. De Cerchio, "Aircraft Systems Cyber Security", *Digital Avionics Systems, Conference (DASC), IEEE/AIAA (2011)* https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6095969, accessed 23 June 2018.

²⁸ Roberto Sabatini, "Cyber Security in an Aviation Context", *Melbourne Cyber Security Conference* (November 2016) *https://www.researchgate.net/publication/312191777_Cyber_Security_in_the_Aviation_Context*, accessed 8 May 2018.

²⁹ Techopedia, *Computer System* (2018) https://www.techopedia.com/definition/593/computer-system, accessed 15 July 2018.

³⁰ De Cerchio, Aircraft Systems Cyber Security, 1.

³¹ Ibid.

³² Fighter World, *Five Generations of Jets*.

examples include human interaction through voice communication no longer acting as 'the primary means of obtaining information',³³ and Cyber-Physical Systems (CPS) extending beyond the information domain to 'monitor and control physical processes'.³⁴ Within this new reality operators must acknowledge that the human element is no longer pivotal. Rather, aircraft are becoming reliant on 'timely, accurate and un-tampered information' being processed by both internal and external support systems.³⁵

Given this, it is becoming increasingly important 'to protect the CIA of the information processed by those systems'.³⁶ Extending beyond the aircraft itself, and considering the military context specifically, it is also recognised that systems 'enable almost everything the military does'.³⁷ This reality has seen information technology evolve in less than a generation 'from an administrative tool...into a national strategic asset'.³⁸

Alongside this reliance on systems, the asymmetric threat of cyber, ³⁹ driven by 'the low cost of computing devices, means that operationally essential systems are increasingly vulnerable'.⁴⁰ Judged by the United States (US) Operational Test and Evaluation (OTE) agency to be as credible a threat as traditional capabilities, it warns that any data exchange, however brief, is open to compromise.⁴¹

Though some might characterise these warnings as an overreaction, reporting confirms that 'over the past ten years, the frequency and sophistication of intrusions into western military networks have increased exponentially'.⁴² In 2008 for example a USB flash drive infected with malware was placed into a US military laptop in the Middle East. Alleged to have given unknown adversaries the ability to control US Department of Defence (DoD) servers, it represented a troubling window into how an enemy can compromise systems.⁴³

³³ De Cerchio, Aircraft Systems Cyber Security, 1.

³⁴ Edward Lee, "Cyber Physical Systems: Design Challenges", *Technical Report No. UCB/EECS-2008-8 - Electrical Engineering and Computer Sciences University of California at Berkeley* (23 January 2008) 1, http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.156.9348&rep=rep1&type=pdf, accessed 12 July 2018.

³⁵ De Cerchio, Aircraft Systems Cyber Security, 2.

³⁶ Michael Olive, Roy Olshi and Stephen Arentz, "Commercial Aircraft Information Security - An Overview of ARINC Report 811", 25th Digital Avionics Systems Conference, (15 October 2006) 1-12: 3, https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=4106238, accessed 4 July 2018.

³⁷ Willian Lynn, 'Defending a New Domain: The Pentagon's Cyberstrategy', *Foreign Affairs*, 89 (5) (September/October 2010) 97-108: 98.

³⁸ Ibid.

³⁹ Ibid.

⁴⁰ Ibid.

⁴¹ Operational Test and Evaluation Centre, "Procedures for Operational Test and Evaluation of Cybersecurity in Acquisition Programs", *Memorandum for Commander Army Test and Evaluation Command and Air Force Operational Test and Evaluation Centre* (1 August 2014) 1, www.dote.osd.mil/pub/policies/2014/8-1-14_Procs_for_OTE_of_ Cybersec_in_Acq_Progs(7994).pdf, accessed 1 July 2018.

⁴² Lynn, Defending a New Domain: 97.

⁴³ Clifford Magee, "Awaiting the Cyber 9/11", Research Paper, USMC University (11 March 2012) 4.

Not limited to ground systems, media reports also confirmed the compromise of information relating to the F-35. In June 2013, for example, a US Senate Sub-Committee was informed that the systems of the prime-contractor, Lockheed Martin, containing sensitive information had been compromised by an unknown adversary.⁴⁴ Reinforced in 2015 through documents leaked by Edward Snowdon, *Der Spiegel* reported that it was Chinese hackers who had compromised Lockheed Martin.⁴⁵ This, in the assessment of industry commentators, led to a significant loss of US advantage over a principal adversary.⁴⁶

Though concerning, these losses are not the most dangerous element of system compromise. With exploits 'becoming more sophisticated over time',⁴⁷ it is an adversary's ability to impact on current operations which poses the greatest threat. Looking to other industries for examples, automobile research has shown that an attacker can now circumnavigate a car's internal network to compromise 'safety critical elements such as the brakes and engine'.⁴⁸ Immensely dangerous, such attacks against operational aircraft could be disastrous. Equally, targeting of the support elements to aviation can also be disruptive. In 2006, for example, a malware attack on the US Federal Aviation Authority's (FAA) Air Traffic Control (ATC) system forced a shutdown of all commercial flights in Alaska.⁴⁹ If repeated against critical military support systems, an adversary could prevent the deployment of air power.

It could be argued, however, that with cyber dominating headlines, its elevation to a strategic issue is an over inflation. In Cavelty's opinion, for example, assessments have ignored the 'low probability of a large scale cyber-attack' and placed too much emphasis on the necessity of military cyber-security.⁵⁰ This assertion is illustrated by the fact that a large-scale cataclysmic cyber-attack, a potential first warned of in 1991 by Schwartau's predictions of a 'Cyber Pearl

⁴⁴ Sydney Freeberg, "Top Official Admits F-35 Stealth Fighter Secrets Stolen", *Breaking Defence* (20 June 2013) https://breakingdefense.com/2013/06/top-official-admits-f-35-stealth-fighter-secrets-stolen/, accessed 1 July 2018.

⁴⁵ Jacob Applebaum, "NSA Preps America for Future Battle", *Das Spiegel* (17 January 2015) www.spiegel.de/ international/world/new-snowden-docs-indicate-scope-of-nsa-preparations-for-cyber-battle-a-1013409-2.html, accessed 3 July 2018.

⁴⁶ Franz-Stefan Gady, 'New Snowdon Document Reveals China Behind F-35 Hack', *The Diplomat* (27 January 2015) https://thediplomat.com/2015/01/new-snowden-documents-reveal-chinese-behind-f-35-hack/, accessed 2 July 2018.

⁴⁷ De Cerchio, Aircraft Systems Cyber Security, 1.

⁴⁸ Stephen Checkoway, Damon McCoy, Brian Kantor, Danny Anderson, Hovav Shacham, Stefan Savage, Karl Koscher, Alexei Czeskis, Franziska Roesner and Tadayoshi Kohno, "Comprehensive Experimental Analyses of Automotive Attack Surfaces", *USENIX Security Symposium* (August 2011) 77-92: 77.

⁴⁹ Federal Aviation Administration, Review of Web Applications Security and Intrusion Detection in Air Traffic Control Systems Report Number: FI-2009-049 (4 May 2009) 5, https://www.oig.dot.gov/sites/default/files/ATC_Web_ Report.pdf, accessed 29 June 2018.

⁵⁰ Myriam Cavelty, "The Militarisation of Cyber Security as a Source of Global Tension" in A. Wenger (ed) *Centre for Security Studies – Strategic Trends 2012* (12 March 2012) https://www.research-collection.ethz.ch/bitstream/ handle/20.500.11850/153535/1/eth-5788-01.pdf, accessed 10 July 2018.

Harbour',⁵¹ has not, to date, occurred. Because of this, it is necessary to ask whether the compromise of systems is truly an issue which should concern the strategic leadership of an air force or if it is an over-exaggeration. To address this question, it is informative to consider two contemporary military aviation systems: UAVs and the F-35's ALIS.

Considering the first, UAVs, it has been argued that having harnessed the ability to 'manoeuvre autonomously...[by] relying on on-board computers'⁵² they are the future of military aviation and the epitome of systems replacing the human. With the US military having increased its investment in the research and production of UAVs to \$4.2 billion by 2012, and their role being extended to include surveillance, reconnaissance, transport and armed attacks, there can be no doubt that they will be an enduring military capability.⁵³

Though providing impressive options for military aviation, Hartmann comments that as a flying system they are 'highly exposed...complex pieces of hardware'.⁵⁴ A potential weakness to their operation, it was not a concern that had been widely considered prior to 2007. The main reason for this, according to Javaid et al, was that prior to this UAVs were not in widespread use.⁵⁵

Developing this argument, we see that since the operational expansion of UAV usage, their vulnerability to cyber-attack has been increasingly highlighted. In 2009, for example, investigations found that a UAV video feed had been compromised by a terrorist group. Recorded using SkyGrabber software,⁵⁶ the events illustrated a widespread problem of unencrypted links between ground stations and UAVs. Allowing an adversary to see the intelligence feeds which guide many modern operations, it reverses the advantage of operating UAVs and potentially places a military's own personnel at an increased threat of harm.

In a second example, a US Sentinel UAV was in 2011 captured by Iranian forces.⁵⁷ Confirmed by President Obama in a press conference,⁵⁸ it has been suggested that a vulnerability with the

⁵² Kim Hartmann and Christoph Steup, "The Vulnerability of UAVs to Cyber-Attacks; An Approach to the Risk Assessment", Cyber Conflict (CyCon) 5th International Conference (June 2013) 1-23: 1, http://citeseerx.ist.psu.edu/ viewdoc/download?doi=10.1.1.156.9348&rep=rep1&type=pdf, accessed 10 July 2018.
⁵³ Ibid.

⁵⁶ Ibid.

⁵¹ Winn Schwartau quoted in US Congress, *Hearing Before the Subcommittee on Technology and Competitiveness* on Computer Security (27 June 1991) https://phibetaiota.net/wp-content/uploads/2017/09/Winn-Schwartau-Congressional-Testimony-Digital-Pearl-Harbor-27-June-1991.pdf, accessed 23 February 2018.

⁵⁴ Ibid.

⁵⁵ Ahmad Javaid, Weiqing Sun, Vijay Devabhaktuni and Mansoor Alam, "Cyber Security Threat Analysis and Modelling of an Unmanned Aerial Vehicle System", *IEEE Conference on Technologies in Homeland Security (HST)* (November 2012) 585-590: 586, https://www.researchgate.net/profile/Ahmad_Javaid/publication/235676360_Cyber_security_ threat_analysis_and_mode.pdf, accessed 27 June 2018.

⁵⁷ Hartmann and Steup, The Vulnerability of UAVs to Cyber-Attacks; An Approach to the Risk Assessment, 8.

⁵⁸ Barak Obama quoted in Rick Gladstone "Iran is Asked to Return US Drone", New York Times (12 December 2011) https://www.nytimes.com/2011/12/13/world/middleeast/obama-says-us-has-asked-iran-to-return-drone.html, accessed 1 July 2018.

UAV's navigation system may have been exploited.⁵⁹ Specifically, as Humphrey explains, the Iranians could have used 'Global Positioning Satellite (GPS) Spoofing' to exploit the fact that GPS has no built-in protection against counterfeiting.⁶⁰ Allowing an adversary to hijack a GPS signal controlling a UAV, it could have allowed Iran to redirect the Sentinel and 'land it safely on an Iranian airfield.'⁶¹

Given these examples, there is a clear indication that whilst cyber-attacks on UAVs may be difficult to execute, ⁶² they are nonetheless possible. With both examples illustrating that a comparatively less capable group can affect or deny the projection of a more powerful state's air power, there is reason for concern. Conversely, however, one might argue that, given the UAV's unique nature as a largely autonomous system, a higher level of vulnerability to cyber-attack should be expected. If this is true, then the systems of the manned (and significantly more costly) fifth generation aircraft should be more immune to cyber-threats.

To explore this statement, there is value in examining a second aviation system: the US led alliance's new fifth generation aircraft, the F-35. An immensely complex aircraft, it takes, in Lockheed Martin's own estimation, 'more than steel, advanced electronics and engine thrust to make [it]...take flight.⁶³ Specifically, the F-35 relies on ALIS.

Designed to provide 'a comprehensive logistic support environment',⁶⁴ ALIS delivers an array of advanced services. These include Prognostics and Health Management (PHM) to enhance aircraft safety and efficiency, automated technical support to reduce specialised maintenance training, digital links between aircraft and Lockheed Martin, and innovative support to deliver sorties at the lowest cost.⁶⁵ Taken collectively, the chief F-35 test pilot for Lockheed Martin, Alan Norman, compares ALIS to R2-D2. Referring to the droid that helped Luke Skywalker fly the X-Wing in Star Wars, he asserts that 'right now [ALIS] is the ultimate in human-machine interaction'.⁶⁶

 ⁵⁹ Hartmann and Steup, The Vulnerability of UAVs to Cyber-Attacks; An Approach to the Risk Assessment, 8.
 ⁶⁰ Todd Humphrey, "Statement on the Vulnerability of Civil Unmanned Aerial Vehicles and Other Systems to Civil GPS Spoofing", *Submitted to the Subcommittee on Oversight, Investigations, and Management of the House Committee on Homeland Security* (18 July 2012) 1, https://homeland.house.gov/files/Testimony-Humphreys.pdf, accessed 3 July 2018.

⁶¹ Hartmann and Steup, The Vulnerability of UAVs to Cyber-Attacks; An Approach to the Risk Assessment, 8.

⁶² David Cenciotti, "Captured Stealth Drone", *The Aviationist* (17 January 2012) http://theaviationist.com/category/ captured-stealth-drone/page/2/, accessed 5 July 2018.

⁶³ Lockheed Martin, *Autonomic Logistics Information System (ALIS)* (2018) https://www.lockheedmartin.com/en-us/products/autonomic-logistics-information-system-alis.html, accessed 1 July 2018.

 ⁶⁴ Simon Henley, Russ Currer, B. Scheuren, A. Hess and Geoffrey Goodman, "Autonomic Logistics - The Support Concept for the 21st Century", *Aerospace Conference Proceedings, IEEE*, 6 (2000) 417-421: 417, https://ieeexplore.ieee. org/stamp/stamp.jsp?tp=&arnumber=877915, accessed 9 July 2018.
 ⁶⁵ Ibid.

⁶⁶ Alan Norman quoted in David Martin, "Can the US Military's New Jet Fighter be Hacked?", *CBS News – 60 Minutes* (1 June 2014) https://www.cbsnews.com/news/can-the-f-35-be-hacked/, accessed 4 July 2018.

With Version 2.02 of ALIS released in 2017, 'for the first time, [it] integrated the entire F-35 from tip to tail, including the propulsion system'.⁶⁷ Given this development which makes ALIS the 'single, secure information environment...for all elements of F-35 operations',⁶⁸ and the importance of the aircraft to the defence of the US and its eight partner nations, serious questions must be asked regarding its ability to protect the CIA of information. The implications of this are huge: if an adversary could compromise ALIS 'they've essentially defeated the plane'⁶⁹ without 'firing a bullet'.⁷⁰

Though detail on whether ALIS is successfully protecting the CIA of information is classified, consistent open source reporting since its inception have raised concerns. An early example in 2012 related to US Navy penetration testers exploiting Lockheed Martin's failure to separate classified and unclassified data streams.⁷¹ Though a temporary workaround to create an 'air gap' allowed the continued development of ALIS,⁷² the events provided an indication of the revelations to come.

In a further circumstance Lockheed Martin, under pressure for its previous failures, acknowledged that 'the company had seen a large increase in the number and sophistication of attacks on its networks'.⁷³ Accusing unnamed governments 'of targeting and breaking into the networks of its suppliers',⁷⁴ it was clear that there was a concerted effort to compromise the cyber-security of the project.

Despite this, events in 2015 showed that elements of ALIS were so deeply flawed that Lockheed Martin were not taking heed of their own concerns. This was illustrated during the USMC Operational Test One (OT-1) which in May 2015 saw seven F-35's embarked on the aircraft carrier *USS Wasp*.⁷⁵ Whilst the USMC would 'triumphantly declare its variant of the F-35 combat ready in late July [2015],⁷⁶ the fanfare hid major failings in cyber-security.

www.pogoarchives.org/straus/2015-9-1-DoD-FOIA-ocr.pdf, accessed 5 July 2018.

⁶⁷ Wilson Brissett, "ALIS 2.02 Ready to Go", *Air Force Magazine* (28 March 2017) http://www.airforcemag.com/ Features/Pages/2017/April%202017/ALIS-202-Ready-to-Go.aspx, accessed 30 June 2018.

⁶⁸ Lockheed Martin, Autonomic Logistics Information System (ALIS).

⁶⁹ David Martin, "Can the US Military's New Jet Fighter be Hacked?", CBS News – 60 Minutes (1 June 2014) https://www.cbsnews.com/news/can-the-f-35-be-hacked/, accessed 4 July 2018.

⁷⁰ Jeremy Bender, "The New F-35 Fighter Jet Can Be Taken Down Without a Bullet Ever Being Fired", *Business Insider* (18 February 2014) www.businessinsider.com/f-35-hackers-2014-2?IR=T, accessed 1 July 2018.

⁷¹ Andrea Shalal-Esa, "Lockheed's F-35 Logistics System Revolutionary but Risky", *Reuters* (16 November 2012) https://www.reuters.com/article/us-lockheed-fighter-logistics-idUSBRE8AF09L20121116, accessed 5 July 2018.

⁷² Dave Majumdar, "USMC Finds Workaround for Cyber-Vulnerability of F-35 Logistics System", *Flight Global* (21 November 2012) https://www.flightglobal.com/news/articles/usmc-finds-workaround-for-cyber-vulnerability-on-f-3-379272/, accessed 2 July 2018.

 ⁷³ Shalal-Esa, Lockheed's F-35 Logistics System Revolutionary but Risky.
 ⁷⁴ Ibid.

⁷⁵ Operational Test and Evaluation Agency, 'Observations on the Marine Corps F-35B Demonstration on USS Wasp', Memorandum For Under Secretary of Defense for Acquisition, Technology And Logistics (22 July 2015) 1,

⁷⁶ Dan Grazier and Mandy Smithburger, "Pentagon Testing Office Calls Foul on F-35 Operational Testing", *Project on Government Oversight* (14 September 2015) www.pogo.org/straus/issues/weapons/2015/pentagon-testing-office-calls-foul.html, accessed 5 July 2018.

Summarised in a memorandum from the US OTE, it was revealed that the operational limitations of ALIS led to 'extraordinary measures to keep the planes flying'.⁷⁷ Specifically, the ALIS Concept of Operation was for data transfer between Squadron Operating Units (SOU) aboard the *USS Wasp* and the Lockheed Martin core logistic node, the Autonomic Logistics Operating Unit (ALOU).⁷⁸ Failures in the datalinks, however, led to the support team travelling off base to use commercial wi-fi to download the aircraft files, burn them to CDs and manually upload the data to the *USS Wasp* SOU.⁷⁹ A monumental breach of operating procedures, there was no other way to keep the aircraft flying and pass the operational test.

With the USS Wasp example also known to have led to 'inconsistencies between home station and deployed files',⁸⁰ the lessons are obvious. The USMC, in attempting to operate an aircraft which is entirely reliant on a single system, compromised security to ensure operational delivery. Whilst this risk might be acceptable in a controlled environment, it would be an entirely different prospect in combat.

Going beyond the risk of data compromise, other reports add additional layers of concern. In 2014, for example, it was suggested that ALIS 'disallows the human pilot to take control of the F-35 if it senses there is a problem'.⁸¹ A safety measure to prevent pilots exceeding the capabilities of a malfunctioning aircraft, it is possible that malware introduced to ALIS might allow an adversary through the corruption of the integrity of information to ground an entire fleet.⁸²

With Lockheed Martin publicly confirming 'that they are working hard to remove vulnerabilities',⁸³ and cyber-security recognised as being a strategic issue, it would be expected that both private industry and government agencies alike would be ensuring that the issues do not continue. This direction of travel is supported by the US OTE which asserted that 'as real world cyber adversaries regularly demonstrate their ability to compromise systems...all operational testing must examine system performance in the presence of a realistic cyber threat'.⁸⁴

Despite this public statement, it was reported in 2016 that the US Joint Program Office (JPO) refused to proceed with the required cyber-security tests for ALIS. This was because 'such

⁷⁷ Ibid.

⁷⁸ Operational Test and Evaluation Agency, Observations on the Marine Corps F-35B Demonstration on USS Wasp, 1.
⁷⁹ Ibid.

⁸⁰ Ibid.

⁸¹ Cyberwarzone, "New F-35 Jet is Vulnerable to Cyber Attack", *Cyber-Security News* (31 May 2014) https://cyberwarzone.com/new-f-35-fighter-jet-vulnerable-cyber-attacks/, accessed 2 July 2018.
⁸² Ibid.

⁸³ Ibid.

⁸⁴ Operational Test and Evaluation Agency, Procedures for Operational Test and Evaluation of Cybersecurity in Acquisition Programs, 1.

realistic hacker tests could damage the critical maintenance and logistics software, thereby disrupting flights of the approximately 100 [aircraft] already in service³⁵ Reinforcing concerns over the failure of ALIS and therefore the F-35, media reports responded by raising 'obvious and disturbing questions about what could happen in combat³⁶

Summarising these concerns, the 2017 US OTE annual report confirmed that cyber-security testing had shown that 'some of the vulnerabilities identified during earlier testing periods still had not been remedied'.⁸⁷ When considered against the backdrop of the significant issues already discussed, there is mounting evidence that the cyber-vulnerabilities of the F-35's systems represent a concerning threat to the aircraft's operational effectiveness. Furthermore, with advanced aircraft such as the F-35 and UAVs signalling the future of modern air power, and the systems of both being susceptible to cyber-attack, it is asserted that the cyber-vulnerabilities of military aviation's systems have created a credible threat to air forces which is serious, widespread and persistent.

Infrastructure

A second area for consideration must be infrastructure. Unlike land forces which can operate with limited basing, or navies which can operate for long periods without the support of ports, the impermanence of aviation requires aircraft to frequently return to an established home base environment.⁸⁸

Encompassing a broad array of infrastructure requirements which are essential to the effective projection of air power, this reliance is similar in nature to the civil concept of Critical Infrastructure. Referring to those elements 'necessary for an organisation to function',⁸⁹ there are, for aviation, numerous aspects of infrastructure which, if lost or compromised, would prevent the projection of air power. Not limited to the physical elements of runways and hangars, air power is equally reliant on secondary infrastructure including electricity, communications and fuel. With many delivered to air forces by external providers, including foreign states where air power is based overseas, assuring their protection becomes increasingly complex.

A requirement since the advent of air power, air forces have by necessity become worldleaders in layered physical and procedural security measures which combine to deliver

⁸⁸ Ministry of Defence, "Joint Doctrine Publication 0-30: UK Air and Space Power", *Development, Doctrine and Concepts Centre*, December (2017) 32, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/668710/doctrine_uk_air_space_power_jd p_0_30.pdf, accessed 9 June 2018.

⁸⁵ Dan Grazier, "F-35 Officials Prove Need for Cyber Testing by Cancelling One", *Centre for Defence Information, Project on Government Oversight* (7 December 2015) http://www.pogo.org/straus/issues/weapons/2015/f-35-officials-prove-need-for-cyber-testing.html, accessed 3 July 2018.

⁸⁶ Ibid.

⁸⁷ Operational Test and Evaluation Agency, "F-35 Joint Strike Fighter", FY 17 Department of Defence Projects (2018) 31-60: 33, http://www.dote.osd.mil/pub/reports/FY2017/pdf/dod/2017f35jsf.pdf, accessed 9 July 2018.

⁸⁹ Centre for the Protection of National Infrastructure, *Critical National Infrastructure* (2018), https://www.cpni.gov.uk/ critical-national-infrastructure-0, accessed 3 June 2018.

effective defence in depth. These established capabilities can, however, be circumnavigated by the cyber-threat. Considered through the lens of modern operations, this vulnerability has been introduced by a growing dependency on Information and Communications Technology (ICT). A defining feature of the 'interconnected and knowledge-based economy',⁹⁰ a situation has emerged in which 'complex physical and cyber based systems'⁹¹ are relied upon to maintain and deliver essential and routine requirements. Making cyber a 'backbone of critical infrastructures...[organisations have reached a place where] a major cyber-security incident could have significant impact' on the continued functioning of key infrastructure.⁹²

Recognising this, the UK's National Cyber Security Centre (NCSC) recommends a 'holistic approach to security that encompasses physical and personnel as well as cyber-security'.⁹³ An expansion of the defence-in-depth principle, the NCSC approach ensures that physical weaknesses are prevented from allowing a hostile actor access to the cyber systems which can, in full circle, impact on the physical delivery of infrastructure.

A high-profile example of where holistic security was not in place, and cyber-vulnerabilities were exploited, was the 2015 attack on the Ukrainian power grid. Initially reported on 24 December 2015 by the Ukrainian news outlet TSN,⁹⁴ the 'synchronised and coordinated [cyber-attack], followed extensive reconnaissance of the victim networks'.⁹⁵ This in turn is believed to have facilitated the introduction of the BlackEnergy3 malware to the power company systems through phishing emails to their employees.⁹⁶ Resulting in a major power outage which disrupted over 50 sub-stations and more than 220,000 consumers,⁹⁷ Ukraine was forced to abandon automation and move to manual operations to restore power.⁹⁸

Placed in the context of aviation, an attack on the power supply for an airbase by an adversary intent on degrading operational capability could have significant impact. Though it is expected

https://ics-cert.us-cert.gov/alerts/IR-ALERT-H-16-056-01, accessed 21 May 2018.

⁹⁰ Paul Cornish, David Livingstone, Dave Clemente and Claire Yorke, "Cyber Security and the UK's Critical National Infrastructure", A Chatham House Report (September (2011) viii, https://www.chathamhouse.org/sites/default/files/ public/Research/International%20Security/r0911cyber.pdf, accessed 10 June 2018.

 ⁹¹ Chen-Ching Liu, "Cybersecurity for Critical Infrastructures: Attack and Defense Modelling", IEEE Transactions on Systems, Man, and Cybernetics, 40 (4) (July 2010) 853-863: 853.
 ⁹² Ibid.

⁹³ Cyber Security Centre, We Work for Government and the Critical National Infrastructure (2 October 2016) https://www. ncsc.gov.uk/information/we-work-government-and-critical-national-infrastructure, accessed 8 June 2018.

⁹⁴ TCH, "Due to a Hacker Attack, The Power of Half the Ivano-Frankivsk Region was De-Energised", *TCH Online*

⁽²⁴ December 2015) https://translate.google.co.uk/translate?hl=en&sl=ru&u=https://ru.tsn.ua/ukrayina/iz-zahakerskoy-ataki-obestochilo-polovinu-ivano-frankovskoy-oblasti-550406.html&prev=search, accessed 17 July 2018. ⁹⁵ Department of Homeland Defence, "Alert (IR-ALERT-H-16-056-01) Cyber-Attack Against Ukrainian Critical Infrastructure", International Control Systems Computer Emergency Response Team (25 February 2016)

⁹⁶ HM Government, National Cyber Security Strategy 2016-2021 2016), 21.

⁹⁷ Ibid.

⁹⁸ Defense Use Case, "Analysis of the Cyber-Attack on the Ukrainian Power Grid", *Electricity Information Sharing and Analysis Center (E-ISAC)* (18 March 2018) v, https://ics.sans.org/media/E-ISAC_SANS_Ukraine_DUC_5.pdf, accessed 16 July 2018.

that resilience planning in the form of generators would provide a back-up, such options may have limited longevity and reduced capacity. With all aircraft, especially fifth generation aircraft, dependent on electrically powered systems to operate, this impact (even at a limited level) could seriously degrade the delivery of air operations.

Exploring this cyber-vulnerability in more detail, and broadening it to consider other key elements of aviation infrastructure such as fuel supplies, an important area of concern is Supervisory Control and Data Acquisition (SCADA) systems. Integral to the performance of much critical Infrastructure,⁹⁹ SCADA systems enable automation and optimisation of industrial processes.¹⁰⁰ Deployed globally in virtually all large industries, they are integral to everything from power generation to transport networks.¹⁰¹ Prominent in the aforementioned Ukraine attack, it was the disabling of the sub-station's SCADA systems which caused the outages.¹⁰²

Given their role as a keystone of critical infrastructure, SCADA systems are 'increasingly becoming the targets of cyber-attacks'.¹⁰³ This interest has been maximised by those with malicious intent recognising the ability for attacks on SCADA systems to have 'physical manifestations in the real world'.¹⁰⁴

The likelihood of such attacks has also increased as these networks (which were previously located in remote locations and air gapped from other networks)¹⁰⁵ have become interconnected, including through the internet. The result, according to Dell, is a doubling of reported SCADA-based cyber-attacks. This, however, may only be the tip of the iceberg. With companies in most countries 'only required to report data breaches that involve personal or payment information, SCADA attacks often go unreported'.¹⁰⁶

For military aviation, this increasing trend is one to observe closely. As demonstrated by the infamous Stuxnet attack, which targeted a SCADA system controlling centrifuges in an Iranian nuclear facility, it is an issue which not only affects private industry or manufacturing.

¹⁰² Defence Use Case, Analysis of the Cyber-Attack on the Ukrainian Power Grid, 20.

⁹⁹ Bill Miller and Dale Rowe, "A Survey SCADA of and Critical Infrastructure Incidents", *Proceedings of the 1st Annual conference on Research in Information Technology* (October 2012) 51-56: 52, https://www.researchgate.net/ profile/Bill_Miller5/publication/262315594_A_survey_SCADA_of_and_critical_infrastructure_incidents/ links/551ab10f0cf2fdce843695f4.pdf, accessed 17 May 2018.

¹⁰⁰ Cabinet Office, *The UK Cyber Security Strategy Protecting and Promoting the UK in a Digital World* (2011) 13, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/60961/uk-cyber-securitystrategy-final.pdf, accessed 22 May 2018.

¹⁰¹ Andrew Nicholson, Stuart Webber, Shaun Dyer, Tanuja Patel and Helge Janicke, "SCADA Security in the Light of Cyber-Warfare", *Computers and Security*, 31 (4) (2012) 418-436: 419.

 ¹⁰³ Miller and Rowe, A Survey SCADA of and Critical Infrastructure Incidents, 52.
 ¹⁰⁴ Ibid.

¹⁰⁵ Vinay Igure, Sean Laughter and Ronald Williams, "Security Issues in SCADA Networks", *Computers and Security*, 25 (7) (2006) 498-506: 500.

¹⁰⁶ Dell, *Dell Annual Threat Report* (2015) https://software.dell.com/docs/2015-dell-security-annual-threat-reportwhite-paper-15657.pdf, accessed 11 May 2018.

Extending to all organisations which operate SCADA systems, it is possible that a hostile actor intent on impacting air operations could disrupt the SCADA systems of an airbase's power supply or fuels infrastructure.

Though aviation-specific examples of SCADA cyber-attacks are not currently in the public domain, successful attacks which could have impacted on air operations have been reported. In 2011, for example, hackers targeted the SCADA system of a pump used by a US water utility company 'after hacking the network of a SCADA vendor and stealing remote access login information'.¹⁰⁷ Causing the pump to constantly turn on and off and finally burn out, ¹⁰⁸ similar means could be used to destroy the fuels infrastructure of an airbase or the network supplying an airbase.

Cutting fuel supplies in this way to a military airbase could quickly bring operations to a halt. Though no military examples of such an occurrence are in the public domain, the non-malicious malfunctioning of the fuel pipeline serving Manchester civil airport in 2012 demonstrated the impact on aviation with fuel shortages causing significant disruption to flights.¹⁰⁹ When added to known attacks using similar methodologies in April 2018 against natural gas pipelines in the US,¹¹⁰ and the signal sent by Russia in 2007 when it allegedly used cyber-operations to target the infrastructure of Estonia,¹¹¹ evidence points towards a clear combination of capability and intent which could be directed against air power.

A current and ever growing concern, the cyber-threat to an air force's own and supporting critical infrastructure is therefore one which is likely to persist. This assessment is underlined by a threat warning issued in 2017 by the US Department of Homeland Security (DHS) which cautioned of an 'Advanced Persistent Threat (APT) targeting government entities and organisations in the energy, nuclear, water, aviation, and critical manufacturing sectors'.¹¹² Issued alongside a Symantec report which warned of the Dragonfly malware¹¹³ targeting European power companies, a claim supported by media reports of hackers targeting the

¹⁰⁷ Fahmida Rashid, "Cyber-Attackers Breach SCADA Network, Destroy Pump at Water Utility", eweek (18 November 2011) http://www.eweek.com/c/a/Security/CyberAttackers-Breach-SCADA-Network-Destroy-Pump-at-Water-Utility-614710, accessed 11 May 2018.

¹⁰⁸ Ibid.

¹⁰⁹ BBC, "Who, what, why: How can an airport run out of fuel?", *BBC News Online* (7 June 2012) https://www.bbc.co.uk/ news/magazine-18355592, accessed 18 June 2018.

¹¹⁰ Haley Zaremba, "U.S. Sees Wave of New Cyber Attacks on Energy Infrastructure" *Oilprice.com* (11 April 2018) https://oilprice.com/Geopolitics/International/US-Sees-Wave-Of-New-Cyber-Attacks-On-Energy-Infrastructure.html, accessed 11 July 2018.

¹¹¹ Rain Ottis, "Analysis of the 2007 Cyber-Attacks Against Estonia from the Information Warfare Perspective", *Proceedings of the 7th European Conference on Information Warfare* (2004) 151-168: 164.

¹¹² Simon Sharwood, "US Energy, Nuke and Aviation Sectors Under Sustained Attack", *The Register* (22 October 2017) https://www.theregister.co.uk/2017/10/22/us_department_of_homeland_security_warns_of_sustained_ attacks_on_industry/, accessed 18 May 2018.

¹¹³ Symantec, Dragonfly: Western Energy Sector Targeted by Sophisticated Attack Group, (20 October 2017) https://www. symantec.com/blogs/threat-intelligence/dragonfly-energy-sector-cyber-attacks, accessed 20 May 2018.

EirGrid company in Wales and Northern Ireland,¹¹⁴ there is mounting evidence that air forces must remain alert to the cyber-vulnerabilities inherent in modern infrastructure.

Notwithstanding the credibility of the threat, the reality is that most of the infrastructure which could be targeted to impact on air operations is beyond the military's control. Whether delivered by commercial or nationalised providers, all of which (under the advisement of organisations including the NCSC) are alive to the threat, there is limited influence an air force's strategic leadership can exert. Furthermore, with most eventualities able to be mitigated through strong resilience planning such as alternate fuel sources or the provision of generators, the ability to impact air operations is lessened. Based on this, it is concluded that though the cyber-vulnerabilities of an air force's infrastructure must be considered, the continuance of current mitigation measures means that infrastructure should not, on balance, be the strategic leaderships principle concern.

Supply Chain

Another significant area for consideration is the securing of an air force's supply chain. With technologically-advanced fifth generation aircraft requiring a complex combination of sub-contractors, commentators have suggested that it is increasingly likely that cyberattacks will not 'come through the front door...[but via] an attack on the weakest link in their supply chain.¹¹⁵

Considered in general, complex global supply chains have 'transformed the world'¹¹⁶ with national economies becoming interdependent.¹¹⁷ In response, supply chains have expanded to achieve reliability and cost-effectiveness. In the delivery of fifth generation air power, the reality is no different. The F-35 project is a prime example, with the main contractor, Lockheed Martin, supported by a myriad of sub-contractors.

Exploring these complexities of the F-35 project is an instructive introduction to discussing the supply chain question. Firstly, to reduce costs, Lockheed Martin optimised its production by contracting-out the manufacture of 60 percent of the 40,000 components required for each aircraft.¹¹⁸ A divergence from its traditional method of bespoke in-house production and

¹¹⁴ Cathal McMahon, "State-Sponsored' Hackers Targeted EirGrid Electricity Network in 'Devious Attack", *Irish Independent* (17 July 2018) https://www.independent.ie/irish-news/statesponsored-hackers-targeted-eirgridelectricity-network-in-devious-attack-36005921.html, accessed 17 July 2018.

¹¹⁵ Omera Khan and Daniel Estay, "Supply Chain Cyber Resilience", *Technology Innovation Management Review* (April 2015) 6-14: 6.

¹¹⁶ Richard Baldwin, "Global Supply Chains: Why They Emerged, Why They Matter, and Where They are Going", *CERP Discussion Paper* (August 2012), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2153484, accessed 14 June 2018.

¹¹⁷ Gary Gereffi, John Humphrey, Raphael Kaplinsky and Timothy Sturgeon, "Globalisation, Value Chains and Development", *IDS Bulletin, 32* (3) (2001) 1-8: 1.

¹¹⁸ Jason Busch, "The F-35 Joint Strike Fighter Supply Chain", *Spendmatters*, (31 July 2006) http://spendmatters. com/2006/05/31/the-f-35-joint-strike-fighters-supply-chain/, accessed 18 June 2018.

maintenance,¹¹⁹ the shift increased efficiency but created a complex supply chain. In the US alone, for example, the F-35 project engages 1,200 small to medium sized suppliers¹²⁰ across 46 states.¹²¹

The international nature of the F-35 project has also created complications. On its commencement, it was agreed that all nine partner countries¹²² would share in the economic dividend. To achieve this, companies from each nation were awarded contracts.¹²³ As a result, even with industry websites publishing comprehensive details of F-35 sub-contractors,¹²⁴ it is unlikely that anyone outside of Lockheed Martin could fully chart the supply chain.

Considering the importance of the F-35 project to all nine partner nations, there should be deep concern over the supply chain's complexity and opaqueness. In terms of cyber-security, however, this concern goes deeper. With each company in the chain requiring access to sensitive information, and a proportion granted access to military systems, the potential sources of cyber-compromise grows exponentially.

In exploring this, the concept of the 'weakest link' looms large. As the UK's Computer Emergency Response Team (CERT-UK) highlights, when supply chains become complex, the overall level of cyber-security is only as strong as its weakest member.¹²⁵ Determined to exploit this, aggressors will focus on companies with lower levels of cyber-security.

Though a generalisation, it is commonly accepted that these 'weak links' are smaller organisations 'who, due to more limited resources, have the poorest cyber-security arrangements'.¹²⁶ This view is supported by the UK Government, which reported that whilst 46 percent of businesses overall identified at least one cyber-security breach in 2017, the number increases to two-thirds among medium businesses.¹²⁷ Further underlined by Verizon's research indicating that 92 percent of cyber incidents occurred in small to medium sized

¹¹⁹ Ibid.

¹²⁰ K. A. Porter, "A Volatile Supply Chain: What is in Your Future?", *Military Embedded Systems* (7 October 2014) http://mil-embedded.com/articles/a-supply-chain-is-your-future/, accessed 17 June 2018.

¹²¹ Lockheed Martin, *F-35 Lightning II; Powering Job Creation for America and its Allies*' (2018) https://www.f35.com/ about/economic-impact, accessed 11 June 2018.

¹²² F-35 project partner countries: Australia, Canada, Denmark, Italy, the Netherlands, Norway, Turkey, the US and the UK.

¹²³ Lockheed Martin, *F-35 Lightning II – Global Participation* (2018), https://www.f35.com/global, accessed 5 June 2018.

¹²⁴ Airframer, *Lockheed Martin F-35 Lightning II* (2018), http://www.airframer.com/aircraft_detail.html?model=F-35_ JSF, accessed 1 July 2018.

¹²⁵ CERT-UK, "Cyber Risks in the Supply Chain", CERT-UK White Paper (2015) 4, https://www.ncsc.gov.uk/content/files/ protected_files/guidance_files/Cyber-security-risks-in-the-supply-chain.pdf, accessed 27 May 2018.
¹²⁶ Ibid.

¹²⁷ Department for Culture, Media and Sport, *Cyber Security Breaches Survey 2017* (April 2017) 3, https://assets. publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/609186/Cyber_Security_ Breaches_Survey_2017_main_report_PUBLIC.pdf, accessed 25 May 2018.

businesses,¹²⁸ there is a clear requirement when assuring the supply chain to look further than just the prime contractor.

Despite the risk, initiatives to assure cyber-security within supply chains have only recently occurred. Previously favouring traditional security, CERT-UK comments that, when managing supply chains, organisations are adept at mitigating physical vulnerabilities but 'seldom deal with cyber-security risks'.¹²⁹ A reversing trend, however, the specialism defined by Oltsik et al as the process of extending 'internal risk management to external parties'¹³⁰ is quickly growing. The result has been new methodologies such as Cyber Supply Chain Risk Management (CSCRM) that weave together cyber-security, enterprise risk management and supply chain management.¹³¹

Having recognised the requirement, increased consideration has been paid to the cybervulnerabilities of supply chains. One prevalent example which complex fifth generation aircraft are particularly susceptible to is counterfeit computer chips. A piece of silicon embedded with an electronic circuit, ¹³² chips are the core component of all modern technology. Though difficult to discern from genuine chips even with close inspection, counterfeits have been found by the US Government to present a greater risk of failure.¹³³ Endangering the performance of systems they are incorporated into, these counterfeits, especially within the demanding environment of military aviation, present a credible risk to life if they fail during flight.

The scale of counterfeit chips being introduced into the military aviation supply chains is unknown, but it has been proved that US companies knowingly sold counterfeit chips made in China to the US military in 2010¹³⁴ and the US nuclear submarine fleet in 2013.¹³⁵ With the price of genuine chips rising by 20 percent in 2018, ¹³⁶ and the US announcing a major review

¹²⁸ Verizon, *2018 Data Breach Investigations Report* (2018) 8, https://www.verizonenterprise.com/verizon-insights-lab/dbir/, accessed 15 June 2018.

¹²⁹ CERT-UK, Cyber Risks in the Supply Chain, 3.

¹³⁰ Jon Oltsik, John Gahm, Jennifer McKnight, "Assessing Cyber Supply Chain Security Vulnerabilities Within the U.S. Critical Infrastructure", *Enterprise Strategy Group Research Paper* (28 November 2010) 10, http://www.nsci-va.org/CyberReferenceLib/2010-11-ESG%20Research%20Report%20Cyber%20Supply%20Chain%20Security.pdf

accessed 1 July 2018. ¹³¹ Sandor Boyson "Cyber Supply Chain Risk Management: Revolutionizing the Strategic Control of Critical IT Systems", *Technovation*, 34 (2014) 342–353; 343.

¹³² Tech Terms, "Computer Chip", *Hardware Terms* (2018) https://techterms.com/definition/chip, accessed 11 July 2018.

¹³³ Congressional Committee on the Armed Services, *The Committee's Investigation into Counterfeit Electronic Parts in the Department of Defense Supply Chain*, 8 (November 2011) 36, https://www.gpo.gov/fdsys/pkg/CHRG-112shrg72702/pdf/CHRG-112shrg72702.pdf, accessed 1 August 2018.

¹³⁴ Robert McMillan, "Woman Helped Sell Fake Chips to US Military", *PC World News* (23 November 2010) https://www.pcworld.com/article/211428/article.html, accessed 15 June 2018.

¹³⁵ Boyson, Cyber Supply Chain Risk Management: Revolutionizing the Strategic Control of Critical IT Systems, 343.

¹³⁶ Matthew Wilson, "Silicon Wafer Makers Plan 20% Increase in Price in 2018", *Kit Guru.net* (5 February 2018) https:// www.kitguru.net/components/graphic-cards/matthew-wilson/silicon-wafer-makers-plan-20-price-increase-for-2018-cpus-gpus-ram-and-nand-to-be-affected/, accessed 1 July 2018.

of the F-35 project to reduce costs in the supply chain,¹³⁷ it is likely that smaller economically squeezed companies might continue the practice of sourcing cheaper counterfeit chips to remain economically viable.

Though the safety issues this practice represents are a major concern for military aviation, it is only one of many problems counterfeit chips represent. Amongst these, a pressing cybersecurity consideration is malicious tampering. Whether occurring during their manufacture or added post-production, there is broad opportunity for counterfeit chips or other hardware from untrusted sources to be targeted by hostile actors before they enter the known supply chain.¹³⁸

Discussing this, Borg highlights that altered circuitry containing malicious firmware could 'function in much the same way as malicious software...[allowing hostile actors to access] any network the component is connected to'.¹³⁹ This has already been proved to have occurred. In 2007, for example, hard drives produced in Thailand for US company Seagate and bound for the US military were found to contain a virus which facilitated a 'report-back' of all data to a Chinese Internet Protocol (IP) address.¹⁴⁰ Given this, it can be assessed that the risk of a hostile actor targeting a weak link in the supply chain to gain remote access to a fifth generation project is real.

A further related cyber-security concern are logic bombs. A form of malware, logic bombs are programmes designed to remain hidden and dormant until triggered by a pre-defined event or activity.¹⁴¹ If embedded by a hostile actor into hardware destined for a fifth generation aircraft, it is feasible that a logic bomb could, in response to a certain event (such as entering the airspace of a specified nation), 'shut down the larger information systems'.¹⁴² Alternatively, Borg warns that, in a worst case scenario, a logic bomb could even 'turn the equipment controlled by the information system against those operating it'.¹⁴³

With such malware virtually impossible to detect once installed,¹⁴⁴ there is a credible risk that a hostile actor could, through a supply chain cyber-vulnerability, damage an air force's

¹⁴³ Ibid.

¹⁴⁴ Ibid.

¹³⁷ Aaron Mehta, "Top Pentagon Official Takes Aim at F-35 Cost, Supply Chain", *Defence News* (23 March 2017) https:// www.defensenews.com/air/2017/03/23/top-pentagon-official-takes-aim-at-f-35-cost-supply-chain/, accessed 3 June 2018.

¹³⁸ Ibid.

¹³⁹ S. Borg, "Securing the Supply Chain for Electronic Equipment: A Strategy and Framework", *The Internet Alliance* (2010) 1, https://obamawhitehouse.archives.gov/files/documents/cyber/ISA%20-%20Securing%20the%20 Supply%20Chain%20for%20Electronic%20Equipment.pdf, accessed 1 July 2018.

 ¹⁴⁰ Boyson, Cyber Supply Chain Risk Management: Revolutionizing the Strategic Control of Critical IT Systems, 343.
 ¹⁴¹ S. Northcutt, "Logic Bombs, Trojan Horses and Trap Doors", *Sans Technology Institute* (June 2018) https://www.sans.edu/cyber-research/security-laboratory/article/log-bmb-trp-door, accessed 27 July 2018.

¹⁴² Borg, Securing the Supply Chain for Electronic Equipment: A Strategy and Framework, 1.

operational effectiveness. In the extreme, if targeted correctly, the projection of air power could even be prevented. Based upon this, there is an imperative for air forces to understand and control their supply chains.

A requirement recognised by the UK for not just the Royal Air Force (RAF) but across Defence, the Ministry of Defence (MOD) introduced its own cyber supply chain security initiative in the form of the Defence Cyber Protection Partnership (DCPP). Acknowledging the need to use an existing building block to achieve timely introduction, the DCPP was based on the UK Government's broader Cyber Essentials Scheme (CES). An initiative launched in 2014 to achieve basic cyber security standards for all UK Government suppliers,¹⁴⁵ the programme included a higher level of CES Plus for suppliers assessed to be at a greater risk of cyber-attack.

Recognising the heightened nature of cyber risks to a military supply chain, and the 'baseline' nature of the CES model, in using the CES the MOD also adopted enhanced measures for the DCPP. Designed to protect complex projects including the fifth generation F-35,¹⁴⁶ the standards were formalised in the Cyber Security Model (CSM)'¹⁴⁷ which is detailed in Defence Standard (DEFSTAN) 05-138.¹⁴⁸

If robust, the DCPP should mitigate the vulnerabilities of Defence's supply chains, including those supporting the RAF's fifth generation aircraft, to a level which removes the area as a credible cyber-threat to military aviation. To assess whether this is achieved, it is necessary to review the DCPP requirements at its strongest level of 'High' risk. As suppliers at this level are also required to meet CES Plus requirements, these standards should be concurrently considered. To do this in a structured manner, five key areas of cyber-security have been examined: boundary firewalls, secure configuration, user access control, malware protection and patch management.

The first – boundary firewalls – focuses on restricting network traffic to authorised connections. Intended to protect internal networks 'against unauthorised access and disclosure from the internet',¹⁴⁹ to meet DCPP and CES Plus requirements suppliers must maintain a network security system.

 ¹⁴⁵ Ministry of Defence, Defence Cyber Protection Partnership Cyber Security Model Industry Buyer and Supplier Guide (June 2018) 1, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/ file/718566/20180203_Cyber_Industry_Buyer_and_Supplier_Guide_v2_1.pdf, accessed 5 July 2018.
 ¹⁴⁶ Gov.UK, Defence Cyber Protection Partnership (2 June 2016), https://www.gov.uk/government/collections/ defence-cyber-protection-partnership, accessed 5 June 2018.

¹⁴⁷ Ibid. ¹⁴⁸ Ibid.

¹⁴⁹ Department for Business, Innovation and Skills, *Cyber Essentials Scheme Requirements for Basic Technical Protection from Cyber Attacks* (June 2014) 5, http://www.cyberstreetwise.com/cyberessentials/files/ requirements.pdf, accessed 10 June 2018.

Although meeting this requirement is an 'important element in securing data from unauthorised attacks', ¹⁵⁰ achieving it in isolation has limited value against a sophisticated attacker. As Mao, Zhe and Li describe, though firewall functions are essential, their effectiveness pivots on the security policy.¹⁵¹ With neither the DCPP nor CES Plus requiring additional proactive 'management techniques and tools', ¹⁵² such as changing of default passwords and updating a devices' operating system, ¹⁵³ firewalls may be of limited value. With industry standards including the Information Security Forum (ISF) framework clearly articulating this additional requirement, ¹⁵⁴ it can be assessed that the DCPP and CES Plus lack of depth fails to mitigate this potential cyber-vulnerability.

Turning next to secure configuration, CES Plus acknowledges that, like firewalls, other 'computers and network devices cannot be considered secure upon installation'.¹⁵⁵ Because of this, both CES Plus and the DCPP require organisations to configure computers and network devices to 'reduce the level of inherent vulnerabilities'.¹⁵⁶ This includes steps such as the removal or disabling of unnecessary user accounts and software.¹⁵⁷

Though this direction amounts to sound cyber-security practices, they are in reality minimum requirements which do not, without development, provide sufficient protection against a determined attacker. Taking passwords as an example, the DCPP requires suppliers to 'define and implement a policy to maintain the confidentiality of passwords'.¹⁵⁸ Acknowledged as an acceptable baseline, the DCPP should go further and acknowledge that passwords in isolation are no longer an acceptable level of security. As highlighted by Bonneau et al,¹⁵⁹ 'the continued domination of passwords over all other methods of end-user authentication is a major embarrassment'. To be relevant, the DCPP should therefore direct additional authentication

¹⁵⁰ Smirti Salarial and Nishi Madaan, "Firewall and Its Policies Management", *International Journal of Computer Science and Mobile Computing*, 3 (4) (April 2014) 359-367: 359.

¹⁵¹ Huaqing Mao, Li Zhe and Mingbiao Li, "Current State and Future Development Trend of Firewall Technology", 8th International Conference on Wireless Communications, Networking and Mobile Computing (WiCOM) (21-23 September 2012) http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6478472, accessed 21 June 2018.
¹⁵² Salarial and Madaan, Firewall and Its Policies Management, 359.

 ¹⁵³Wes Noonan and Ido Dubrawsky, "Managing Firewalls", *Cisco Press* (27 November 2007) https://www. networkworld.com/article/2289079/lan-wan/chapter-11--managing-firewalls.html, accessed 25 July 2018.
 ¹⁵⁴Information Security Forum, *The 2011 Standard of Good Practice for Information Security*, (June 2011) https://www.uninett.no/webfm_send/730, accessed 22 June 2018.

¹⁵⁵ Department for Business, Innovation and Skills, *Cyber Essentials Scheme Requirements for Basic Technical Protection* from Cyber Attacks, 7.

¹⁵⁶ Ibid.

¹⁵⁷ Ibid.

¹⁵⁸ Ministry of Defence, *Defence Standard 05-138; Cyber Security for Defence Suppliers* (28 September 2017) 6, https:// assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/652597/20171016-Defence_Standard_05-138_lss_2.gov.uk.pdf, accessed 11 June 2018.

¹⁵⁹ Joseph Bonneau, Cormac Herley, Paul Van Oorschot and Frank Stajano, "The Quest to Replace Passwords: A Framework for Comparative Evaluation of Web Authentication Schemes", *2012 IEEE Symposium on Security and Privacy* (2012), 553-567: 553, http://ieeexplore.ieee.org/xpls/abs_all.jsp?arnumber=6234436, accessed 23 June 2018.

systems including biometrics or access cards. Not revolutionary, this would bring suppliers in line with industry standards such as the ISF Control Framework (CF) on access management.¹⁶⁰

Acknowledging that passwords are a singular example, it remains evident that the DCPP and CES Plus fall short of contemporary security practices. Given this, secure configuration is again an area within the supply chain which is not being effectively mitigated if baselines are not being exceeded.

Within a third area – user access control – the CES Plus requires organisations to ensure that user accounts are only assigned to employees authorised to hold the relevant levels of access.¹⁶¹ This is reflected in the DCPP standards to a less specified extent with the requirement to 'define and implement a policy to monitor user account usage and to manage changes of access rights'.¹⁶² In evaluating whether these measures are sufficient, it is instructive to compare them against industry standards. Within ISO 27001,¹⁶³ for example, the requirements provide a similar level of assurance. If one were to criticise, it could be argued that all current standards fail to address the importance of the Systems Administrator who 'sets authorisations on the basis of the security policy'¹⁶⁴ and must therefore be 'trusted to conform to procedural and administrative controls'.¹⁶⁵ Because, however, this is a common oversight, it would be fair to conclude that the DCPP and CES Plus do provide a suitable level of assurance.

This trend is not, however, continued in malware protection. Referring to protecting systems that are connected to the internet or have imported software from malware, CES Plus requires dedicated software monitors to detect and disable malware.¹⁶⁶ This is reflected in the DCPP requirement to control the exchanging of information via removable media, use Intrusion Detection Systems (IDS) and control the use of authorised software.¹⁶⁷

¹⁶³ BSI Standards, 'BS ISO/IEC 27001:2013 - Information Technology Security Techniques Information Security Management Systems Requirements (Incorporating Corrigenda September 2014 and December 2015); *BSI Standards Publication* (2015) https://extranet.cranfield.ac.uk/Download/bsol.bsigroup.

com,SSL+SubscriptionPdfDocument?materialNumber=0000000, accessed 22 June 2018.

¹⁶⁰Information Security Forum, The 2011 Standard of Good Practice for Information Security, CF 8.2.

¹⁶¹ Department for Business, Innovation and Skills, *Cyber Essentials Scheme Requirements for Basic Technical Protection from Cyber Attacks*, 9.

¹⁶² Ministry of Defence, Defence Standard 05-138; Cyber Security for Defence Suppliers, 12.

¹⁶⁴ Ravi Sandhu and Pierangela Samarati, "Access Control: Principle and Practice", *Communications Magazine*, 32 (9) (1994) 40-48: 40.

¹⁶⁵ David Ferraiolo, Dennis Gilbert and Nickilyn Lynch, "An Examination of Federal and Commercial Access Control Policy Needs", *Proceedings of the 6th NIST-NCSC National Computer Security Conference, Baltimore* (20-23 September 1993) 109, https://books.google.co.uk/ books?hl=en&lr=&id=vQEHUD51YNEC&oi= fnd&pg=PA107&dg=N.+(1993),+%E2%80%98A, accessed 24 June 2018.

¹⁶⁶ Department for Business, Innovation and Skills, *Cyber Essentials Scheme Requirements for Basic Technical Protection from Cyber Attacks*,10.

¹⁶⁷ Ministry of Defence, Defence Standard 05-138; Cyber Security for Defence Suppliers, 10.

Considered to be a baseline requirement, the DCPP and CES Plus direction is essential. With CERT-UK warning, however, that 'attackers continue to evolve', ¹⁶⁸ and Stange assessing that organisations must go beyond baselines and 'note the limitations of anti-malware products', ¹⁶⁹ there is a requirement for suppliers to exceed DCPP and CES Plus. This is underlined by software company OPSWAT, which comments that 'installing an antivirus product is the first, not last, step to having a safe and secure computer'.¹⁷⁰ As a result, there is again concern that whilst baselines are directed, a robust level of assurance within the supply chain will not be achieved at the specified levels.

Turning to the final area – patch management – we see another example of baseline provision by the DCPP and CES Plus. Discussing a process in which vendors 'try to provide fixes for identified vulnerabilities',¹⁷¹ CES Plus recognises the requirement directing suppliers to, as a minimum, maintain licences, remove out-of-date software and install security patches. This is reflected by the DCPP's requirement to patch and review risk where patching is not possible.¹⁷²

Acknowledging Gerace and Cavusoglu's¹⁷³ assessment that the routine application of security patches would prevent an estimated 95 percent of security breaches, patch management is essential. With the DCPP and CES Plus reflecting this, it is one area where the baseline practices directed meet industry norms and should therefore provide sufficient assurance within the supply chain.

Considering this review of DCPP and CES Plus against the prior discussion of 'weak links' and supply chain cyber-vulnerabilities, a troubling picture emerges. Subject to concerted cyber-attack by hostile actors, air forces face a concerning challenge in securing cyber-elements of their supply chains. Despite acknowledging this through initiatives such as the UK MOD's DCPP, the analysis suggests that, in the UK at least, measures to manage the risk are insufficient. Defined at best as industry baseline standards, and at worst as a failure to meet the contemporary cyber-challenge, the reality is that the supply chain of air forces remains vulnerable to exploitation.

Based upon this analysis, and working on the assumption that the UK example is indicative of all modern air forces, it is concluded that military aviation's supply chains are not adequately

¹⁶⁸ CERT-UK, "An Introduction to Malware", *CERT-UK White Paper* (2014) 5, https://www.cert.gov.uk/wp-content/ uploads/2014/08/An-introduction-to-malware.pdf, accessed 25 June 2018.

¹⁶⁹ Szilard Stange, "Detecting Malware Across Operating Systems", Network Security, 6 (2015) 11-14: 11.

¹⁷⁰ John Dunn, "Who Runs an Antivirus Scan These Days? Apparently Almost Nobody", *TechWorld* (28 January 2015) www.techworld.com/news/security/who-runs-anti-virus-scanthese-days-apparently-almostnobody-3595951/, accessed 25 June 2018.

¹⁷¹ Department for Business, Innovation and Skills, *Cyber Essentials Scheme Requirements for Basic Technical Protection from Cyber Attacks*, 11.

¹⁷² Defence Standard 05-138; Cyber Security for Defence Suppliers, 10.

¹⁷³ Thomas Gerace and Huseyin Cavusoglu, "The Critical Elements of the Patch Management Process", *Communications of the ACM*, 52 (8) (2009) 117-121: 117.

protected against the contemporary cyber-threat. Opening a door for hostile actors to degrade or even remove the ability to operate information-reliant aircraft, air forces should be deeply concerned by the credible cyber-threat to air operations which has been created by their compromised supply chains.

Personnel

Though systems, infrastructure and supply chains represent distinct cyber-security concerns, the final area of discussion, an air force's personnel, holds unique importance. This is because if information is 'the lifeblood of Defence'¹⁷⁴ then its people are the beating heart. As a result, if people act in a way which compromises information, Defence will 'bleed-out' and operational effectiveness will be lost.

This graphic analogy loses none of its relevance when discussing air power in a fifth generation environment. With people, despite advances in technology, still entwined at every step of projecting air power there are no areas which do not rely on people's ability to protect information. Whilst this is an intuitive statement, the integral security role of an organisation's people was only recognised relatively recently.

Research by Briney and Prince, for example, suggests that as long as 15 years ago large private companies were on average spending \$6m per annum on information security.¹⁷⁵ With nearly 20 percent of this focused on security products,¹⁷⁶ the driving force within cyber-security was traditionally on protection from external attack. This was mirrored within Defence sectors, including in the UK, which dedicates the majority of its DCO budget on outwardly focused capabilities. The flagship amongst these is the Global Operations Security Control Centre (GOSCC) at MOD Corsham. Leading on the MOD's 'Operate and Defend' mission, it manages the raft of technical solutions which support the delivery of DCO.¹⁷⁷

Though the external threat managed by these means cannot be underestimated, Herath and Rao identified that an organisation's contemporary security depends on three components: people, processes and technology.¹⁷⁸ Encouraging a shift in mainstream thinking, Leach also suggested that there is an increasingly accepted assessment that the people and process

¹⁷⁴ Ministry of Defence, JSP 441 – Managing Information in Defence – Part 1: Directive (January 2017) 1, https://assets. publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/618489/JSP441_Part 1.pdf, accessed 1 July 2018.

 ¹⁷⁵ Andrew Briney and Frank Prince, "Does Size Matter", *Information Security*, 5 (9) (2002) 36-39: 36.
 ¹⁷⁶ Ibid.

¹⁷⁷ House of Commons Defence Committee, *Defence Committee: Further Written Evidence from the Ministry of Defence – The Global Operations Security Control Centre (GOSCC)* (June 2012) https://publications.parliament.uk/pa/cm201213/ cmselect/cmdfence/106/106we05.htm, accessed 15 May 2018.

¹⁷⁸ Tejaswini Herath and Raghav Rao, "Encouraging Information Security Behaviours in Organizations: Role of Penalties, Pressures and Perceived Effectiveness", *Decision Support Systems*, 47 (2) (2009) 154-165: 154.

elements, which represent threats internal to an organisation, potentially pose the greatest risk to information.¹⁷⁹ A conclusion supported by cyber-security companies including Symantec (which in 2012 identified the subcategories of 'negligent insiders and malicious [internal] attacks'),¹⁸⁰ academics such as Noonan and Archuleta have suggested that security professionals finally woke up to the internal threat.¹⁸¹

A concept which focuses on current employees using 'specialised knowledge...[to gain an] advantage over security efforts',¹⁸² this thinking engendered a growing consensus amongst security professionals. Specifically, it is now accepted that whilst 'an adversary who makes a frontal attack can be anticipated or repulsed...[one who] attacks from within...cannot be readily countered.'¹⁸³

An example of this internal attack and the damage it can cause was the 2013 actions of Edward Snowdon, a US National Security Agency (NSA) contractor, who downloaded an estimated 1.7 million classified documents before leaking some to *The Guardian* newspaper.¹⁸⁴ From a sympathetic perspective, Snowdon is a whistle-blower who provided a necessary 'window into the NSA and its international intelligence partners' secret mass surveillance programs and capabilities'.¹⁸⁵ Conversely, however, the breach is assessed by official sources to have caused extensive damage. A declassified US House of Representative report for example stated that the breach 'caused tremendous damage to national security...[including to] military programmes of great interest to [US] adversaries'.¹⁸⁶

Placing the Snowdon example in the context of a contemporary air force, it is possible to see how such a breach could cause major damage to the success of a fifth generation project.

¹⁷⁹ John Leach, "Improving User Security Behaviour", Computers and Security, 22 (8) (2003) 685-692: 685.

¹⁸⁰ Symantec, "2011 Cost of Data Breach Study: Global", Ponemon Institute, March (2012) 2, http://www.symantec.com/ content/en/us/about/media/pdfs/b-ponemon-2011-cost-ofdata-breach-global.en-us.pdf, accessed 15 May 2018.

 ¹⁸¹ Thomas Noonan and Edmund Archuleta, "Final Report and Recommendations on the Insider Threat to Critical Infrastructures", *The National Infrastructure Advisory Council* (8 April 2008) 32, http://ftp.scadahacker.com/library/ Documents/Insider_Threats/NIAC%20%20Insider%20Threat%20to%20Criticail%20Inf, accessed 15 May 2018.
 ¹⁸² Department of Homeland Security, "National Risk Estimate: Risks to U.S. Critical Infrastructure from Insider Threat", *National Protection and Programs Directorate Office of Infrastructure Protection*, December (2013) 3, https://scadahacker.com/library/Documents/Insider_Threats/DHS%20%20Risks%20to%20US%20Critical%20 Infrastruct ure%20from%20Insider%20Threat%20%2023%20Dec%2013.pdf, accessed 17 May 2018.
 ¹⁸³ Nicholas Catrantzos, "No Dark Corners: Defending Against Insider Threats to Critical Infrastructure", *Naval Postgraduate School* (September 2009) 1, http://calhoun.nps.edu/bitstream/handle/10945/4656/09Sep_ Catrantzos.pdf?sequence=1, accessed 21 May 2018.

¹⁸⁴ Michael Kelley, "NSA: Snowden Stole 1.7 Million Classified Documents and Still has Access to Most of Them", *Business Insider* (13 December 2013) http://www.businessinsider.com/how-many-docs-did-snowden-take-2013-12?IR=T, accessed 8 May 2018.

 ¹⁸⁵ The Courage Foundation, Who is Edward Snowdon? (2018) https://edwardsnowden.com/, accessed 12 May 2018.
 ¹⁸⁶ United States House of Representatives, Review of the Unauthorised Disclosure by Former National Security Agency Contractor Edward Snowden (15 September 2016) https://intelligence.house.gov/uploadedfiles/hpsci_snowden_review_declassified.pdf, accessed 1 July 2018.

Whether leaks pertained to the release of technical details leading to a loss of comparative advantage, or the identification of vulnerabilities reducing operational effectiveness and endangering mission success, the impact could be extensive.

Although such malicious insider breaches are of concern, some argue that the true risk is from non-malicious insiders. This sub-group is defined by Nurse et al as those 'without malicious intent who through action or inaction [cause] harm'.¹⁸⁷ Potentially broad in its manifestation and impact, examples range from the accidental loss of work devices to the publishing of sensitive information on social media.

Given the preventable nature of non-malicious insider events, security professionals quickly adopted clichés including 'behind every computer error, no matter how massive, is one or more humans'.¹⁸⁸ Leading to personnel being treated 'as a security risk to be controlled',¹⁸⁹ this newfound concern has developed into a rut of one-dimensional thinking on punishment being the key to managing non-malicious insiders.

An illustrative example of this persistent issue exists in UK Defence. Whilst the MOD's policies on controlling their personnel's security practices may appear robust, open source reports suggest that the approach is not working. In 2018, for example, the UK Government confirmed that the MOD, including in part the RAF, lost through their personnel's negligence 30 desktop computers, 81 laptops and one tablet in the Financial Year 2017/18.¹⁹⁰ Illustrating the damage such losses can cause, *The Guardian* reported in 2008 that amongst that year's MOD losses of 503 laptops, one contained the personal details of 600,000 applicants to the UK Armed Forces.¹⁹¹

When explored further, this example becomes deeply concerning. Not simply a major Data Protection issue, the loss of personal information could be used to identify and target military personnel likely to be employed in sensitive areas. Invaluable to those with hostile intent, Foreign Intelligence Services (FIS) could use this information alongside other open-source information including social media to build personal profiles. Having obtained this information,

¹⁸⁷ Jason Nurse, Oliver Buckley, Philip Legg, Michael Goldsmith, Sadie Creese, Gordon Wright and Monica Whitty, "Understanding Insider Threat: A Framework for Characterising Attacks", *Security and Privacy Workshops* (May 2014) 214-228: 214. http://ieeexplore.ieee.org/xpls/abs_all.jsp?arnumber=6957307, accessed 11 May 2018.

¹⁸⁸ info security, *The User is Not The Enemy: How to Increase Information Security Usability* (3 August 2009) http://www.infosecurity-magazine.com/magazine-features/the-user-isnot-the-enemy-how-to-increase/, accessed 20 June 2018.

 ¹⁸⁹ Ann Adams and Martina Sasse, "Users Are Not the Enemy", *Communications of the ACM*, 42 (12) (1999) 40-46: 40.
 ¹⁹⁰ T. Ellwood, 'Ministry of Defence Computers: Written Question - 141014', *UK Parliament; Written Questions and Answers* (18 May 2018) https://www.parliament.uk/business/publications/written-questions-answers-statements/ written-question/Commons/2018-05-03/141041/, accessed 4 June 2018.

¹⁹¹ James Sturcke, "Laptop Lapses Which Embarrassed Government", *The Guardian* (12 June 2008) https://www. theguardian.com/politics/2008/jun/12/defence.terrorism, accessed 3 June 2018.

a FIS could identify how to manipulate an individual to provide information or take actions which would allow a technical attack on a system.¹⁹²

This process, commonly referred to as social engineering, is defined by Gafhir et al as 'an ultimate psychological manipulation technique used by attackers to generate responses from unwilling targets'.¹⁹³ The result of this when successful can range from gaining access to a workplace through to obtaining state secrets.¹⁹⁴

Taking the Stuxnet attack on Iranian nuclear centrifuges as an example, some analysts have suggested that it is exactly this process that led to social engineering in the form of well-targeted 'spear phishing' emails. When received, these emails may have contained convincing personal details which lured insiders to unwittingly run infected programs, allowing the Stuxnet malware to be introduced.¹⁹⁵ Though alternate explanations suggest that Stuxnet may have been caused by an employee 'deliberately loading malware from removable media like a USB memory stick'¹⁹⁶ the foundation remains the same: breaches of information concerning an organisation's people can lead to an adversary socially engineering a target to facilitate a major cyber-related incident.

For a fifth generation air force which relies on interconnected systems, this issue is ever growing. In the modern air force there is a necessity to process an immense amount of data which requires access being granted to not only Service Personnel and Civil Servants but also civilian contractors. With many of these providing often opaque routes into sensitive systems, it is no longer the case that those solely granted high level access can cause significant breaches. Rather, everyone – from the administrative assistant to the intelligence officer – if targeted effectively by a hostile actor, can provide a route into a sensitive system.

Beyond this angle of social engineering, non-malicious insiders can also cause breaches through their day-to-day use of social media. With 62.5 percent of the UK population expected to be active social media users by 2021¹⁹⁷ it is a growing reality that the majority of people will chronicle every aspect of their lives online.

¹⁹² Aditya Sood and Richard Enbody, "Targeted Cyber Attacks: A Superset of Advanced Persistent Threats", *IEEE Security* and Privacy (January 2012) 54-61: 55.

¹⁹³ Ibrahim Ghafir, "Security Threats to Critical Infrastructure: The Human Factor", *The Journal of Supercomputing* (26 March 2018) 1-17: 2.

¹⁹⁴ Ibid.

 ¹⁹⁵ Jon R. Lindsay, "Stuxnet and the Limits of Cyber Warfare", *Security Studies*, 22 (3) (2013) 365-404: 381.
 ¹⁹⁶ Ibid.

¹⁹⁷ Statista.com, Forecast of Social Network User Numbers in the United Kingdom (UK) from 2015 to 2022 (in million users) (2018) https://www.statista.com/statistics/553530/predicted-number-of-social-network-users-in-the-unitedkingdom-uk/, accessed 14 June 2018.

A trend recognised in the UK by the MOD, guidance for military personnel on the appropriate use of social media has been published.¹⁹⁸ Despite these attempts to educate, media reporting in 2018 indicated that members of the UK Armed Forces continue, through social media, to 'compromise operations and national security'.¹⁹⁹ According to Freedom of Information (FoI) requests published by *The Telegraph*, this has included, amongst a list of other examples, SECRET information being published on LinkedIn and a 10 minute *YouTube* video of personnel and equipment on deployment in Afghanistan.²⁰⁰

Even though there is nothing to suggest that such breaches are malicious, their occurrence creates a significant security concern. With academic literature acknowledging 'a rapid and massive growth in cyber-exploitation operations'²⁰¹ from states including China, it can be assessed that adversaries are not just attacking systems but are actively monitoring social media for breaches of information. Based upon this, the collective damage of self-induced social media breaches may greatly undermine the security of a nation's sensitive military information.

Taken in the context of a fifth generation air force, the potential areas of damage are significant. From the posting on social media of photos of sensitive information on operations boards and cockpits, through to details of aircraft capabilities, there is broad scope for an adversary to easily collect open-source information which may undermine air operations.

In its totality, the risk posed by an air force's own people to either maliciously or inadvertently cause information breaches is concerning. Understanding and accepting this is the first stage; appreciating how to manage it is an altogether more demanding process. Requiring a focus on the psychology of the individual and how to induce them to follow established policies, an air force's strategic leadership must direct concerted effort towards research and development in this area. If they do not, and their own people continue to pose a cyber-security vulnerability, the operational effectiveness of military aviation will continue to be degraded by security breaches that could have been avoided.

Conclusion

This article explored military aviation's contemporary cyber challenge by asking whether cyber vulnerabilities are a credible threat to a modern air force. Beginning with a discussion of the relevant concepts, the article highlighted the requirement to understand cyber-vulnerabilities within the context of an air force's operational delivery. Specifically considering the modern air

¹⁹⁸ Ministry of Defence, Social Media Guide (2012)

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/34247/ social_media_i nfo_card.pdf, accessed 10 June 2018.

¹⁹⁹Ben Farmer, "Troops Leaked Confidential Data on Twitter and Facebook", *The Telegraph* (8 July 2018) https://www. telegraph.co.uk/news/uknews/defence/10948490/Troops-leaked-confidential-data-on-Twitter-and-Facebook. html, accessed 9 July 2018.

²⁰⁰ Ibid.

²⁰¹ Nigel Inkster, "Chinese Intelligence in the Cyber Age", Survival, 55 (1) (2013) 45-66: 58.
force's operation of fifth generation aircraft in a fifth generation environment, it was identified that the issue would be examined through an analysis of four fundamental aspects of aviation: systems, infrastructure, supply chains and personnel.

Turning first to consider the systems which deliver modern military aviation, it was noted that the area has become increasingly complex. Driven by the advent of NextGen e-enabled aircraft, the human element has been reduced by a reliance on the processing of information. With evidence that the information held within these complex systems can be compromised through the cyber-domain, the article warned that as adversaries become increasingly sophisticated, there is a rising chance of cyber-attacks impacting on operations.

To address whether this is a pressing issue for military aviation, the article considered two key systems: UAVs and the F-35. Initially examining UAVs, it was concluded that whilst cyber-attacks on UAVs may be difficult to execute, they are nonetheless possible. Reason enough to be troubled, the conclusion was balanced by an acknowledgment that UAVs' unique autonomous nature makes them more vulnerable to cyber-attack.

Turning next to the F-35, it was identified that ALIS is the aircraft's key system. Exploring open-source reports regarding its security failings, and noting a 2017 US OTE report which confirmed that identified vulnerabilities had not been remedied,²⁰² it was asserted that there is mounting evidence of a cyber-threat to air forces operating the F-35. Taking this in the context of previous discussions, it was concluded that the cyber-vulnerabilities of those systems which are integral to cutting-edge aircraft represent a persistent and credible threat to modern military aviation.

Moving next to examine the issue of infrastructure, the article identified that unlike other forms of military power, the impermanence of aviation makes air power uniquely dependent on infrastructure. Similar to the civil concept of Critical Infrastructure, this means that the loss or compromise of infrastructure could cause significant disruption to air operations.

Responding to this, it was noted that air forces have become world-leaders in layered physical and procedural security measures. Though robust, with the cyber-threat able to circumnavigate these measures, and modern infrastructure extensively reliant on ICT, examples including the 2015 attack on the Ukrainian power grid were explored to show potential vulnerabilities of aviation. Having extended the discussion to the more specific example of SCADA systems, it was acknowledged that militaries are limited in the level of influence they can exert on a large amount of air power's supporting infrastructure. Due to this, and the ability of resilience planning to mitigate the impact, it was concluded that the cyber-threat to

²⁰² Operational Test and Evaluation Agency, F-35 Joint Strike Fighter, 33.

an air force's infrastructure is concerning but is not the greatest cyber-vulnerability facing modern military aviation.

A third area highlighted for consideration was the securing of supply chains. Commenting on the complexities created in the modern inter-connected world, it was specifically noted that the delivery of fifth generation aircraft creates a heightened requirement for support.

Citing the F-35 as an example, and exploring the concept of cyber-supply chain security further, it was established that the 'weakest link' often resides within smaller firms with lower cyber-security provision. Increasingly recognised, organisations have begun to regulate their suppliers to ensure cyber-security compliance. Within UK Defence, the article noted that this is being attempted through the DCPP. Aligned to the broader UK Government CES initiative, five key areas of cyber-security provision were examined. Having done so, the article concluded that the DCPP and CES Plus at best require defence suppliers to meet industry baseline standards. At worst, however, they show a concerning failure to meet the contemporary cyber challenge. Based upon this, it was concluded that if the UK example is indicative of all air forces, strategic leaderships should focus on overcoming the cyber-vulnerabilities that supply chains are exposing their organisations to.

The final area considered was an air force's personnel. Developing the well-known phrase of information being 'the lifeblood of Defence',²⁰³ the article likened its people to a beating heart. Expanding this analogy, it was suggested that the causing of cyber-security breaches by its people will lead Defence to 'bleed-out' and operational effectiveness to be lost.

Building upon this, the article discussed how people are entwined at every step of projecting air power. Playing an integral role in security, it was noted that breaches can occur from malicious actors such as Edward Snowdon through to non-malicious personnel who cause incidents through negligence or as a result of manipulation by hostile actors. With media reports showing that UK Defence continues to experience breaches, particularly through non-malicious activity, the article concluded that for a fifth generation air force which relies on interconnected systems, this issue is ever growing. Because of this, it was suggested that air forces must work to understand and manage the issue. If they fail to do so, their own people's mistakes will continue to cause an avoidable degradation of operational effectiveness.

Considered in its totality, the article presented a troubling picture of the cyber challenge for military aviation. Across the four lenses used to explore whether cyber-vulnerabilities represent a credible threat to modern air forces, the analysis found concerning aspects in all. An area where some reassurance can be sought is infrastructure. Here, strong resilience planning aligned with the robust approach of organisations including the NCSC provides a good level

²⁰³ Ministry of Defence, JSP 441 – Managing Information in Defence – Part 1: Directive, 1.

of assurance. Through this, an air force's infrastructure is protected from cyber-attack or, where attacks occur, the impact can be mitigated to a level that will prevent any major degradation of air operations.

Further good news can be found in an air force's personnel. Though media reports indicate that UK Defence continues to be troubled by its personnel's non-malicious breaches, and a future 'Snowdon' is difficult to predict, it is an issue which the strategic leadership can manage. With sufficient resource, there is good potential to understand the motivation of its people and, thereafter, develop means to prevent future losses. Such optimism must, however, be cautioned with a requirement to invest. If the strategic leadership does not provide the resources required, or fails to lead by example, its people are likely to continue to falter and, through faltering, cause damaging losses.

Whilst positive assessment can be found, the two other areas explored – systems and the supply chain – are far more concerning. This articles examination of systems identified how, by its very nature, cutting edge air power, through its reliance on information and the systems that process it, is highly susceptible to cyber-attack. Further, the examination of the F-35's ALIS showed long-standing and unresolved problems. From its position as a 'single point of failure', through to the deeply concerning examples of previous breaches, there is a plethora of areas to concern an air force's strategic leadership.

Though limited in their ability to address the information-reliant aspect of modern aviation, and likely restricted in their ability to meaningfully impact on the failures of existing projects led by other nations, the strategic leadership can nonetheless act to manage future failure. With new aircraft under development, the lessons identified by UAVs and the F-35's ALIS must be recognised, reflected upon and fed into future programmes. If this is done robustly, there is hope for enhanced cyber-resilience. If it is not, there will be growing examples of adversaries exploiting system vulnerabilities and impacting on the viability of modern air power.

Leading to the other area of concern – the supply chain – air forces are arguably presented with the most pressing worry. Unlike systems which are, by their nature, unavoidably vulnerable, supply chains have, in response to austerity, been allowed to become immensely complex. Added to this, the means put in place to ensure cyber-resilience in the supply chain have, taking DCPP and CES Plus as an example, fallen disturbingly short of even industry baseline standards for cyber-security. With the Defence sector experiencing an arguably more complex threat from its potential adversaries, it can therefore be assessed that the supply chains of modern air forces are already compromised.

In response to this, air forces must return to the 'drawing board' and reassess the level of cyber-security they are demanding of their suppliers. Taking the UK as an example, the DCPP, though a fair starting point, is not thorough enough. It requires depth with, as a minimum, compliance of industry standards such as the ISO 27001 series. This then needs to be

implemented alongside much simpler supply chains. If this can be achieved, the vulnerabilities presented by the supply chain may be controlled; if it is not, adversaries will continue their infiltration of supply chains which will reduce advantage and, most worryingly, compromise in an unseen manner an air force's ability to project air power.

In conclusion, cyber-vulnerabilities are, based upon the above discussion, a credible threat to modern air forces. Notwithstanding this, the threat is in part controllable. To achieve this control, and proactively manage the cyber-vulnerabilities which threaten military aviation's operational effectiveness, there is a requirement for the strategic leadership of air forces to first acknowledge the scale of the cyber-challenge. Having done so, they must next commit sufficient time and resource to the serious, in-depth and reflective study of the concerns highlighted by this article. If this is achieved, most pressingly within the areas of systems and the supply chain, and subsequent recommendations are followed, it will be possible to ensure that cyber-vulnerabilities do not significantly degrade the effectiveness of modern military aviation. Alternatively, if strategic leaderships ignore the problem, or approach it in an uncoordinated manner, modern air power's relevance to contemporary operations will be systematically destroyed by hostile actors' exploitation of military aviation's cyber-vulnerabilities.



Justice from Above: The Application of Militarised American Air Power in the War on Drugs

By Flying Officer Iwan Benneyworth

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Abstract: This paper demonstrates how the application of militarised American air power has made a demonstrable contribution as a force multiplier in the prosecution of the war on drugs in South and Central America and on the U.S. southern border. It outlines what militarisation means in a theoretical context in order to establish how this descriptor is applied to the air assets covered in the paper. The history of America's gradual militarisation of its counter-narcotics strategy is then explored chronologically, from the 1980s to the present day, and how it has applied to Colombia, Mexico and the southern United States. The examples provided throughout will demonstrate how air power, while certainly not a solution to the challenges presented by drug trafficking, has made a substantive contribution to counternarcotics operations.

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Introduction

n September 1969 Operation Intercept saw two thousand U.S. customs and border-patrol agents deployed along the Mexican border for a three-week period, during which time over five million travellers were searched for illicit narcotics.¹ This yielded little in the way of contraband but generated positive publicity for the administration of President Richard Nixon and its nascent counter-narcotics policy.² Growing public complaints from the Mexican government saw the initiative quietly shelved under State Department pressure. The Administration claimed that the main goal of encouraging the Mexican government to step up its own efforts at drug interdiction had been achieved, aided by a \$1 million grant for the purchase of light aircraft for such purposes.³

This set the tone for U.S. counter-narcotics policy in South and Central American countries, as well as domestically, in the decades going forward, that of financial, equipment and training support for partner security forces. As each subsequent presidential administration took office, this policy was either maintained or amplified by increasingly adding a military dimension as more robust operational and tactical thinking was employed to target narcotics and those who would profit from them. It is an initiative colloquially referred to as the 'war on drugs'. It has resulted in vast expenditure, prompted the creation of Federal government agencies such as the Drug Enforcement Administration, and been the driver of several international treaties. Regarding the United Kingdom, the perceived threat to society posed by illicit drugs was reported as one of the motivators for deploying British troops to Afghanistan's Helmand province, the heart of opium poppy cultivation.⁴

The employment of air power has increasingly become one of the most important tools in the arsenal of U.S. drug enforcement and of Latin American allies, facilitating the interdiction of narcotics shipments, the transport of security forces, the gathering of intelligence material and even kinetic strikes. The intention of this paper is not to exhaustively chronicle every example of when air power has featured in the war on drugs. Instead, it is to broadly educate the reader as to how militarisation, and the growth of militarised air power as a deployable asset, came to have increased utility in U.S. counter-narcotics strategy in Latin America and on its southern border.

To achieve this objective, this paper will adopt a chronological approach in order to demonstrate the progressive militarisation of air power with regards to counter-narcotics. The operational period covered will be between the 1980s efforts of the Reagan Administration, to the end of the Obama Administration as the last full-term executive

¹ E. Epstein, Agency of Fear: Opiates and Political Power in America (New York: G.P. Putnam's Sons, 1977), p.83-84.

² Ibid. p.83-84.

³ Ibid. p.83-84.

⁴ Afghanistan - Fourth Report, drafted by the Select Committee on Foreign Affairs, 2 July 2006, located at https://publications.parliament.uk/pa/cm200506/cmselect/cmfaff/573/57311.htm, accessed 20 May 2018.

mandate on record (though some post-2016 developments in Unmanned Aerial Systems (UAS) deployment will be covered). As the war on drugs has primarily been prosecuted throughout the United States, Colombia and Mexico, there will be a degree of geographical shift as the chronology progresses. Before exploring the development of air power in counter-narcotics, however, it is important to firmly establish exactly what militarisation means in the academic and analytical context of this paper.

What is militarisation?

Militarisation is not just the physical build-up and utilisation of military assets but is a security status in and of itself.⁵ The full academic principles that underpin securitisation and militarisation theory are worthy of their own paper, and so are well beyond the remit of this piece. However, it is useful to summarise the essential elements so that the reader can better appreciate the evolution of U.S. policy to become increasingly receptive to the use of military, or 'military style' air power.

Security is a contentious subject. An automatic assumption is that 'security', as a term, is rooted in public safety, intelligence and defence. Yet, upon further analysis, security can prove to be a far more flexible concept. The environmental security of Pacific islanders gradually seeing their homes disappear beneath rising sea levels is of far more concern to them than the political security risk of Russian cyber-attack. It is for this reason that security is subjective. Different audiences will perceive various security issues in different ways and the more seriously they take those threats the more sweeping or intense the measures intended to deal with them.⁶ Such thinking can be best summarised by security theory pioneers Buzan, Wæver and de Wilde:

Security is about survival. It is when an issue is presented as posing an existential threat to a designated referent object... The special nature of security threats justifies the use of [emergency] measures to handle them. Invocation of security has been key to legitimising the use of force, but more generally it has opened the way for the state to mobilise, or to take special powers, to handle existential threats.⁷

The term 'referent object' refers to the thing most threatened by a security issue, such as an ethnic group, a country's territory, or even something as abstract as society or culture. Whenever we act against terrorism, immigration, hostile powers, or a multitude of other threats, real or perceived, Buzan, Wæver and de Wilde's observation can be seen, and the security issue in question can be placed somewhere on the spectrum below:

⁵ I. Benneyworth, Narco Wars – An Analysis of the Militarisation of U.S. Counter-Narcotics Policy in Colombia, Mexico and the U.S. Border, 2016, located at http://orca.cf.ac.uk/91408/, accessed 20 January 2019, p.42.

⁶B. Buzan, O. Wæver and J. de Wilde, *Security: A New Framework for Analysis* (Boulder, Colorado; Lynne Rienner Publishers, 1998), p.27.

⁷ Ibid. p.29.

Non-Politicised – Politicised – Securitised – Militarised – Violised (Violence of Warfare)⁸

This spectrum should be viewed as an escalating continuum, as rungs on a ladder. Any security issue can move up and down it. Let us consider narcotics in the American national discourse as a prime example, especially for the purposes of this paper.

Narcotics were widely accepted as a (Non-Politicised) non-issue for some time in Western society, with opium and cocaine (albeit in far less potent forms than today) sold across 19th Century pharmacy counters without protest.⁹ However, due to increasing (Politicised) social concerns over growing numbers of addicts as such substances became stronger in the first half of the 20th Century, narcotics became subject to legal prohibition and a huge law enforcement effort to enforce it (Securitised). The drug 'threat' has continued along the security spectrum in the United States to the extent that the measures deemed necessary to counter it have become militarised.

Militarisation is the involvement of the military itself or the presence, even embracing, of military personnel, assets, or culture by outside bodies, or indeed all three in combination, but without automatic recourse to the use of violence on a war-like scale.¹⁰ Limited, targeted violence is permissible, for even civilian organisations such as the police can employ it without sanction in certain circumstances. If the full force of a military institution, assets or militaristic culture were unleashed on a significant scale, however, then a security issue would move up the spectrum into a Violised 'war-like' state, in accordance with Iver Neumann's concept of 'violisation' as the most extreme form of securitisation, where lethal action is actually taken, as opposed to potential threats simply being articulated or promoted to audiences.¹¹

In theory, it is possible to militarise any issue providing these parameters are maintained. So, for example, military assets could be employed to oversee endangered species, protect threatened natural environments, keep the peace in urban or rural settlements, monitor elections, and so on. Non-lethal military assets such as surveillance aircraft, transport helicopters or peacekeeping troops could all be utilised in these endeavours. Targeted violence could be employed, but this does not necessarily mean lethal force, as poachers could be apprehended, or pirate boats towed away or sunk after evacuation, for instance. The employment of military personnel, assets or operational culture, even if nonviolent in nature, is still enough for a security issue to be militarised.

⁸ I. Benneyworth, *Narco Wars*, p.42.

⁹ British Medical Association Board of Science, 2013, Drugs of Dependence – The Role of Medical Professionals, located at: https://www.bma.org.uk/-/media/files/pdfs/news%20views%20analysis/in%20depth/drugs%20of%20 dependence/drugsofdepend_roleofmedprof_jan2013.pdf, accessed 19 January 2019, p.87.
¹⁰ I. Benneyworth, Narco Wars, p.47.

¹¹ I. Neumann, "Identity and the Outbreak of War: or Why the Copenhagen School of Security Studies Should Include the Idea of 'Violisation' in its Framework of Analysis", *International Journal of Peace Studies* 3, no.1 (January 1998), pp.1-10.

Now that the essential conceptual foundations of militarisation have been covered – and how it can become a measure to tackle a threat – the history of how American counter-narcotics policy evolved to feature militarised air power as a crucial element can be explored.

From Cold War to Drug War

Concerns abounded about drug use in the United States during the 1960s, especially of marijuana by youth, with one-in-ten 18-year olds reportedly indulging each day.¹² Two-thirds of 18 to 25-year olds professed to having tried some form of illegal drug, including 22 million Americans admitting to cocaine use.¹³ Such numbers meant high demand and thus significant profits to be made. By 1979, cocaine ranked as one of Florida's biggest imports, totalling \$10 billion a year, and the competition between Colombian and Cuban traffickers saw a drug-related murder in Miami every day.¹⁴

If drugs were regarded as a moral and social concern, measured in crime figures and numbers of addicts, then the trade behind them quickly came to be viewed as a greater security threat. It had turned certain American cities into battlegrounds that posed a danger to public safety. By the early-1980s, the pendulum had swung from a market for heroin to one for cocaine. The dominance of Latin America in the production of that drug, and of spawning cartels that trafficked it and waged war over its proceeds, meant that a forceful and proactive response was required to meet this emerging threat. If President Nixon had declared what was essentially a metaphorical war on drugs in a speech in 1971,¹⁵ then during the 1980s President Ronald Reagan would begin the process of transforming such rhetoric into action and introduce militarised elements into what had been a principally law enforcement and diplomacy-focused campaign.

Federal authorities estimated that by 1980, 70 percent of all cocaine and marijuana entering the country passed through South Florida.¹⁶ In January 1982, the South Florida Drug Task Force was formed and steered at Cabinet level under Vice President George H.W. Bush. It was designed to squeeze the cartels logistically and financially through enforcement and interdiction and provided a template for similar task forces in other troubled areas of the country. Most relevantly, the task force marked the first time that the U.S. military – albeit on a small scale – was actively deployed for the purpose of drug interdiction, with elements of the Army and Navy mobilised to patrol the South Florida coast and surrounding waters.¹⁷

¹² T. Feiling, *The Candy Machine: How cocaine took over the world*. London; Penguin, 2009), p.38.

¹³ Ibid. p.38.

¹⁴ Ibid. p.38-39.

¹⁵ R. Nixon, *Special Message to the Congress on Drug Abuse Prevention and Control*, 17 June 1971, located at http://www.presidency.ucsb.edu/ws/?pid=3048, accessed 03 May 2018.

¹⁶ G. Posner, *Cocaine Cowboys*, 2009, located at http://www.thedailybeast.com/articles/2009/10/12/cocaine-cowboys.html#url=/articles/2009/10/12/cocaine-cowboys.html, accessed 09 May 2018.

¹⁷ Drug Enforcement Administration Museum, *A Tradition of Excellence: A History of the DEA*, 2014, located at http://www.deamuseum.org/dea_history_book/, accessed 09 May 2018.

Such initiatives highlighted the potential for military or associated assets to be used in counter-narcotics on an operational level, but the floodgates of domestic drug war militarisation were opened in 1981 with the passage of the Military Cooperation and Law Enforcement Act. This allowed extensive sharing of drug interdiction intelligence, training, tactics, technology and weaponry between the Department of Defense (DOD) and federal, state and local police departments.¹⁸ While an additional Anti-Drug Abuse Act was passed in October 1986, which sought to implement a primarily social policy-focused effort,¹⁹ the Reagan Administration had still sought to make early headway on the participation of the military, and justification thereof.

It did this through the issuing of National Security Decision Directive (NSDD) 221 the previous April, which deemed that:

The expanding scope of global narcotics trafficking has created a situation which today adds another significant dimension to the law enforcement and public health aspects of this international problem and threatens the national security of the United States.²⁰

To deal with such a threat, the policy implementation section charged the Secretary of Defense, in conjunction with the Attorney General and Secretary of State, to:

Develop and implement any necessary modifications to applicable statutes, regulations, procedures, and guidelines to enable U.S. military forces to support counter-narcotics efforts more actively, consistent with the maintenance of force readiness and training.²¹

Operation Blast Furnace was one of the principal results of this directive, one of the first military air power initiatives conducted on a significant scale. Three months after NSDD 221 was issued by President Reagan, a contingent of six U.S. Army Black Hawk helicopters and 160 supporting personnel were deployed from their station in Panama to Bolivia.²² Their mission was to provide air transportation to native counter-narcotics police in an effort to locate and destroy cocaine labs. Under the direction of civilian Drug Enforcement Administration (DEA) personnel, these U.S. army aviation assets provided the means for Bolivian counter-narcotics forces to disrupt cocaine manufacturing for the four months they were deployed, from July to October 1986, depressing coca prices below production costs.²³

¹⁸ R. Balko, *Overkill: The Rise of Paramilitary Police Raids in America*, 2006, located at http://www.cato.org/sites/cato.org/files/pubs/pdf/balko_whitepaper_2006.pdf, accessed 08 April 2018, p.7.

¹⁹ United States Congress, *H.R.5484 - Anti-Drug Abuse Act of 1986*, 1986, located at https://www.congress.gov/ bill/99th-congress/house-bill/5484, accessed 20 January 2019.

²⁰ White House, *National Security Decision Directive 221 – Narcotics and National Security*, 1986, located at http://www.fas.org/irp/offdocs/nsdd/nsdd-221.htm, accessed 12 April 2018, p.1.

²¹ Ibid. p.1.

 ²² W. Mendel, Illusive Victory: From Blast Furnace to Green Sweep, *Military Review*, December 1992, pp.74-87.
 ²³ Ibid. p.76.

Considering that Black Hawk air mobility and accompanying U.S. troops were there to facilitate the counter-narcotics activities of the Bolivian security forces, not to do it for them, the short-term results seemed promising. A Central Intelligence Agency (CIA) impact assessment for the operation concluded that Blast Furnace 'had achieved considerable success in disrupting cocaine processing and trafficking operations', in addition to 'the presence of U.S. troops and sophisticated helicopters [being] a major factor' in helping to inhibit reprisal attacks by the targeted criminals.²⁴ Yet, in a tacit admittance that the assessment risked overemphasising the positives, the same report acknowledged that it was likely such success would be short-lived once U.S. air assets were withdrawn. So it proved, for as soon as they left cocaine production and export returned to normal levels, along with the corruption and complicity observed in many Bolivian officers while the U.S. military were in theatre.²⁵ Sustainability of effort became an important mission objective in future counter-narcotics assistance initiatives, with Colombia to eventually become a standard-bearer.

After Reagan left office, the successor administration of George H.W. Bush placed the war on drugs on the centre stage of its foreign policy priorities, effectively underlined by National Security Directive 18. Like Reagan's past directive, it sought to effectively mobilise the U.S. military and intelligence community in the service of drug interdiction, directing that:

The Secretary of Defense, in conjunction with the Secretary of State, shall revise DOD policy directives and procedures to expand DOD support of U.S. counter-narcotics efforts and to permit DOD personnel to conduct training for host government personnel and operational support activities anywhere in the Andean region.²⁶

It is no surprise that the directive allowed operational support activities 'anywhere in the Andean region', for as Afghanistan and areas of South East Asia are to heroin, so are the three principal countries of the Andes to cocaine, namely Bolivia, Peru and Colombia.

The crown jewel from a drug cartel perspective is Colombia, one of the largest drug producing states in the world, accounting for 60 percent of global cocaine manufacturing.²⁷ While tonnage production of fresh coca leaf has substantially decreased since 2005, from 555,400 hectares that year, it still stood at 146,000 hectares by the end of 2016.²⁸ This was despite 2010 seeing

https://www.cia.gov/library/readingroom/docs/DOC_0000395412.pdf, accessed 12 May 2018.

²⁵ M. Abbott, "The Army and the Drug War: Politics or National Security?" *Parameters*, (December 1988): p.95.
 ²⁶ White House, *National Security Directive 18 – International Counter-narcotics* Strategy, 1989, located at

http://bushlibrary.tamu.edu/research/pdfs/nsd/nsd18.pdf, accessed 12 April 2018, p.3.

²⁷ UNODC (United Nations Office on Drugs and Crime), *Global Overview of Drug Demand and Supply*, 2018, located at https://www.unodc.org/wdr2018/prelaunch/WDR18_Booklet_2_GLOBAL.pdf, p.29.

²⁴ Central Intelligence Agency, *Bolivia: The Impact of Operation Blast Furnace*, 1986, located at

²⁸ UNODC (United Nations Office on Drugs and Crime), *Colombia - Survey of territories affected by illicit crops*, 2017, located at http://www.unodc.org/documents/crop-monitoring/Colombia/Colombia_Coca_survey_2016_ English_web.pdf, accessed 12 May 2018, p.11.

the lowest number of cultivated hectares in recent years, at 62,000, only for it to bounce back to the 2016 level.²⁹ Increased coca cultivation has resulted in a commensurate increase in cocaine manufacturing. Potential cocaine output reached 1,410 tons (at 100 per cent purity) in 2016, the highest level ever estimated, representing a 25 percent rise in global cocaine manufacture from 2015.³⁰ This demonstrates the Sisyphean task of controlling coca cultivation, one that existed just as potently in the 1980s and 1990s as now, and the increased inclination to turn to military solutions in an attempt to make some form of impact.

Following Operation Blast Furnace in 1986, which was mainly confined to Bolivia and was conducted for a limited time, Operation Snowcap was launched in 1987 as a precursor to Bush Administration efforts. It was a seven-year, broad Andean initiative, initially targeting Bolivia and Peru, before extending into Colombia in 1989 as the Bush Administration focused in on the larger strategic drug threat.³¹ The civilian DEA initially took the lead with several leased DOD Huey helicopters, with the native police and military forces of the Andean countries supported and instructed in counter-narcotics tactics that involved significant air mobility. By the end of the 1980s and beginning of the 1990s, however, the DOD itself was to become one of the most prominent and powerful players in American counter-narcotics strategy.

The 1989 National Defense Authorization Act (a series of United States federal laws specifying the annual defence budget and expenditures) designated the DOD as the 'single lead agency' for detecting and monitoring illegal drugs transitioning to the U.S. by air or sea.³² Despite initial apprehension by the Department over potentially straying into the traditional domain of law enforcement, as the Cold War wound down the Pentagon and other national security agencies gradually embraced the opportunity afforded by the drug war to keep their vast budgets intact.³³ Under this authority the DOD could utilise its enormous budget to pay for narcotics interdiction efforts, such as radar sites located around the region, surveillance flights, naval and Coast Guard maritime patrols, and intelligence gathering.³⁴ Interdiction was one area where significant U.S. military resources and personnel could be brought to bear against traffickers. The standard role – as per Operations Blast Furnace and Snowcap – was supporting native security forces in tackling drug production and trafficking, where often matters of sovereignty and legislative barriers prevented unsupervised actions by U.S. military personnel in foreign jurisdictions.

https://www.unodc.org/wdr2018/prelaunch/WDR18_Booklet_2_GLOBAL.pdf, accessed 20 January 2010, p.28. ³¹ R. Crandall, *Driven By Drugs: U.S. Policy toward Colombia* (London; Lynne Rienner Publishers, 2008) p.27-28.

³² United States Congress, *H.R.2461 - National Defense Authorization Act for Fiscal Years 1990 and 1991*, 1989, located at https://www.congress.gov/bill/101st-congress/house-bill/2461/text, accessed 2 February 2019. ³³ P. Zirnite, *Reluctant Recruits: The US Military and the War on Drugs*, 1997, located at

https://www.tni.org/files/download/Reluctant%20recruits%20report_0.pdf, accessed 2 February 2019. ³⁴ A. Isacson, "The U.S. Military in the War on Drugs" in *Drugs and Democracy* in Latin America: The Impact of U.S. Policy, ed. A. Youngers and E. Rosin (London; Lynne Rienner Publishers, 2005) p.28.

 ²⁹ UNODC (United Nations Office on Drugs and Crime), World Drug Report 2017 – Booklet 2, 2017, located at https://www.unodc.org/wdr2017/field/Booklet_2_HEALTH.pdf, accessed 28 April 2018, p.58.
 ³⁰ UNODC (United Nations Office on Drugs and Crime), Global Overview of Drug Demand and Supply, 2018, located at

A primary example of when U.S. air assets intimately supported native security forces was the operation which ultimately led to the death of one of history's most notorious drug barons, Colombia's Pablo Escobar. At the same time as the Colombian government was locked in conflict with the Revolutionary Armed Forces of Colombia (FARC) in the late-1980s and early-1990s, Escobar was in open warfare with other drug barons and the state itself. The Medellin drug cartel under Escobar's leadership undertook what could be best described as narco-terrorism. It resorted to targeted murders of politicians, judiciary and police and mass casualty actions against civilians, such as car and airline bombings, in efforts to resist challenges to its primacy and to dissuade the government from extraditing traffickers to the U.S. The campaign against the latter reached a highpoint in November 1985, when cartel-sponsored guerrillas attacked Colombia's Supreme Court, burning extradition documents and leading to the deaths of half the justices in the ensuing rescue attempt.³⁵

The defining incident of Escobar's narco-terror campaign was the November 1989 bombing of Avianca Flight 203, a domestic Colombian passenger flight. In an effort to assassinate César Gaviria, a candidate in the 1990 presidential elections and later president, Escobar's henchmen planted a bomb on the aircraft which detonated mid-air, killing all aboard except Gaviria, who had cancelled his flight. Among the dead were two American citizens.³⁶ Following this event, Escobar's capture became a priority for the United States and Colombia alike, regarded as he was by the former as a 'clear and present danger' to national security.³⁷ This was not an easy proposition, as Escobar's personal fortune was measured in billions of dollars, allowing him to shower his home region with largesse so that he assumed the role of folk hero, enjoying genuine support to the extent that at one point he was even elected to the Colombian parliament.³⁸

With military training provided by SEAL Team Six and Delta Force, along with strict security vetting, a native Colombian unit known as *Bloque de Búsqueda* (Search Bloc) was specifically created to track Escobar down, and was substantially aided by U.S. military intelligence. A special unit known as the United States Army Intelligence Support Activity (often shortened to ISA), was deployed to Colombia to utilise their intelligence gathering and surveillance expertise.³⁹ Codenamed 'Centra Spike', the unit utilised fixed-wing aircraft in their surveillance and intelligence-gathering activities. While their opponents may have expected large and sophisticated aircraft overhead, in reality Centra Spike employed an ordinary Beechcraft

³⁶ R. McFadden, *Drug Trafficker Convicted Of Blowing Up Jetliner*, 1994, located at https://www.nytimes.

³⁵ P. McLean, "Colombia: Failed, Failing, or Just Weak?" pp.124-125.

com/1994/12/20/nyregion/drug-trafficker-convicted-of-blowing-up-jetliner.html, accessed 19 January 2019. ³⁷ M. Bowden, *Killing Pablo* (London; Atlantic Books, 2012).

³⁸ A. Wallace, *Drug boss Pablo Escobar still divides Colombia*, 2013, located at http://www.bbc.co.uk/news/world-latinamerica-25183649, accessed 05 May 2018.

³⁹ M. Smith, *Killer Elite: The Inside Story of America's Most Secret Special Operations Team* (London; Orion Publishing Group Ltd, 2006) pp.165-168.

300 and 350, albeit enhanced with \$50 million worth of signals intelligence and direction-finding equipment.⁴⁰

Over several years of operations, airborne monitoring and cell-phone triangulation technology allowed key members of the Medellin cartel to be identified and monitored through interception of their radiophone and cell phone transmissions. Link analysis of their organisational structure led to the gradual capture and erosion of the Medellin hierarchy until, in 1993, the location of Escobar himself was revealed, leading to his death at the hands of Search Bloc as he attempted to escape a raid on his safe house.⁴¹

Meanwhile, Mexico was increasingly becoming one of the main transit routes for Colombian cocaine into the United States, as shall be explored later, and the latter sought to tackle this emerging issue. From 1989 to 1996 the U.S. provided 33 UH-1H helicopters to the Mexican Attorney General's Office and 73 UH-1H helicopters to the Mexican Ministry of Defence to enhance the air mobility of a dozen specialised units involved in drug interdiction.⁴² Unfortunately, like Operation Blast Furnace in the previous decade, lessons about long-term thinking had not yet been applied as they eventually would be in Colombia, for the U.S. Government Accountability Office found that the operational effectiveness of the UH-1Hs was significantly reduced at altitudes above 5,000 feet.⁴³ Given that most of Mexico, coastal regions excepted, lies above this level and is where the majority of drug cultivation and trafficking takes place, this presented an obvious issue. Information at the time indicated that the Mexican military still used the UH-1Hs in a counter-narcotics capacity, primarily as troop transports for interdiction and manual eradication forces, logistics support and aerial reconnaissance.⁴⁴ However, the oversight in effective operational altitude and the limitations this incurred demonstrated that increasing air mobility assets was not a catch-all solution, especially if specific theatre requirements were not properly thought through.

Besides developing air mobility, the period of 1990 to 2000 saw active cooperation between the U.S. and Mexico on a radar network designed to improve the tracking of small drug flights coming in from Colombia. However, at the very same time, lucrative cocaine flights from Mexico were crossing the border into the U.S. with impunity, just some of an estimated 3,500 annual cocaine supply sorties by 1989. A fleet of 30 Boeing 727s, belonging to Mexican drug baron Amado Carrillo Fuentes (earning him the title 'Lord of the Skies'), were provided with

⁴⁰ M. Bowden, Killing Pablo.

⁴¹ M. Smith, *Killer Elite*, pp.165-168.

⁴² U.S. General Accounting Office, Drug Control: Update on U.S.-Mexican Counter-Narcotics Efforts – Statement of Benjamin F. Nelson, Director, International Relations and Trade Issues, National Security and International Affairs Division, 1999, located at https://www.govinfo.gov/content/pkg/GAOREPORTS-T-NSIAD-99-86/pdf/GAOREPORTS-T-NSIAD-99-86.pdf, p.12.

 ⁴³ U.S. Government Accountability Office, *Drug Control - U.S.-Mexican Counter-narcotics Efforts Face Difficult Challenges*, 1998, located at https://www.gao.gov/archive/1998/ns98154.pdf, accessed 22 May 2018, p.18.
 ⁴⁴ Ibid, p.18.

federal protection from the Mexican government as they left and returned to the drug-transit city of Hermosillo.⁴⁵ The semi-authoritarian Mexican government of the period, and especially its security forces, were effectively complicit with the Drug Trafficking Organisations (DTOs) in profiting from the drug trade and demonstrated how institutional corruption could negate technological effectiveness.

In addition to burgeoning international cooperation with Mexico, by the late-1980s the U.S. had become increasingly comfortable in utilising its domestic air power assets in helping to secure its own airspace and facilitate interdiction. As Cold War tensions diminished, the North American Aerospace Defense Command, or NORAD, shifted substantial assets towards counter-narcotics as the Pentagon assumed the lead agency role. Along with 41 ground radar sites based in the continental United States, tethered Aerostats (radar balloons) were located in Florida and the Southwest to help detect Caribbean and Mexican-border smuggling flights.⁴⁶ Upon detecting suspected drug flights, 60 high-alert fixed-wing aircraft were ready to scramble at 30 locations, backed up by a fleet of E-3 Airborne Warning and Control System (AWACS) aircraft, with 42 percent of USAF AWACS missions at the time focused on drug interdiction.⁴⁷

Saving Colombia

By the end of the 1990s, the Colombian cocaine trade was only growing despite the best efforts of U.S. counter-narcotics policy. In fact, the increased cultivation resulted in the production tonnage of coca leaf in Colombia rocketing, from 45,422 tonnes in 1993, to 71,958 tonnes a year later in 1994, to 165,934 tonnes by 1998, almost matching the production of Peru and Bolivia *combined*.⁴⁸ In 1990 Colombia only accounted for 16 percent of that year's global total. By 1999 it accounted for 68 percent of the total.⁴⁹ These figures demonstrated that while U.S. counter-narcotics policy in the region had, to a relatively successful degree, squeezed production in Bolivia and Peru, cultivation had instead shifted into home-grown Colombian coca. The drug cartels, FARC, the similar National Liberation Army (ELN) and the right-wing paramilitary groups that opposed them, all relied on drug profits to fund their operations,⁵⁰ and caught in the middle of rampant violence was an increasingly unstable Colombian state. In response, in 2000 the United States approved 'Plan Colombia', a \$1 billion increase in aid to the Colombian military and police, including significant transfers of equipment and special forces mentoring, not least in air mobility and air interdiction capabilities.

⁴⁵ M. Beith, The Last Narco: Hunting El Chapo, the World's Most Wanted Drug Lord (London, Penguin Books Ltd, 2010), p.54.

⁴⁶ T. Bartimus, "NORAD Tunes In to Drug War", 1990, located at http://articles.latimes.com/1990-09-16/news/mn-952_1_drug-war, accessed 20 January 2019.

⁴⁷ Ibid.

⁴⁸ UNODCCP (United Nations Office for Drug Control and Crime Prevention), *Global Illicit Drug Trends*, 1999, located at http://www.unodc.org/pdf/report_1999-06-01_1.pdf, accessed 16 May 2018, p.42.

 ⁴⁹ UNODCCP (United Nations Office for Drug Control and Crime Prevention), *World Drug Report*, 2000, located at http://www.unodc.org/pdf/world_drug_report_2000/report_2001-01-22_1.pdf, accessed 16 May 2018, p.28.
 ⁵⁰ J. Otis, *The FARC and Colombia's Illegal Drug Trade*, 2014, located at https://www.wilsoncenter.org/sites/default/ files/Otis_FARCDrugTrade2014.pdf, pp.2-4.

To understand the importance and, indeed, operational necessity of efficient and effective air mobility in Colombia, it is necessary to appreciate the extent to which the country's geography presents a challenge to central governments in extending their remit across the land. Colombia is divided by three mountain ranges, with significant portions of the east comprised of the plains and jungles of the Amazon basin, home to only one-fifth of the population, while the rest reside along the western plateaus and the valleys between the mountains and the Caribbean coast.⁵¹ While matters have improved in recent years, at the height of Colombia's drug conflict the country's infrastructure, whether in the form of transportation links or substantial and permanent government presence, had traditionally experienced poor penetration in these hard-to-reach areas, generating significant inequality.⁵² This allowed guerrillas and later drug cartels to take advantage and establish a presence, facilitated by the lack of state political and security authority. This isolation has made air mobility essential for conducting counter-narcotics operations in these areas.

From 2000 to 2013, of the over \$9 billion the U.S. ultimately invested in supporting Colombia, the lion's share went towards military and security support, with \$4.2 billion dedicated to counter-narcotics funding to provide training, support and resources for Colombian military and police interdiction and eradication efforts.⁵³ In addition to this, almost \$670 million of direct weaponry and equipment transfers to the Colombians took place, including air assets, with over \$400 million supporting Air Wing operations and many dozens of rotary-wing aircraft, one of the most important tactical assets at the disposal of the military and Colombian National Police in adopting swift and effective counter-narcotics operations.⁵⁴

Plan Colombia eventually transitioned to the home-grown Colombian initiatives of 'Democratic Security' and then 'Plan Patriota', underwritten by American weapon and equipment transfers, DOD support and general interdiction support. As the Colombian government took more responsibility for its own security under both initiatives, the native budget grew to 5.2% of GDP by 2003, with total annual spending on defence rising to \$6.9 billion by 2006.⁵⁵ By 2007, the Colombian army had grown by 78,000, and new military units were deployed, including 2 divisions, 6 brigades, 12 new mobile units and 6 mountain battalions. As a result, the armed forces acquired significant additions to their air mobility assets, including over two-dozen helicopters, the provision of which was again by the U.S.

americas/2013/07/06/taking-the-slow-road, accessed 2 February 2019.

 ⁵¹ P. McLean, "Colombia: Failed, Failing, or Just Weak?" *The Washington Quarterly*, 25, no. 3 (2002): p.124-125.
 ⁵² The Economist, *Infrastructure in Colombia: Taking the Slow Road*, 2013, located at https://www.economist.com/the-

⁵³ J. Beittel, *Colombia: Background, U.S. Relations, and Congressional Interest*, 2012, located at http://fas.org/sgp/crs/ row/RL32250.pdf, accessed 18 May 2018, p.38.

⁵⁴ Ibid. p.38.

⁵⁵ USAID - United States Agency for International Development, *Assessment of the Implementation of the United States Government's Support for Plan Colombia's Illicit Crop Reduction Components* 2009, located at http://pdf.usaid.gov/ pdf_docs/PDACN233.pdf, accessed 18 May 2018, p.10.

Increased Colombian security forces were required in order to 'clear, hold and build' contested areas and expand the remit of the Colombian state, which gradually became known as the 'Consolidation' phase.⁵⁶ There is no doubt that narcotics production and trafficking remains a major security issue in Colombia today. However, as Figure 1 illustrates, the levels of violence have generally decreased to the extent that the country no longer balances on a precipice as it did during the 1990s, with major security gains in-part attributable to the force multiplier of air power.



Figure 1: Intentional homicides (per 100,000 people) in Colombia⁵⁷

The growth and development of air mobility assets in the Colombian security forces proved to be of major operational benefit in helping to re-establish some semblance of state control in ungoverned regions and disrupting drug trafficking operations. This is not to say that air mobility was, nor remains, solely responsible for recent security gains, but it has provided an important tactical capability for the Colombian army and national police, allowing counternarcotics interdiction and destruction of drug labs deep in inhospitable and often hostile territory. It is a Sisyphean task given the sheer scale of cocaine production, yet what operations that do take place successfully deny DTOs extra funding for their operations.

⁵⁶ A. Isacson, Consolidating "Consolidation" - Colombia's "security and development" zones await a civilian handoff, while Washington backs away from the concept, 2012, located at http://www.wola.org/files/Consolidating_ Consolidation.pdf, accessed 30 April 2018, p.3.

⁵⁷ The World Bank, Intentional Homicides (per 100,000 people), 2019, located at https://data.worldbank.org/indicator/ VC.IHR.PSRC.P5, accessed 2 February 2019.

While the increased air mobility of counter-narcotics security forces has had some detrimental impact on the cocaine industry, given the sheer scale of land set aside for coca growth, the most direct method of striking at the heart of Colombia's drug cultivation has usually been via the employment of air-released herbicides. The practice of aerial crop eradication is targeted at the vast coca plantations and not the populace directly. Under the auspices of the United States, the Colombians had long implemented significant aerial eradication efforts, such as Operation Condor during the 1994-1998 presidential term of the scandal-ridden Ernesto Samper, who sought to earn favour by deploying thirty-eight helicopters and twenty-one aircraft in a huge aerial campaign against illicit crops.⁵⁸ Yet this did not stop the slide into narcotics-related disorder in the late-1990s that prompted Plan Colombia. Still, as Figure 2 highlights, the number of hectares of coca cultivation were almost halved between 2000 to 2004 as Plan Colombia gained traction, indicative of success, but at the cost of creating thousands of internally displaced peoples, many already fleeing the violence of the civil conflict who also saw their main, indeed only source of income defoliated.



Figure 2: Number of Internally Displaced Persons and coca cultivation, 2000-2004⁵⁹

⁵⁸ R. Crandall, Driven By Drugs: U.S. Policy toward Colombia, p.102.

⁵⁹ UNODC (United Nations Office on Drugs and Crime) and Government of Colombia, *Colombia: Coca Cultivation Survey*, 2005, located at http://www.unodc.org/pdf/andean/Part3_Colombia.pdf, accessed 27 May 2018.

As a consequence, the primary resource of the cocaine industry was depleted, but the civil damage caused meant that the economically desperate would return to cultivation and trafficking once the opportunity arose, thus doing little to tackle the narcotics industry in the long-term. This is another demonstration of how air power can be tactically effective yet must be wedded with a longer-term strategy. It would seem that the Colombians later learnt this as the security situation improved, with Consolidation allowing increased government presence and economic development to wean areas off coca cultivation. This was in conjunction with a growing confidence to disagree with the U.S., such as when the Colombian government halted aerial spraying in May 2015 due to concerns over the environmental and health effects of the chemicals used.⁶⁰

Going to War with the Cartels

The combined efforts of the U.S. and Colombia to stabilise the country and target the South American cartels from the mid-1980s to early-2000s led to the dismantlement of these organisations and the closure or restriction of many previous air and maritime trafficking corridors. As a result, the Colombian DTOs sub-contracted the trafficking of cocaine to Mexican DTOs, making payment with the drug itself. This gradually allowed the latter to evolve from mere traffickers into the wholesalers they are today, responsible for generating their own billions of dollars in revenue rather than being subservient to the Colombians as they traditionally were. As profits soared, so too did the incentive for the Mexican DTOs to compete with each other for market share and lucrative trafficking routes into the United States.⁶¹

Mexican drug cartels are, by their own standards at least, increasingly militarised entities, often due to the presence of turncoat military operatives and counter-narcotics police in their ranks. The most notable example is Los Zetas.⁶² Though most of the original members have been captured or killed, in their original incarnation the Zetas were recruited by the Gulf Cartel as a military and enforcement wing for operations.⁶³ They had training and expertise as a Special Forces unit, with some members rumoured to have undergone U.S. training at Fort Benning, Georgia.⁶⁴ The initial leaders were even able to entice members of Mexico's special airborne counter-narcotic military unit – the GAFE – into the Zeta ranks. It was a process that eventually created what was estimated to be a paramilitary army numbering 4,000 by 2010, a powerful tool that helped the Zetas turn on their former masters in the Gulf Cartel and assume drug trafficking operations themselves.⁶⁵

⁶⁵ Ibid. p.15-16.

⁶⁰ W. Neuman, *Defying U.S., Colombia Halts Aerial Spraying of Crops Used to Make Cocaine*, 2015, located at http://www.nytimes.com/2015/05/15/world/americas/colombia-halts-us-backed-spraying-of-illegal-cocacrops.html, accessed 27 May 2018.

⁶¹ J. Beittel, Congressional Research Service – Mexico's Drug Trafficking Organizations: Source and Scope of the Violence, 2013, located at http://www.fas.org/sgp/crs/row/R41576.pdf, accessed 27 April 2018, p.8.

⁶² B. Lee, *Council on Foreign Relations – Mexico's Drug War*, 2014, located at http://www.cfr.org/mexico/mexicos-drug-war/p13689, accessed 27 April 2018.

⁶³ I. Grillo, *El Narco: The Bloody Rise of the Mexican Drug Cartels* (London, Bloomsbury, 2011) p.145.

⁶⁴ E. Vulliamy, *Amexica: War Along the Border Line* (London; The Bodley Head, 2010) p.15.

In the face of an increasingly militarised and vicious opposition, the Mexican government adopted a militarised counter-narcotics strategy of its own and deployed its armed forces in *de facto* military occupations of areas of drug violence. As with the situation prior to the launch of Plan Colombia, the United States saw a rising security crisis on its Southern border and took action. Overarching counter-narcotics aid to Mexico, whether military or predominantly law-enforcement in nature, was christened the Merida Initiative and was launched in 2008.⁶⁶

While the United States favours developing law enforcement capability in Mexico in the long-term, the Mexican military is generally perceived to be more efficient and less corrupt and so offers the better immediate partner.⁶⁷ For example, as recently as September 2018, the Mexican Army assisted in replacing the entire police force of the Pacific Coast city of Acapulco after fears that the municipal police were corrupted by drug cartels.⁶⁸ Nevertheless, in contrast to Colombia, where American military and intelligence personnel largely operated freely, the Mexicans have traditionally closely guarded their sovereignty, limiting the U.S. to an assistance and advisory role outside of Mexican territory. Yet, by 2013 the Mexican military was becoming increasingly comfortable cooperating with U.S. Northern Command in developing interdiction capability, most notably via upgrading many of its airborne platforms for counter-organised crime operations.⁶⁹

Ever since the 1990s, when the semi-authoritarian Mexican government was complicit with its native DTOs, the U.S. government has had to adopt both a positive and cautious approach to its support for Mexican counter-narcotics. Positive, because since 2000 the Mexican government is fully democratic and recognises the national security threat that the cartels pose to it and the United States, but also cautious because levels of corruption are still endemic in parts of the Mexican security and counter-narcotics forces. It is for this reason that greater military cooperation between the U.S. and the Mexican Navy and Marines, rather than with the Mexican Army, is not coincidental. The former has demonstrated enthusiasm in working with the U.S., being far more willing to adopt American air power techniques, compared to what is regarded as the more insular and corruption-prone Mexican Army.⁷⁰

As part of the Merida Initiative, four CASA 235 maritime surveillance aircraft, valued at \$50 million each, were delivered to the Mexican Navy to help increase maritime vigilance and control over Mexican territorial waters with the aim of impeding and disrupting coastal and

⁶⁶ C. Seelke, *Mexico: Evolution of the Mérida Initiative*, 2007-2019, 2018, located at *https://fas.org/sgp/crs/row/IF10578.pdf*, accessed 2 February 2019.

⁶⁷ B. Asch, N. Burger and M. Fu, *Mitigating Corruption in Government Security Forces: The Role of Institutions, Incentives, and Personnel Management in Mexico* (Santa Monica, The RAND Corporation, 2011), p.27.

⁶⁸ E. Malkin, *Mexican Authorities Disarm Acapulco Police Amid Corruption Inquiry*, 2018, located at https://www.nytimes. com/2018/09/26/world/americas/mexico-acapulco-police.html, accessed 2 February 2019.

⁶⁹ U.S. Department of Defense, Northcom Pursues Closer Engagement with Mexico, 2013, located at http://www.defense. gov/news/newsarticle.aspx?id=119074, accessed 24 May 2018.

⁷⁰ J. Beittel, *Congressional Research Service - Mexico: Organized Crime and Drug Trafficking Organizations*, 2018, located at *https://fas.org/sgp/crs/row/R41576.pdf*, accessed 19 January 2019, p.7.

Caribbean drug trafficking.⁷¹ Further supplementing this effort, an Intelligence, Surveillance and Reconnaissance (ISR) Dornier 328-JET arrived in late 2014,⁷² while in 2016 the Mexican Navy also adopted its American equivalent's fondness for Unmanned Arial Systems, as it introduced the Arcturus T-20 JUMP system to enhance its surveillance and interception capabilities.⁷³ Additionally, nine UH-60M Black Hawk helicopters were delivered to Mexican security forces, with three going to the Mexican Navy and six to the Federal Police, along with eight Bell 412 helicopters to further supplement the Mexican rotary-wing force, like the Colombians for the purpose of mobility and interdiction.⁷⁴

The examples detailed above concerning Colombia and Mexico have principally involved relatively benign military air asset support, from mobility to surveillance. Since the days of Operation Blast Furnace, American military personnel have traditionally adopted a 'hands-off' policy when working with native partner forces, preferring (and legally obligated in any case) to only provide mentoring and training rather than direct lethal participation in counternarcotics operations. However, this is not to say that covert operations with lethal effect have not taken place, as the ISA's instrumental role in helping to eliminate Pablo Escobar demonstrated. Operating under a covert programme authorised by President George W. Bush following FARC's seizure of American hostages in 2003, and continued under President Obama (and falling outside the approved Plan Colombia support package, hence its clandestine nature), the CIA was able to assist the Colombian military with intelligence and, eventually, equipment to facilitate the killing or capture of FARC commanders.⁷⁵

The CIA set up a special intelligence cell in the U.S. embassy in Bogota, where they could collect and assess intelligence on the FARC leadership and pass it on to Colombian forces, facilitated by U.S. Special Forces trainers. Lethal, direct military air support was introduced when – after legal approval was granted – the CIA were authorised to provide the Colombian air force with the Enhanced Paveway II, a relatively inexpensive guidance device that could convert a standard 500 pound drop-bomb into a targeted smart bomb.⁷⁶ In order to ensure that the use of such ordnance remained under U.S. control and was strictly limited and targeted, the CIA liaisons to the Colombian forces maintained possession of the encryption codes necessary to activate the smart bomb conversion equipment, freeing them up only with

⁷⁵ D. Priest, *Covert Action in Colombia*, 2013, located at http://www.washingtonpost.com/sf/ investigative/2013/12/21/covert-action-in-colombia/, accessed 19 May 2018.

⁷⁶ The Guardian, *Covert CIA program helped Colombia kill rebel leaders*, 2013, located at http://www.theguardian.com/

⁷¹ U.S. Embassy – Mexico 2013, *Fact Sheet: The Merida Initiative - An Overview*, 2013, located at http://photos.state. gov/libraries/mexico/310329/docs/Merida-Initiative-Overview.pdf, accessed 22 May 2018.

 ⁷² C. Seelke and K. Finklea, *Congressional Research Service - U.S.-Mexican Security Cooperation: The Mérida Initiative and Beyond*, 2017, located at https://fas.org/sgp/crs/row/R41349.pdf, accessed 22 May 2018, p.13.
 ⁷³ UAS Vision, *Mexican Navy Begins Operations with New UAV*, 2016, located at

https://www.uasvision.com/2016/08/08/mexican-navy-begins-operations-with-new-uav/, accessed 22 May 2018. ⁷⁴ C. Seelke and K. Finklea, *Congressional Research Service - U.S.-Mexican Security Cooperation: The Mérida Initiative and Beyond*, 2017, located at https://fas.org/sgp/crs/row/R41349.pdf, accessed 22 May 2018, p.13.

permission from above and when legitimate targets were confirmed.⁷⁷ It was this combination of actionable intelligence and lethal capability that allowed the Colombian military to locate, attack and kill almost two-dozen guerrilla leaders between 2007 to 2013, further compounding FARC's strategic troubles, eventually forcing them to the peace table and, if not eliminating then at least severely compromising one of Colombia's main DTOs.⁷⁸ In terms of the security spectrum, while lethal violence was indeed deliberately applied, it was highly targeted and not executed on a mass scale, and thus still constitutes militarised and not violised use of air power.

Fortress America

The final link in the drug supply chain that extends from the Andean region up through Central America, is the southern border of the United States. The border has presented an increasingly salient security issue for the U.S. long before the Trump Administration's recent concerns. Illegal immigration has always been on the agenda, but as the Mexican DTOs took over from the Colombians as the greater threat, their efforts to infiltrate their northern neighbour has led to the militarisation of U.S. border security, on the ground and in the air, as illustrated below.

In 2007 the U.S. Customs and Border Protection agency (CBP) formed the U.S. Border Patrol's Special Operations Group (SOG) – headquartered in El Paso, Texas – to direct the operations of the Border Patrol Tactical Unit (BORTAC) and the Border Patrol Search, Trauma, and Rescue Unit (BORSTAR).⁷⁹ While BORSTAR is a tactical medical and search and rescue unit that utilises rotary-wing aircraft, BORTAC is, for all intents and purposes, the Border Patrol's in-house Special Forces unit, modelled on its military counterparts, with similar rotary-wing-based transport and insertion. Formed in 1984 to serve a civil disturbance function following rioting at several Immigration and Naturalisation Service detention facilities, the unit quickly evolved to undertake specialised roles in 'high-risk warrant service; intelligence, reconnaissance and surveillance; foreign law enforcement/Border Patrol capacity building; airmobile operations; maritime operations; and precision marks-man/observer.⁸⁰ The unit has even served in American theatres of operation, including Iraq and Afghanistan, as part of Mobile Training Teams. The CBP operates a vast fleet of air assets in support of its mobility and interdiction operations involving BORTAC and regular agents, from traditional fixed-wing and rotary-wing aircraft to the latest UAS, as detailed later. These are broken down into Air Branches and Units distributed along the Southwest Border region, either alone or alongside marine assets, as Map 1 details.

⁷⁷ Ibid.

⁷⁸ Ibid.

 ⁷⁹ U.S. Customs and Border Protection, *Border Patrol Special Operations Group (SOG)*, 2014, located at http://www.cbp.gov/sites/default/files/documents/Border%20Patrol%20Special%20Operations%20Group.pdf, accessed 14 May 2018.
 ⁸⁰ U.S. Customs and Border Protection, *Border Patrol Tactical Unit (BORTAC)*, 2014, located at http://www.cbp.gov/sites/default/files/documents/Border%20Patrol%20Tactical%20Unit.pdf, accessed 14 May 2018.



Map 1: CPB Air and Marine Infrastructure in the Southwest Border Region⁸¹

The CBP primarily operates fixed-wing aircraft for intelligence-gathering, situational awareness and interdiction operations, though it also utilises aircraft such as the Super King Air 350ER (MEA) to move personnel and equipment.⁸² A significant portion of the CBP's rotary-wing fleet is utilised for air mobility, transporting personnel such as BORTAC to swiftly intercept suspected trafficking operations. The fleet includes such military stalwarts as the Bell UH-1N 'Huey', the Sikorsky UH-60 Black Hawk, the Sikorsky S-76 and the Bell UH-1H Huey II.⁸³ As well as allowing crews to operate in the heat and terrain of the American southwest, aircraft such as the Hueys and Black Hawks are ideally suited to missions associated with air mobility. These include external lifts via sling loads, the insertion of CBP forces via fast rope and rappel, and general access to inaccessible terrain, search and rescue taskings, air crew rifle operations, and aerial patrols.

In addition to air mobility, the CPB also utilises former military airborne situational awareness assets. The aforementioned Aerostat programme still endures after four decades, having been transferred from the U.S. Air Force to Customs and Border Protection in 2013. As Map 2 illustrates, a chain of eight fixed-location Tethered Aerostat Radar Systems (TARS), to give them their proper name, allows continuous and detailed monitoring of aerospace on the U.S. southern border, detecting aircraft at a range of 200 miles, even light smuggling aircraft that would have previously flown low or through mountainous terrain or valleys to avoid detection.⁸⁴

⁸¹ U.S. Customs and Border Protection, *Air and Marine - Southwest Border Region*, 2013, located at https://nemo.cbp. gov/air_marine/FS_Southwest_Border_Region.pdf, accessed 22 May 2018.

⁸² U.S. Customs and Border Protection, *Multi-Role Enforcement Aircraft - Super King Air 350ER*, 2018, located at https:// www.cbp.gov/sites/default/files/documents/FS_2015_MEA_Fact%20Sheet_FINAL.pdf, accessed 22 May 2018.

⁸³ U.S. Customs and Border Protection, *Air and Marine Operations Assets*, 2018, located at https://www.cbp.gov/ border-security/air-sea/aircraft-and-marine-vessels#wcm-survey-target-id, accessed 22 May 2018.

⁸⁴ U.S. Customs and Border Protection, *CBP's Eyes in the Sky*, 2015, located at https://www.cbp.gov/frontline/frontlinenovember-aerostats, accessed 11 May 2018.



Map 2: Tethered Aerostat Radar Systems coverage in the United States and Caribbean⁸⁵

Wireless capability allows each TARS to upload radar data to the Cloud, which is combined with data transmitted by its cousins. The data is in turn downloaded to the Air and Marine Operations Centre (AMOC) in Riverside, California, where it is fed into the Air and Marine Operations Surveillance System. The system allows AMOC to integrate over 700 sensor feeds, allowing simultaneous tracking of over 50,000 aircraft in flight over the U.S., Central America, the Caribbean and relevant parts of South America.⁸⁶ Due to the efficiency of TARS, it is claimed that the number of unidentified aircraft flying over the border has dwindled from 8,500 in the early-1980s to less than 10 per year by the mid-2010s, the assessment being that drug traffickers are now landing well short of border airspace and switching to land-based smuggling, making them notionally easier to interdict.⁸⁷ However, the CBP acknowledge that the TARS system may suffer operational outages for up to 25 percent or more of the time, due to an inability to operate in poor weather conditions, with a spokesman admitting that 'there is no 100 percent coverage. They can't monitor the entire airspace.'⁸⁸ Therefore, while the statistics noted above are seemingly impressive, they cannot be taken as absolute fact.

⁸⁵ Ibid.

⁸⁶ Ibid.

⁸⁷ Ibid.

⁸⁸ M. Browne, *US Radar Has Detected Hundreds of Illegal Low-Flying Aircraft Attempting to Cross Border From Mexico*, 2016, located at https://www.cnsnews.com/news/article/mark-browne/us-radar-has-detected-hundreds-illegal-low-flying-aircraft-attempting-cross, accessed 2 February 2019.

The CBP are not the only civilian organisation to have had former DOD assets, such as TARS or aircraft, transferred to their control. A continuing legacy of the Clinton Administration's 1997 National Defence Authorisation Security Act, which allowed surplus military equipment to be transferred to civilian law enforcement, has seen serious military hardware being operated by large urban police departments to small rural sheriffs.⁸⁹ Alongside assault rifles, night-vision equipment and armoured vehicles, a significant number of air assets have been purchased by law enforcement in various counties nationwide, but especially those along the main drug trafficking routes into the United States.



Map 3: Counties which acquired former-DOD fixed and rotary-wing aircraft, 2006-2014⁹⁰

As Map 3 highlights, over one hundred counties throughout the United States purchased former-DOD aircraft between 2006 to 2014, both fixed-wing and rotary, though mainly the latter to assist law enforcement with similar counter-narcotics operations as the CBP. El Paso County, which mirrors the violent Mexican drug city of Ciudad Juarez, purchased eight helicopters to complement its efforts, while Los Angeles County, experiencing significant trafficking and drug-related gang activity, purchased 15 helicopters to enhance its air mobility, surveillance and interdiction efforts.⁹¹ Counties in Florida and the Southwest generally show healthy aircraft purchases, reflecting the recent revival of older drug trafficking routes through

⁸⁹ R. Balko, Overkill.

⁹⁰ T. Giratikanon, A. Parlapiano and J. White, *Mapping the Spread of the Military's Surplus Gear*, 2014, located at http://www.nytimes.com/interactive/2014/08/15/us/surplus-military-equipment-map.html, accessed 22 May 2018.
⁹¹ Ibid.

the Caribbean and up through South Florida, in order to avoid the violent Mexican border regions, and increasingly securitised American side of the border.⁹²

Imagery collection is vital in developing the intelligence and situational awareness that contributes to securitising and militarising the border. With the apparent successful application of the main Aerostat system, the CBP is assessing the potential of smaller, more tactical variants to supplement its border security operations. In-keeping with previous initiatives, the DOD transferred tactical aerostats to the CBP following use by military forces deployed in Afghanistan. There are three models of tactical aerostat; the Persistent Threat Detection System; the Persistent Ground Surveillance System, and the smallest, the Rapid Aerostat Initial Deployment system, all of which operate from 500 to 5,000 feet and utilise infrared and electro-optical cameras as well as radars in order to monitor ground activity and produce imagery intelligence.⁹³

While the CBP utilises fixed-wing aircraft such as the Beechcraft King Air 200 and C-12C, and the Lockheed Martin P-3 Orion Airborne Early Warning, amongst others, for intelligence-gathering and situational awareness, like the DOD it has also embraced the UAS revolution, in the form of the Predator system, albeit the unarmed B-Class variant used for surveillance and reconnaissance. The programme began in 2005 and by 2011 there were six Predator-Bs covering most of the U.S.-Mexico border.⁹⁴ By 2018 this had increased to nine, yet analysis by the Government Accountability Office found that the Predators were airborne only 6.4 percent of available hours per year from 2013 to 2016, whether as a consequence of cancelled flights due to inclement weather, or a desire to minimise flight time in order not to excessively erode operational lifespan, among several reasons.⁹⁵ By contrast, despite the admitted coverage issues during poor weather, the TARS system operated around 60 percent of the time,⁹⁶ perhaps explaining why the CBP is increasingly interested in acquiring smaller, tactical TARS in order to supplement this superior efficiency.

Nevertheless, just as with these tactical TARS, the CBP has recently been assessing the operational utility of smaller Unmanned Aerial Systems, or sUAS, via a test programme conducted between the Autumn of 2017 to the Spring of 2018. The CBP tested AeroVironment's Raven and Puma UAS systems, as well as PSI Tactical's InstantEye quadcopter,

⁹⁴ W. Booth, More Predator drones fly U.S.-Mexico border, 2011, located at http://www.washingtonpost.com/world/more-predator-drones-fly-us-mexico-border/2011/12/01/glQANSZz8O_story.html, accessed 11 May 2018.
 ⁹⁵ D. Bier and M. Feeney, Drones on the Border: Efficacy and Privacy Implications, 2018, located at

https://www.cato.org/publications/immigration-research-policy-brief/drones-border-efficacy-privacyimplications, accessed 12 May 2018.

⁹² W. Gibson, *Shifting drug smuggling routes bring contraband to Florida*, 2014, located at http://articles.sun-sentinel. com/2014-04-05/news/fl-drug-smuggling-routes-20140404_1_central-florida-south-florida-cocaine-shipments, accessed 13 April 2018.

⁹³ U.S. Customs and Border Protection, "CBP's Eyes in the Sky".

⁹⁶ Ibid.

all of which could be equipped with regular or infrared cameras and be operated by a ground controller. The Puma is the largest of the trio, weighing in at 14 pounds with a 9.5 foot wingspan, while the Raven comes in at four pounds with a 4.5 foot wingspan, while the InstantEye quadcopter weighs a mere 0.7 pounds, meaning that the larger devices could be carried on a vehicle whilst the smallest would fit in a backpack.⁹⁷ As with the tactical TARS, such devices are already in use by the U.S. military in surveillance and force protection roles and would enable CBP agents to conduct surveillance, reconnaissance and tracking activities in areas potentially too hazardous for manned flight or ground operations, which is often why drug traffickers traverse them.

Additionally, much like how the main TARS system uploads data to the Cloud to combine with other information to form a clearer operational picture, the U.S. government has sought to marry the versatility of the sUAS with the huge criminal database it possesses. In 2017, the CBP solicited proposals from the consumer drone industry for sUAS with facial-recognition capability which theoretically could cross-reference captured imagery with hundreds of millions of photographs held by federal law-enforcement databases.⁹⁸ The upshot is that CBP agents could be forewarned when recognised traffickers, potentially with histories of armed violence, were in the vicinity and adjust their procedures accordingly. Additionally, if other recognition technology were also employed, the sUAS could identify if certain areas of vegetation showed disturbance that may indicate the passage of traffickers, or if such groups were armed or not by analysing their persons. If properly realised, this would all dramatically enhance the intelligence picture for counter-narcotics operations on the U.S. southern border.

Conclusion

This paper has sought to demonstrate how the application of military air power, or civilian air assets of a military nature, have facilitated the prosecution of the war on drugs in South and Central America and on the U.S. southern border. While no means exhaustive, the examples offered demonstrate that the principal benefit of air power has been as a force multiplier. Whether interdicting traffickers in the air or ground, rapidly inserting counter-narcotics forces, providing valuable intelligence and situational awareness, or attacking the primary resource and leadership of DTOs, the application of air power, especially as technology has improved, has allowed the United States and its partners to prosecute their counter-narcotics campaigns with an effectiveness that would have been impossible to achieve without air assets. This is not to say that air power is a panacea for the fight against illicit drugs. The drug war is fought on multiple fronts, involving society, culture, economics, public health and law enforcement. Based on the evidence presented in this paper – and on the wider assessments

⁹⁷ M. Rockwell, *CBP tests small drones for border surveillance*, 2017, located at https://gcn.com/articles/2017/09/18/ drones-border-tests.aspx, accessed 12 May 2018.

⁹⁸ R. Brandom, *The US Border Patrol is trying to build face-reading drones*, 2017, located at https://www.theverge.com/2017/4/6/15208820/customs-border-patrol-drone-facial-recognition-silicon-valley-dhs, accessed 12 May 2018.

conducted by American agencies, international organisations and think tanks from which much of this evidence is gathered – the 'war on drugs' is essentially unwinnable based on current strategy. Management is the best that can be hoped for. Yet without the advantages progressively offered by air power over the past three decades - especially in mobility, intelligence and situational awareness – such management as has taken place would arguably have been unachievable. Therefore, if air assets are not helping the United States to ultimately triumph in the fight against narcotics, then they are certainly preventing it from losing. The direct incorporation of military air assets into the drug war, or their transfer to civilian authorities, is contentious. At a base level the military exists to destroy the enemy while law enforcement is designed to keep the peace. They should be mutually exclusive, but recently the lines have blurred. Indeed, once militarisation is reached on the security spectrum and effectively becomes institutionalised through budget growth, resource allocation and organisational culture, it is extremely difficult for de-escalation to occur and for matters to return to a securitised status, let alone politicised or non-politicised. The ramifications of this for wider civil societies in which militarisation occurs outside of wartime will require much analysis and discussion in future. Yet, as this paper has demonstrated, there is strong evidence to suggest that operational lessons and technological development attributed to the military has utility for drug enforcement if applied responsibly and with due consideration. If the drug war is fought on multiple fronts then so too are there multiple ways to dispense justice, whether on the sea, on the ground, or increasingly from above.

> OROYAL AIRFORCE Centre for Air and Space Power Studies

High Flying Agents and Mystical Technology: Air Power, Bush Warfare and The Nuers, Anglo-Egyptian Sudan, 1927-1928

By Brigadier Andrew Roe

Biography: Brigadier Andrew Roe is the Director of the Higher Command and Staff Course and Assistant Commandant (Land) at the Joint Services Command and Staff College, Shrivenham. He is a graduate of the United States Army Command and General Staff College, the School of Advanced Military Studies and the Higher Command and Staff College. He holds a doctorate from King's College London and is the author of two books and numerous articles.

Abstract: Many of the small-scale actions undertaken by the RAF in the interwar years fail to feature highly in historical works on the evolution of the RAF or air power. Some were simply too small in scale or duration, too remote or unavoidably overshadowed by more significant events to recount. As a rule, modern-day research has largely ignored them. One such example is the use of a flight of No. 47 (B) Squadron against the Neur tribesmen of the Anglo-Egyptian Sudan in 1927-1928. This was a complex operation, with air and the Sudan Defence Force working closely together. It was to last well over a month and consisted of two separate, but sequential, actions. Events are worth recounting as, not only do they demonstrate the flexibility of air power, they also help expose the realities of its, at times, controversial application in Colonial Africa.

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Introduction

Great as was the development of air power in the war on the Western front, it was mainly concerned with aerial action against enemy aircraft and co-operation with other arms in action in which land or sea forces were the predominant partner. In more distant theatres, however, such as Palestine, Mesopotamia and East Africa the war has proved that the air has capabilities of its own.

> 'On the Power of the Air Force and the Application of that Power to Hold and Police Mesopotamia', March 1920¹

It must not be forgotten we were still very angry with the Nuer for murdering Fergusson Bey.

F. D. Kingdon

Challenging Times and Emerging Opportunities

The Royal Air Force (RAF) faced momentous change in the years following the Armistice of 11 November 1918. The return to peaceful conditions in Europe resulted in reductions to all three Services, but particularly to the RAF. Apart from a limited number of squadrons in India and the other overseas garrisons, the RAF almost ceased to exist. 'This was perhaps inevitable', recalled Squadron-Leader John Slessor in an article titled 'The Development of the Royal Air Force', published in 1931. He went on to clarify his assertion:

The Air Force had no peace policy nor tradition. The threat from the air, which had been largely instrumental in calling it into being a unified Service, had disappeared with the disruption of the German Air Force, while the possibility of a similar menace coming from any other direction naturally then seemed inconceivable.²

Even so, the physical change was immense. In late November 1918, the RAF consisted of 185 squadrons, 30,000 officers, 263,000 other ranks and 22,000 aircraft. Within two years the number of squadrons had reduced to 28 (of which 21 were overseas), 3,280 officers and 25,000 other ranks.³

The challenge faced by the Air Ministry was essentially twofold. First, it had to build a regular Service out of the remains of the wartime RAF, whilst simultaneously cooperating with the Navy and Army in a number of peacetime activities and widely-scattered campaigns across a vast Empire. Second, it had to engage in the continuing *mêlée* to maintain the independence of the force. All of this had to be undertaken at minimal cost, with only a

¹ AIR 1/426/15/260/3, Air Staff, 'On the Power of the Air Force and the Application of that Power to Hold and Police Mesopotamia', Mar 1920.

² Slessor, J. C., 'The Development of the Royal Air Force', RUSI Journal, Vol. 76, Feb-Nov 1931, p.324.

³ 1X/5/9, Liddell Hart Centre for Military Achieves, King's College, London.

handful of trained staff, no permanent list of personnel and whilst exploiting the economies of peace. Fortunately, direction was at hand. Based on the assumption that there would be no major war in Europe for the next ten years, the blueprint for the RAF's long-term success came in the form of a 7,000 word White Paper. This was titled 'The outline of a scheme for the permanent organisation of the Royal Air Force'.⁴ Drafted and redrafted at Chief of the Air Staff's request, it was published in December 1919.⁵ It became a model for other air forces around the world.⁶ The principal foundations on which the Service would shape itself were: first, reducing the number of operational squadrons to the minimum necessary to meet overseas commitments; second, maintaining a small force in the United Kingdom as a reserve; and third, concentrating the remainder on perfecting the training of officers and men, thereby creating an efficient cadre capable of expansion should the need arise.⁷ Underpinning the document was emphasis on maintaining the independence of the new Service. The scheme was approved by Parliament and work to restructure the RAF began in earnest in 1920.

The RAF was soon to get an unforeseen helping hand from troubles in the Middle East. During the Summer of 1920, a full-scale rebellion occurred among the tribesmen in Mesopotamia – the 'cradle of civilisation' and Britain's most troublesome new mandate.⁸ Some 130,000 tribesmen were involved, of whom perhaps half were armed with modern rifles. Despite a robust military response, the country remained volatile throughout 1921 and 1922.⁹ This proved to some to be an example of the 'Army's inability to nip trouble in the bud ...,' or to contain it.¹⁰ It also presented compelling evidence that any genuine measure of administration based on traditional methods of force would involve the maintenance of large military garrisons. This was deemed unsupportable under the stringent economic conditions of the time. The total casualties for the insurrection were 875 British killed and missing, and 1,228 wounded. Arab losses were estimated at 8,450 killed and injured.¹¹ 4,800 British and 24,500 Indian army troops were dispatched to the Iraq Mandate to reinforce the 102,000 imperial troops already stationed in Mesopotamia, as well as two additional RAF squadrons. The financial price tag of the enterprise shocked the British government. Military operations alone had cost the treasury 40 million pounds. Understandably, a new approach was called

⁴ 'Permanent Organization of the Royal Air Force', note by the Secretary of State for Air on a Scheme Outlined by the Chief of the Air Staff, H.M. Stationary Office, London, dated December 1919. See https://archive.org/details/ PermanentOrganizationOfTheRoyalAirForce1919.

⁵ The Chief of the Air Staff was Hugh Trenchard.

⁶ Millar, R., *Boom: The Life of Viscount Trenchard – Father of the Royal Air Force*, (London: Weidenfeld & Nicolson, 2016), p.246.

⁷ Mahoney, R., 'Trenchard's Doctrine: Organisational Culture, the 'Air Force Spirit' and the Foundation of the Royal Air Force in the Interwar Years', *British Journal for Military History*, Vol. 4, Issue 2, Feb 2018, pp.143-177. ⁸ Iraq as of 1921.

⁹ O'Connell, J. F., *The Effectiveness of Airpower in the 20th Century: Part 1 (1914-1939)*, (New York: iUniverse, 2007), p.182.

¹⁰ Kingston-McCloughry, E. J., *Winged Warfare: Air Problems of Peace and War*, (London, Jonathan Cape Ltd., 1937), p.240.

¹¹ Jacobsen, M., 'Only by the Sword: British Counter-Insurgency in Iraq, 1920,' *Small Wars and Insurgencies*, No. 2, Aug 1991, p.357.

for to control Mesopotamia and a bold proposal to employ air power, in substitution for the Army and in a policing role, was put forward.¹²

The British government welcomed the idea. The brainchild of Winston Churchill, ¹³ then Secretary of State for the Colonies, and Trenchard, the scheme was endorsed at the Cairo Conference on 12 March 1921. The daring approach saw the Air Ministry shoulder the burden of the internal order of Mesopotamia, on a system based on air power as the primary striking force, supported by a relatively small force of soldiers on the ground. This consisted of four armoured-car squadrons, braced by British, Indian and locally recruited troops.¹⁴ The annual cost of the proposal was forecast to be just £3-4 million.¹⁵ Despite strong-willed opposition from the Army,¹⁶ the trial was initiated at the end of 1922 and the political situation in the country steadily improved, although tribal banditry and heavy fighting was not uncommon. Brigadier-General P. R. C. Groves underlines the clear fiscal benefit of the approach:

... the most striking result of the substitution of air control for military control in Iraq was the immense economy effected. In 1920, when there was a general rising in Iraq, the military expenditure for defence amounted to no less than £38,500,000. In 1921 it was nearly £21,000,000. In 1922 the Air Force took over control, and by 1925 the expenditure had been reduced to four million. Of recent years it has averaged less than a million and a half.¹⁷

The experiment – increasingly known as 'air control' – proved to be a success in Iraq and appeared to suit the myriad police problems common to a violent tribal society.¹⁸ It employed the RAF (only eight squadrons of fighters and light bombers) as the primary arm to support the political administration in maintaining peace at an acceptable cost. Governed by clearly defined rules, its success depended on high-grade intelligence, combined with an intimate knowledge of the habits, mentality and aims of the local inhabitants.¹⁹ This allowed the RAF to conduct operations with an accuracy that seemed sometimes superhuman to the tribesmen.²⁰ Aircraft enabled remote or inaccessible areas to be reached within hours and

¹² Roe, A. M., 'Flying In The Blazing Sun: Air Control, District Intelligence Officers And Mixed Results', *British Army Review*, No. 159, Winter 2013-2014, p.64.

¹³ Churchill had previously been Secretary of State for Air (15 Jan 1919-1 Apr 1921); therefore, he was intimately involved in the creation of the RAF and was a strong supporter for the substitution policy.

¹⁴ AIR 19/109, 'The Development of Air Control in Iraq', October 1922.

¹⁵ Salmond, J., 'The Air Force in Iraq', *RUSI Journal*, Vol. 70, No. 479, 1925, p.485.

¹⁶ Orange, V., Churchill and his Airmen: Relationships, Intrigue and Policy Making 1914-1945, (London: Grub Street, 2013), p. 64; Millar, Boom, p.256.

¹⁷ Groves, P. R. C., Behind the Smoke Screen, (London, Faber & Faber Ltd., 1934), p.287.

¹⁸ The policy of assigning responsibility for defence of a region to the Air Ministry.

¹⁹ Thomas, M., 'Bedouin Tribes and the Imperial Intelligence Service in Syria, Iraq and Transjordan in the 1920s', *Journal of Contemporary History*, Vol. 38, No. 4, Oct 2003, pp.539-561.

²⁰ However, the reality was that most bombing attacks were often inaccurate and heavy-handed. Roe, 'Flying In The Blazing Sun', p.65.

proved effective against the tribesmen, who judged the strength of an administration by its ability to deliver punishment without delay when misbehaviour occurred. However, air control was not invulnerable to criticism. The RAF had to defend itself against the charge of inhumane and callous methods of warfare, especially when a Labour government came to power in 1924. Even so, air control was extended to other areas where conditions were deemed similar, including Trans-Jordan.²¹ From its establishment in 1922, a combination of aircraft and armoured cars successfully subdued both intertribal lawlessness and Wahhabi raiders from Saudi Arabia.²² That same year the Air Ministry assumed control of Palestine (part of a single mandated territory with Trans-Jordan). By 1925 the military garrison consisted of only a single cavalry regiment, a company of armoured cars and a squadron of aircraft.²³ In the Spring of 1928, the Air Ministry assumed responsibility for the defence of the Aden Protectorate, Britain's longest and concluding application of air control, creating 50 landing grounds near all the main centres of population. Air policing – albeit under Army control – was also employed successfully on several occasions on the North-West Frontier of India, for example in 1925, 1927, 1928 and throughout the 1930s.²⁴

Elsewhere, air power had already proven its utility. In 1916, a small detachment of B.E.2c biplanes, operating at extreme range from their original base location, were employed against Sultan Ali Dinar, the one-time official Government agent for the Darfur region of Sudan. Air power played a key role throughout the operation, helping to reconnoitre and attack the Sultan's position.²⁵ Four years later, air power was used against Mohammed Abdullah Hassan, better known as the 'Mad Mullah' of British Somaliland. This became a clear example of the value of air policing and military economy. It proved swifter, cheaper and a lower risk alternative to the use of large ground forces. It also helped bring to an end a 20-year-long resistance. The historical imprint is that the campaign lasted only three weeks and cost less than £100,000.²⁶ There were more positive headlines to come. The Afghan rebellion of 1928-29 resulted in a risky air evacuation comprising of 84 active sorties to save hundreds of embassy staff from several countries, along with their families and 24,000 pounds of baggage, after inter-tribal strife spread into civil war in Afghanistan.²⁷ In ungainly aircraft, in some of the worst weather conditions outside the Arctic Circle, the skill of the pilots, supported by dedicated

²¹ Slessor, 'The Development of the Royal Air Force', p.332.

²² Towle, P. A., *Pilots and Rebels: The Use of Aircraft in Unconventional Warfare 1918-1988* (London: Brassey's, 1989), p.24.

²³ Omissi, D. E., *Air Power and Colonial Control: The Royal Air Force, 1919-1939*, (Manchester, Manchester University Press, 1990), p.44.

²⁴ Cloughley, B., L. W. Grau and A. M. Roe, From Fabric Wings to Supersonic Fighters and Drones: A History of Military Aviation on Both Sides of the North-West Frontier, (Solihull, Helion & Co. Ltd., 2015); Slessor, J., The Central Blue: Recollections and Reflections, (London, Cassell & Co. Ltd., 1956), p.52.

²⁵ Roe, A. M., 'Air Power in Darfur, 1916: The Hunt for Sultan Ali Dinar and the Menace of the Fur Army', *Air Power Review*, Vol. 20, No. 1, Spring 2017, pp.8-24.

²⁶ Roe, A. M., 'Air Power in British Somaliland, 1920: The Arrival of Gordon's Bird-men, Independent Operations and Unearthly Retributions', *Air Power Review*, Vol. 21, No, 1, Spring 2018, pp.74-93.

²⁷ Baker, A. and R. Ivelaw-Chapman, Wings Over Kabul: The First Airlift (London: William Kimber & Co. Ltd., 1975).

crews, mechanics and riggers, accomplished a marvel of airmanship under the most testing conditions.²⁸ The Middle Eastern campaigns and wide range of miscellaneous, but essential, colonial duties were key to shaping the fledgling RAF. They were also strengthening the hand of the Service at each turn and the future independence of the RAF was secured by 1925.²⁹

While such activities are largely well known to air power enthusiasts, almost forgotten are a number of smaller actions undertaken by the RAF in the interwar years. These were often not necessarily viewed as successful, or instructive when selling the virtues of air control. Some were simply too small in scale or duration, too remote or unavoidably overshadowed by more significant events to recount. As a rule, they do not figure highly in historical works on the evolution of the RAF or air power. And modern-day research has largely ignored them. One such example is the use of a flight of No. 47 (B) Squadron against the Neur tribesmen of the Anglo-Egyptian Sudan in 1927-1928.³⁰ This was a complex operation, with air and the Sudan Defence Force working together. It was to last well over a month and consisted of two separate, but sequential, actions. The first against Gwek Wonding, the recalcitrant witchdoctor of the Lau Nuers, and the second directed against the Nuers of Lake Jorr, and those associated with the murder of Captain Fergusson, the District Commissioner on 15 December 1927. Events are worth describing because not only do they demonstrate the flexibility of air power, under conditions of considerable difficulty and hardship, they also help to expose the realities of its application in Africa and its mixed reception. They also highlight the danger of air power simply being an auxiliary to land forces. Moreover, they are useful in other ways. As Neville Parton cautions wisely, unless practitioners '... have an understanding of what has gone before – what has worked, and perhaps more importantly what has demonstrably not – [they] have nothing on which to base [their] decision making.³¹

The Anglo-Egyptian Sudan and the Troublesome Nuers

The African native is in a far more primitive stage of advancement than the Arab or the North-West Frontier tribesmen ...

TNA/PRO Air 9/59

In early 1899, an Anglo-Egyptian agreement reinstated Egyptian rule in Sudan, but as part of a condominium, or joint authority, exercised by both Britain and Egypt.³² The agreement designated territory south of the twenty-second parallel as the Anglo-Egyptian Sudan. Initially, the colonial government favoured indirect rule, which allowed the British to govern

²⁸ Roe, A. M., 'Evacuation by Air: The All-But-Forgotten Kabul Airlift of 1928-29', Air Power Review, Vol. 15 No. 1, Spring 2012, pp.21-38.

²⁹ Killingray, D., "A Swift Agent of Government': Air Power in British Colonial Africa, 1916-1939', Journal of African History, No. 25, 1984, p.432.

³⁰ No. 47 (B) Squadron's motto is: *'Nili nomen roboris omen'* (the name of the Nile is an omen of our strength). ³¹ Parton, N., 'In Defence of Doctrine ... But Not Dogma', DDefS (RAF) Discussion Paper, Oct 2007.

³² On the whole Sudan was arguably the most successful and altruistic of all Britain's colonial ventures, from which Britain gained very little and the Sudanese people, over time, a great deal.

through indigenous leaders. For good reason, southern Sudan's inaccessible, unproductive and undeveloped provinces received little official attention. But British policy in the region was about to change. Prior to 1919, the Government's approach towards the southern provinces – less perhaps the maintenance of law and order – was largely passive. Beyond 1919 and into the 1920s, influenced by the Egyptian Revolution, ³³ the Government became increasingly active and interventionist.³⁴ However, unlike in the north, where early transition from military to civilian administration had occurred, the management of the south was dominated by the military and a martial approach. This brought the Government into regular contact with the 'children of the swamp' – the Nuers. The Nuers of southern Sudan were a troublesome and belligerent tribe, easily roused to violence. Disturbances, petty-skirmishes and misbehaviour, resulting in punitive action, were frequent. There was always a new generation of young warriors keen to assert themselves. The tribesmen remained resentful of foreign interference and influence, and disregard for Government orders was commonplace.

In total, there were approximately 400,000 Nuer tribesmen. The majority lived in the swamps and open, clayey savannah of the Upper Nile Province. This was a remote, mysterious and unknown land. But there were smaller sections in Bahr el Ghazal and the Nuba Mountains provinces. *The Times* noted: 'Their territory is one vast flat plain of cotton soil intersected by parts of the Bahr el Ghazal, Bahr el Jebel, Zeraf and Sobat rivers and cut up by numerous swamp khors'.³⁵ Nuer land extended over some 20,000 square miles. The rainy season, which lasts from early May until late November, resulted in areas of the plain being flooded and covered in dense green grass. This grew to six to eight feet tall. There were very few trees. Throughout the period the country was virtually impassable. Towards the end of January grass fires, started by the tribesmen, swept across the plain, leaving a scorched, bare and deeply-fissured surface. This helped facilitate cattle movement and offered good grazing; new grass shoots, which grew readily, provided excellent food for livestock. It also allowed easier access to water. Beyond March it was difficult to obtain water except from the major rivers and larger pools.³⁶

The Nuers were viewed as independent, elusive and warlike. They had no predominant leader. Each of the sections, or clans, had its own hereditary chief – a sacred person, but without administrative authority. This lack of tribal homogeneity and the fractious nature of clan politics helped lessen the likelihood of the sections combining for warlike purposes. But it also increased the difficulty of administration for the Government. This was further complicated by

³³ The Egyptian Revolution of 1919 was a countrywide rebellion against the British occupation of Egypt and Sudan. It was carried out by Egyptians from different walks of life in the wake of the British-ordered exile of the revolutionary Egyptian Nationalist leader Saad Zaghlul, and other members of the Wafd Party in 1919.

³⁴ Abdel Rahim, M., 'The Development of British Policy in the Southern Sudan 1899-1947', *Middle Eastern Studies*, Vol. 2, No. 3, Apr 1966, p.227.

³⁵ The Times, 'The Nuers: Difficulties of Control', 11 Feb 1928.

³⁶ Evens-Pritchard, E. E., 'The Nuer of the Southern Sudan', pp.73-80. Available at https://www.uio.no/studier/emner/sv/sai/SOSANT1000/h14/pensumliste/evans-pritchard_the_nuer.pdf.
a lack of an actual, active chief's influence. In its place, *kujurs*, witchdoctors or medicine men, had the greatest power over the young, hot-headed warriors. These individuals rarely came into contact with Government officials, of which there were no more than four or five to cover the territory. Tribal warriors were armed with spears, shields and clubs. They also had access to modern rifles that came from Abyssinia. As a rule, they lived a semi-nomadic existence, moving far and wide with their livestock during the dry season, before returning to their villages at the start of the rainy season.³⁷ Edward Evans-Pritchard notes in *The Nuer* that: 'Cattle are their dearest possession and they gladly risk their lives to defend their herds or to pillage those of their neighbours'.³⁸ The warriors covered and defended their precious animals at all costs. They placed very little value on their village huts or crops (millet or maze). Although primitive, the Nuer was a formidable foe.

The Arrival of Air Power and its Early Use

The hunter who is tracking an elephant does not stop to throw stones at birds.

African proverb

There were no military aircraft in sub-Saharan Africa prior to 1914. Aircraft first reached Khartoum in 1914, and by 1916 air power was deployed in campaigns in South-West and East Africa. These operations in far-off and thinly populated territory quickly proved the utility of aircraft.³⁹ Despite a 1919 plan for a permanent RAF base in Nigeria, Sudan was chosen in its place following the early employment of air power against the Nuers in 1920. However, it was not until 1927 that a squadron moved permanently to Khartoum. The squadron was viewed principally as an insurance against a revival of Mahdism, the influence of Egyptian nationalism or a mutiny of locally-recruited troops. It also contributed to Britain's dominance of the Middle East and the defence of the Suez Canal. However, in a country where ground movement was difficult, aircraft offered speed, long-range and the ability to cross hills, grass plains and swamps uninhibited, linking together the scattered units of the Sudan Defence Force. In 1927, No. 47 (B) Squadron moved to Khartoum and in December of that year it replaced its ageing DH.9As in favour of Fairey IIIF (mark IVCs – J9053-J9077), a two-seat, landbased general purpose aircraft.⁴⁰ Featuring composite construction, it was very strong and, although it lacked the power to allow tight turns without the loss of height, it was an effective platform with good rough-field and short-field performance. Nevertheless, due to the fear of criticism for attacking some of the most primitive and defenceless people within the Empire, air power was generally limited to supporting ground operations. The conditions for air control in Sudan were viewed as far from ideal and operations against the Nuers were going to help reinforce this perception.

³⁷ The Times, 'The Nuers', 11 Feb 1928.

³⁸ Evans-Pritchard, E. E., *The Nuer: A Description of the Modes of Livelihood and Political Institutions of a Nilotic People*, (Oxford: Clarendon Press, 1940), p.17.

³⁹ Killingray, 'A Swift Agent of Government', p.430.

⁴⁰ Mason, F. K., The Fairey IIIF: Profile Number 44, (London: Hills & Lacy Ltd., 1965), p.4.

In the 1920s, the Nuers were viewed as an un-administered, superstitious and truculent tribe. M. W. Daly recalls in *Empire on the Nile* that '... their history of relations with the Sudan Government [was] a long chapter of misunderstanding and neglect punctuated by official violence and popular mistrust.'⁴¹ For example, in late 1920, a government patrol was sent against the Gaajok and Gaajack Nuer east of the Sobat. The sections had rebelled and raided their neighbours. The assembled force included a detachment of two aircraft flown in from Egypt, known as 'H Unit'.⁴² It based itself at a crude airstrip at Nassar. Initial air patrols revealed that the campaign was not going to be straightforward. Not only was it difficult to identify the tribesmen in the swamp, but the natives were not frightened by the sight of DH.9As overhead. However, regular low-level bombing and machine-gun attacks took their toll on the tribesmen. Working in combination with ground forces, which increasingly targeted food stocks, the combined effect resulted in peace negotiations. Air operations ended on 23 May. The force had employed 165 bombs, 50 incendiary bombs and 7,000 machine-gun bullets. The human cost was severe but there were no RAF casualties. Nevertheless, 'H Unit' did not have it all its own way. One aircraft crashed due to mechanical problems, and a fire at Nassar on 18 February destroyed the workshops. The remaining aircraft crashed during take-off on 3 March and was only replaced on 1 April.⁴³

The deployment was judged a success and the only observation from the ground commander was that more aircraft should have been deployed to prevent gaps in air cover due to accidents or mishaps.⁴⁴ The official Air Report states:

The moral effect was tremendous ... enhanced by the accuracy of the attacks – information gleaned showing the casualties inflicted on people and stock to have been severe – there is no doubt that this type of warfare will produce excellent results even if carried out when less favourable conditions render accurate bombing more difficult.⁴⁵

The effect of air power was deemed instantaneous and decisive. It helped set the conditions for its future application; often more aligned with the Army's doctrine of maximum lethality rather than the RAF's minimum force ethic.⁴⁶ However, the operation resulted in no long-term political solution and relations between the political authority and the Nuers remained strained. Activity, thereafter, took a more cautious and less heavy-handed approach, steered by those with greater cultural and linguistic understanding of the region. It reflected the

⁴¹ Daly, M. W., *Empire on the Nile: The Anglo-Egyptian Sudan 1898-1934* (London: Cambridge University Press, 1986), p.399.

⁴² https://weaponsandwarfare.com/2018/07/19/imperial-policing-in-the-interwar-era-i/

⁴³ Groves, Behind the Smoke Screen, p.282.

⁴⁴ Renfrew, B., *Wings of Empire: The Forgotten Wars of the Royal Air Force, 1919-1939* (Stroud, Gloucestershire: The History Press, 2015), pp.60-63.

⁴⁵ TNA, AIR 20/680, 'Report on Operations, South East Sudan, 1921'.

⁴⁶ Longoria, M. A., 'A Historical View of Air Policing Doctrine: Lessons from the British Experience Between the Wars, 1919-1939', Thesis, School of Advanced Airpower Studies, Air University, Maxwell Air Force Base, Alabama, May 92.

reality that trouble was generally abating, tribes were settling their own differences internally and taxes were being paid. It was also an indication of the skill and influence of the district commissioners and medical practitioners.

But trouble was often fomenting and some tribesmen found a life without conflict dull. Moreover, without the ability of the chiefs to control the hot-headed tribesmen with traditional executive powers, maintaining tribal peace was a significant undertaking.⁴⁷ Trouble often erupted and needed addressing.

The Lau Nuer Operations

I fear that Messrs. Pok and Gwek Will shortly get it in the neck And that an overwhelming shock Is due to Messrs. Gwek and Pok. Then let us mourn the bitter wreck In store for Messrs. Pok and Gwek When we administer the knock To Mr. Gwek and Mr. Pok.

Punch magazine

The next notable flare-up occurred in 1927. This resulted in operations against the Lau Nuers in the triangle between the Nile and the Sobat. Its roots were deep and loosely attributed to '... a conspiracy of witchdoctors – kujurs – who are suspicious of the progress of peaceful administration.⁴⁸ Unrest came to a head when a progressive policy of road building through Lau territory resulted in a number of kujurs establishing followings of dangerous tribal warriors. But interestingly, there is also a suggestion that the confrontation between the government and the Nuer, that began to foment in late 1927, was triggered by one of the district administrators, as a means of compelling the government to commit more resources to the region.⁴⁹ The individual in question was C. A. Willis, known as 'Chunky'. Willis was posted to the Upper Nile Province as Governor in 1927 from the Intelligence Department in Khartoum, where he had spent the previous decade as both Assistant Director and Director. Although a prodigious writer of reports, his objectivity and judgement were questionable.⁵⁰ He had failed to provide advanced warning of the army mutiny and the White Flag League Revolt of 1924 while stationed in Khartoum.⁵¹ These were factors that resulted in his posting to one of the least developed provinces in the Sudan. Willis portrayed the Nuer prophets, or witchdoctors, as men of war whose influence had to be eradicated. By removing the prophets, many of whom refused to acknowledge British authority, his view was that hereditary chiefs could emerge and administrative progress could take root.

⁵⁰ Daly, *Empire on the Nile*, pp.400-401.

⁴⁷ Daly, *Empire on the Nile*, p.400.

⁴⁸ The Times, 'The Sudan Murder: Rounding up the Rebels (R.A.F. in Action)', 20 Jan 1928.

⁴⁹ He had already persuaded Khartoum to allocate money for the development of the province, the most important grant coming from the Egyptian Government for the examination of irrigation schemes.

⁵¹ The White Flag League was an organised nationalist resistance movement of Sudanese military officers, formed in 1923-24, which made a substantial early attempt toward Sudanese independence.

His particular dislike was a 45-year-old chief called Gwek (the frog) Wonding, of the Lau Nuer. Gwek was a fitting moniker for, as he got older, he developed misshapen arms and legs, a stubby body and a short toad-like cranium. Wonding's power over his followers was said to originate from a large hand-built 60 foot high earthen 'pyramid', or *bieh*, in the centre of his village, Dengkur.⁵² The conical earth mount, exceptionally smooth, built of cattle dung, clay and cotton soil, was adorned with coloured stones, ostrich eggs, feathers, ivory, and other talismans.⁵³ It was visible for miles around and commemorated his father, Ngundeng Bong, also a celebrated witchdoctor. Wonding objected to a new road being constructed in tribal territory and forbade tribesmen to support any construction activity.⁵⁴ He was suspicious of its role and utility. Gradually fomenting trouble, Wonding stated forcefully that: 'The Lau know not how to make roads ...'in a chiefs' meeting.⁵⁵ Later, he was the first to show open defiance. The political authorities viewed him as anti-government and truculent. The timing of the project may also have been an irritant to him; it appeared to clash with the time the Nuer normally cleared their fields for cultivation.

Based on troubling reports⁵⁶ that Wonding planned to kill Percy Coriat, the District Commissioner, on his return from leave in England, and raise the Nuer in rebellion, Willis had already persuaded Khartoum to authorise a patrol among the Lau in the dry season of 1928. But grounded in former allegations about Wonding, which turned out to be fabricated, the Governor-General was cautious and suggested that Coriat meet with Wonding and attempt to establish ground truth. If that failed, and only then, would force be used. However, unbeknownst to Coriat, military preparations were in the advanced stages and there appeared to be an irreversible momentum to re-test offensive air action in Sudan in order to determine its utility in tribal administration. Despite the Governor-General's wish, Coriat was only allowed to go to Abwong to discover the extent of Wonding's support. He was not permitted to meet him. He arrived in Malakal by air on 20 November 1927, arriving at Abwong by steamer seven days later. Once there, he conducted a number of meetings with go-betweens and local tribal visits. These were misinterpreted by the tribesmen as preparation for war with the Nuer. Attempts to obtain Wonding's submission failed. As a result, hundreds of bulls were sacrificed at the pyramid, which the tribesmen believed would give them strength over the invader, and war drums were beaten. Some tribesmen evacuated their homes and travelled to the Government Posts at Abwong and Duk Fayuil for safety.

⁵² Deng is the Dinka name for the Great Spirit or Godhead. Kur in Nuer means war or anger. Therefore, Dengkur means 'God of war' or the 'Wrathful God'.

⁵³ The Times, 'The Sudan Murder', 20 Jan 1928; Renfrew, Wings of Empire, p.192.

⁵⁴ Johnson, D. H., *Empire and The Nuer: Sources on The Pacification of The Southern Sudan, 1898-1930* (Oxford: Oxford University Press, 2016), p.198.

⁵⁵ Coriat, P, 'Gwek, The Witch-Doctor and the Pyramid of Denkgur', *Sudan Notes and Records*, Vol. 22, No. 2, 1939, p.231.

⁵⁶ Some of these were undoubtedly anti-Wonding reports from Nuer tribesmen. Inter-clan fights were commonplace in the region. Truth was routinely manipulated or misinterpreted.

Moreover, two less well known witchdoctors, Char Koryom and Pok Keirjok, accompanied by some tribesmen, joined Wonding in staunch support.⁵⁷ There were reported to be 1,000 tribesmen ready to fight any incursion into tribal territory.

Prompt action was deemed necessary. It was decided that Wonding should be removed from the Lau Nuer, that his followers should disband and return under the authority of their tribal chiefs, and that the pyramid at Dengkur should be destroyed. In addition to ground forces, it was recommended that aircraft cooperate with Sudan Defence Force troops in attaining their objectives. One flight of No. 47 (B) Squadron, with accompanying ground personnel, was allocated to support 60 rifles of No. 7 Infantry Company, Equatorial Corps from Malakal, a detachment of engineer troops from Khartoum and forty mounted police. This was thought to be a robust force to deal with the evolving situation. Preparations for military operations were now advancing at pace. A forward operating base was established 17 miles south of Malakal, close to the junction of the Khor Filus with the Sobat River. This included the establishment of a suitable landing ground for the RAF. By 17 December, the flight, complete with ground personnel, bombs and stores was established.⁵⁸

The following day Coriat, who had been appointed political officer to the patrol, announced that the number of warriors in rebellion had risen from 1,000 to 4,000. Possibly only half of these possessed rifles. Concentrations of recalcitrant tribesmen had now advanced within 10 miles of Nyerol. In light of the developing situation, the RAF was tasked to bomb Dengkur on 18 December. Coriat informed a number of chiefs that only cattle camps would be attacked and that women and children should remove themselves from the area. This allowed the tribesmen to relocate their families and as much of their movables and livestock to a place of safety in order to avoid casualties. This reflected air control doctrine which sought to disrupt everyday life by the minimum application of force. However, logistic challenges resulted in the hoped-for aircraft not being available in time. Coriat was only informed at 02:00 hours on 18 December that the attack would not occur.⁵⁹ This was a frustrating start, and the day of the initial raid passed with no aerial activity at all. Tribal road gangs immediately downed tools. To help regain prestige, a more ambitious demonstration was planned for the following day. On the morning of 19 December⁶⁰ aerial action occurred, but no tribal information was received as to the effects of the activity until 23 December. Aircraft repeatedly circled and attacked the pyramid, the first planes arriving in the morning in time to interrupt the sacrifice of an ox. However, their incendiary bombs failed to set fire to the surrounding village and most of the ordnance dropped missed the pyramid; perhaps a reflection of the poor bombing skills

⁵⁷ Coriat, 'Gwek, The Witch-Doctor and the Pyramid of Denkgur', p.233.

⁵⁸ CAB 4/18, CID 903B, 'Operations in the Sudan (Dec 1927-Feb 1928)' – despatch from His Majesty's High Commissioner for Egypt and the Sudan, covering a Report by the Governor-General of the Sudan, p.2.
⁵⁹ Johnson, *Empire and The Nuer*, p.201.

⁶⁰ CAB 4/18, CID 903B, 'Operations in the Sudan (Dec 1927-Feb 1928)', p.3.

of the crews. Subsequent bombing and machine-gun raids against the pyramid occurred, achieving holes in the mounds.⁶¹

Over the period 20-21 December the RAF carried out offensive operations against Dengkur, Ryr, tribal concentrations and cattle herds.⁶² Thereafter, aircraft flew over the territory several days running, machine-gunning any concentrations of men or cattle they could find. It was hoped that the loss of the latter would be severely felt. 'Further action was then suspended to enable the political officer to discover what moral and material damage had been caused by these air attacks.'⁶³ Results were mixed. The material damage was very small except against cattle herds. Tribal morale, however, was plummeting and enemy concentrations were lessening. Coriat reported that the total casualties caused by the RAF were only one man killed and several cattle slayed.⁶⁴ However, the plan to bomb the pyramid to discredit Wonding's authority had fallen short. It was hoped that the 20 pound bombs carried by the Fairey IIIFs could destroy the earthen mound; proof that the Government had the stronger power. The pyramid stood tall.

With aerial action continuing, thought turned to the structure of the punitive patrol and the need for a dedicated reserve. To bolster the ground force, the Talodi Company, Camel Corps, was ordered to move to Khor Filus. Moreover, as a result of Captain V. H. Fergusson's murder (discussed below) and the necessity of a second patrol against the Garaluark Nuers, reinforcements were sent from Khartoum to act as a general reserve at Malakal. With the addition of No. 1 Company, Cavalry and Mounted Rifles, on 26 December and the appointment of Captain J. R. Chidlaw-Roberts M.C. as Officer Commanding the Lau Patrol, the ground force, known as Patrol S.8, was ready and started to move deeper into Nuer territory. In support, air reconnaissance was carried out over the Faddoi area on 27 December. The following day, aviation attacked herds of cattle on the Khor Filus with bombs and machine-gun fire. Severe loses were inflicted. It was during a strafing run that one of the pilots, Flight-Lieutenant A. J. Rowe, was wounded in the left thigh, after a number of tribesmen opened fire on the attacking aircraft. Normally, rifle-fire was widely inaccurate, but a lucky shot hit the intended target. Rowe managed to fly his aircraft back to Khor Filus – but took no further part in the operation. By the morning of 30 December, after a difficult march, the slow-moving punitive patrol reached Dengkur. Following preliminary bombing by the RAF, the patrol entered the village which was deserted, but showed some signs of rushed evacuation. The arrival of ground forces had the effect of frightening Gwek and dispersing any remaining warriors.⁶⁵ With the younger tribesmen seeking sanctuary in the

⁶¹ Johnson, D. H., 'Colonial Policy and Prophets: The 'Nuer Settlement', 1929-1930', *Journal of the Anthropological Society of Oxford*, Vol. 10, 1979, p.12.

⁶² CID 903B, 'Operations in the Sudan (Dec 1927-Feb 1928)', p.3.

⁶³ Ibid.

⁶⁴ Johnson, *Empire and The Nuer*, p.201.

⁶⁵ CID 903B, 'Operations in the Sudan (Dec 1927-Feb 1928)', p.4.

territory of neighbouring tribes, all that remained were women, children and the old. With no tribal attacks and a number of chiefs submitting, organised resistance had effectively come to an end.⁶⁶ Gwek's village was burnt. Thereafter, the raiding column was unable to find any large concentrations of Nuers to fight. Due to repeated aerial activity, the tribesmen had scattered widely, seeking sanctuary in remote areas, where the troops were unlikely to follow, or had sought refuge among their tribal neighbours.

Although organised resistance had come to an end, small pockets of rebellion continued. On 7 January the RAF undertook offensive action against the Ket area, west of Fadding. This resulted in a section surrendering and starting work on road construction. Four days later the RAF was in action again, this time bombing cattle camps south of Fathai. It was on this day, 11 January that Char Coriam, one of Wonding's chief supporters, surrendered with 100 warriors and 18 rifles, after seeing a RAF aircraft fly over his camp.⁶⁷ Events had now effectively come to a close. Patrolling in the local area only resulted in a few prisoners. The ground force started to recover and reconstitute for future actions around Lake Jorr, and the RAF refocused on the adjacent operation against the Garaluark Nuers. However, the result was far from satisfactory. Despite relative peace returning to the area and over 100 miles of rudimentary road constructed, the pyramid at Dengkur was still standing and Wonding had evaded capture, along with many of his followers. Something had to be done. Attempts to pursue and capture Wonding by No. 9 Company, Equatorial Corps, failed. But the witchdoctor was now a fugitive with no following. Importantly, he no longer resided in the Lau area, though his exact whereabouts remained unclear. Attention now turned to destroying the pyramid.

The plan was to destroy the pyramid on 8 February in the presence of as many Lau chiefs as possible. Engineers spent a week digging a tunnel into the base of the structure, in which to place a charge of high explosive. It was hoped that the demolition of Wonding's spiritual authority and stronghold symbolised the downfall of the influence of witchdoctors. Come the day, 34 Lau chiefs listened to Coriat as he explained to them that he would make the pyramid disappear. 'They were told to keep their eyes on the Pyramid which would vanish with a reverberating bang ...'⁶⁸ With a theatrical gesture, he dropped a handkerchief to the ground to initiate the explosion. Unfortunately, the result was underwhelming. The wind blew the sound of the explosion into the distance and only a puff of smoke and a few lumps of earth falling down the side of the pyramid indicated that the explosion had occurred. When the dust settled, only the top of the mound had been removed; the base remained frustratingly intact.⁶⁹ Coriat notes, however'... if one could judge from their expressions, the

⁶⁶ The Times, 'The Sudan Murder', 20 Jan 1928.

⁶⁷ Ibid.

⁶⁸ Coriat, 'Gwek, The Witch-Doctor and the Pyramid of Denkgur', p.234.

⁶⁹ CID 903B, 'Operations in the Sudan (Dec 1927-Feb 1928)', p.4; Johnson, 'Colonial Policy and Prophets', p.13.

effect was adequate.⁷⁰ It was subsequently announced that the pyramid had been destroyed. With most troops now withdrawn from the area, a company of mounted rifles were tasked to march through the Gaweir country, between Khor Filus and the Zeraf River. They were glad to leave the area. The ground force suffered terribly from mosquitoes and plagues of flies. Fevers were common and all British officers suffered from malaria and dysentery.

It was not until the following year that Wonding finally met his maker. During a Nuer attack on a Sudan Defence Force and police patrol on 8 February, near the site of the Dengkur Pyramid, the tribesmen were repulsed and pursued by unremitting cavalry. Wonding, three other witchdoctors and 14 warriors were killed, but Pok Karajok, who helped lead the attack, escaped. There were no government casualties in the incident and the symbols of office Wonding had inherited from his father, including a ceremonial rod of wood and metal called the *dang*, were confiscated. *The Times* reported '... although since last year's operations Gwek [Wonding] had been a fugitive with few adherents, his final disappearance should go far towards a peaceful settlement of the turbulent Nuer area under the administrative measures now in progress'.⁷¹

Garaluark Nuer Operations

Air action commenced on the 24th June and was immediately effective, so much so that on the 3rd February the Governor reports that 3,900 natives and 7,000 head of cattle had surrendered. Further surrenders a matter of time owing to dispersal ... Moral effect of bombing has broken any hostile spirit.

Extract from a report by Officer Commanding the RAF, Garaluark Nuer Patrol

On 15 December 1927 Captain Vere H. Fergusson (known as 'Fergie Bey' or 'Fergusson Bay'), the District Commissioner of the Bahr-el-Ghazal Province, a Greek merchant (Andria Panagopoulos)⁷² and 16 Dinka carriers were murdered by Nuers at Lake Jorr, 25 miles north of Shambe. *The Times* reported that: 'So far as is known at present the murder occurred while cattle taken by the Nuers from the Dinkas were being restored to their owners. The murderers are followers of Chief Garaluark of the Nuong tribe.'⁷³ No political significance was attached to the murders. However, the reality was more grisly and would prove to be a catalyst for wider events. To abridge the account, Fergusson arrived at Lake Jorr by steamer in the course of his routine duties. Attempting to restore cattle stolen from the Dinka tribe, he had arranged to meet the Nuer chiefs at a post approximately 400 yards inland. 'The presence of a large number of Nuers caused no suspicion, as the people had been called in for the purpose of checking the population lists'.⁷⁴ Fergusson was debating business with Panagopoulos when

⁷⁰ Coriat, 'Gwek, The Witch-Doctor and the Pyramid of Denkgur', p.234.

⁷¹ The Times, 'Defeat of Nuer Malcontents: Notorious Wizard Killed', 14 Feb 1929.

⁷² Sunday Times (Perth), 'Trouble in the Sudan: Punitive Expedition Leaves Khartoum', 18 Dec 1927.

⁷³ The Times, 'Officer Murdered in the Sudan: Sequel to Cattle Thefts', 17 Dec 1927.

⁷⁴ The Times, 'Tribal Treachery in the Sudan: Capt. Fergusson Stabbed to Death', 19 Dec 1927.

he was suddenly attacked by a Nuer youth, who hurled a spear towards him. The spear, which hit, barely penetrated and Fergusson threw it back. He was then attacked savagely by other tribesmen and died on the spot. Panagopoulos was stabbed to death while rushing towards Fergusson; 16 servants and Dinka carriers, as well as two Arab merchants were also killed. The others present, pursued by the Nuers, reached the safety of the steamer and managed to escape. The ship's engineer kept the tribesmen at bay with a shot gun, while the mooring ropes were cut. It was an ungainly escape. Subsequently, it was noted that: 'There had been no reason to suspect treachery. No grievances were known, and there had been no warning of trouble.'⁷⁵ Events were about to focus on Nuers around Lake Jorr.

It was believed, erroneously as it later transpired, that Chief Garaluark was the inciter, and that all the Nuer in the Lake Jorr area were simmering in revolt. Detailed intelligence, however, was to prove sketchy and difficult to obtain. This was a remote, inaccessible and complex area. Although some judged the impending operations against the Nuers more as police measures than as military operations, the force gathered was robust and capable of operating in difficult country against a tenacious foe. F. D. Kingdon helps explain why a large and capable force was necessary:

Nuer were credited with the most advanced tactics, such as lying up in the long grass, firing the grass as we passed through, and night attacking behind a screen of cattle or even women and children, and no one knew enough to discredit these opinions.⁷⁶

The ground force consisted of No. 1 Company, Equatorial Corps, No. 6 Company, Equatorial Corps and a detachment of engineer troops from Khartoum. No. 4 Company, Equatorial Corps from Wau was also placed at readiness and No. 1 Company, cavalry and mounted rifles from Shendi was ordered to Malakal as a general reserve. The force gathered at three locations and was supported by numerous tribal carriers, servants, guides and interpreters. Major L. C. Bostock M.C. was appointed to command the patrol and Captain H. F. Kidd M.B.E. was appointed as political officer. The object of the operation was to bring the enemy to action, to arrest those responsible for Fergusson's murder, including Chief Garaluark,⁷⁷ to destroy their villages and to capture or kill all their cattle. This was a challenging ask. The terrain was difficult, on many occasions soldiers were waist deep in water, and local administration had completely collapsed with the murder of Fergusson. To complicate matters further, there were linguistic difficulties, mapping was inaccurate, illness inevitable and tribal politics were challenging. Moreover, 'The task of separating the innocent from the guilty ... [was] rendered difficult by the mode of thought of a primitive people which regards responsibility for crimes committed

⁷⁵ Ibid.

⁷⁶ Kingdon, F. D., 'The Western Nuer Patrol 1927-28', Sudan Notes and Records, Vol. 26, No. 1, 1945, p.173.

⁷⁷ On 29 December Chief Garaluark gave himself up and was taken to Shambe under escort. He was subsequently imprisoned at Malakal, the capital of Upper Nile Province, only to be released in 1935.

by individuals as falling on the whole community'.⁷⁸ Some efforts were made to reassure the tribesmen that only punishment of the guilty was sought. But the realities on the ground appear to paint a different picture.

Three columns,⁷⁹ known collectively as Patrol S.9, departed on 2 January 1928. Advancing simultaneously from different points to Lake Jorr, they cautiously made their way towards the objective, burning thatched settlements and killing cattle as they progressed; the Army's use of maximum destruction was widely accepted. There were multiple challenges en-route. Attacks of tsetse, mosquito and red ant made life particularly unpleasant. Night-time camps swarmed with flies. Danger also came in the form of venomous snakes and lion and crocodile attacks. On top of that there was native hostility towards the columns, the realities of typhoid, and localised attacks were common. Rapid assaults and swift retreats were frequent, and the tribesmen often relied upon their capacity to recover to complex and inaccessible country at pace. On arrival in the Lake Jorr area on 5 January, small parties of enemy ambushed the columns, but were quickly driven off. Three hundred cattle were killed in the attacks. The effect of the continuing operations was to drive the rebellious elements, including their highly prized cattle, to a number of out-of-the-way and inaccessible islands in the swamps. It was viewed as impossible for troops to negotiate the swamps without sinking up to their necks in water. Boats were also useless, due to the height and thickness of the papyrus grass. F. D. Kingdon recalls: ... no one felt inclined to follow them up, nor did it appear to be any use. This was not as defeatist as it sounds, as anyone who has seen the Sudd area will agree.⁸⁰ With the tribesmen confined to a relatively small area, the ground columns were used to cordon off the area and to provide rallying points for those tribesmen who wanted to avoid being bombed. A cordon sanitaire was set. It was now the role of the RAF to bring operations to a close by inflicting maximum casualties - in direct opposition to air control doctrine and its minimum force ethos.⁸¹

With a local landing site constructed on dry ground at Thurnum, some four miles south-west of Lake Jorr, Wing-Commander G. R. M. Reid D.S.O. M.C., with two aircraft, arrived at Lake Jorr to investigate the use of air power. An aerial reconnaissance of the swamp satisfied Reid that air action was feasible and would achieve positive results. Arrangements were immediately put in place to employ the RAF in the area, subordinate to the patrol commander. The complete flight, include supporting personnel, was established at Thurnum by 23 January. In preparation, the RAF sought to put in place an elaborate system of ground to air signals and, in time, various attempts were made to get aeroplanes to pick up written messages. But they proved unsuccessful, especially as the signals were frequently changed, '... and what stood for 'more bombing required' one day meant 'Nuers coming in well' the next day'.⁸² Aircrew also

⁷⁸ The Times, 'The Sudan Murder', 20 Jan 1928.

⁷⁹ Shambe column, Luell column and Adok column.

⁸⁰ Kingdon, 'The Western Nuer Patrol 1927-28', p.177.

⁸¹ CID 903B, 'Operations in the Sudan (Dec 1927-Feb 1928)', p.4; Johnson, 'Colonial Policy and Prophets', p.6.

⁸² Kingdon, 'The Western Nuer Patrol 1927-28', p.177.

considered their safety, especially as the reputation of the Nuer was for unthinkable cruelty – especially against foreigners.

They suggested we should give the pilots a letter to any Nuer who might find them if they made a forced landing, offering a large reward if the pilot was brought back unharmed to the Government. It might have been a good idea if any of the Nuer had been able to read, and if any of us had been able to write Nuer.⁸³

Aerial bombing started on 24 January and focused principally on the cattle camps or *murahs*, which were clearly visible from the air on the patches of dry land in the swamp.⁸⁴ By this time the tribesmen were suffering from a severe lack of food and unrelenting insect bites. Young calves were also dying and many of the cattle were suffering from thrush, resulting from standing continuously in water. On 14 and 15 January the RAF systematically and repeatedly bombed the tribesmen and their cattle. The impact was significant. It resulted in 200 cattle being captured and numerous warriors sending messages to indicate their willingness to surrender. William. A. Porter, who was the inspector of agriculture in the area, but seconded as Political Officer to No. 1 Company, Equatorial Corps, for the operation, noted simply in his diary:

Jan 24th. Two aeroplanes seen bombing Nuer murahs E and SE of Amair from 06:00 hours till 08:00 hrs ...

Jan 25th. Two aeroplanes seen bombing Nuers in swamps SE of Amair from 06:00 hours till 08:00 hours. Aeroplanes circled over Amair landing ground and one came down to within 2 feet of the ground in order to inspect ...

Jan 26th. No aeroplanes seen this morning. Native officer with two sections and all the carriers and surrendered Nuers went out at 06:00 hours and returned at 14:00 hours with 8,000 rolts dura, having continued the burning of surroundin[g] villages ... Requested that our desires re bombing be put out by a ground signal.⁸⁵

It was clear that the terrifying psychological and physical impact of air power was having an effect. However, some Nuers learnt the art of dispersal and concealment. Warriors hid in the jumble of tall dense green vegetation, watercourses and bogs. There were often only fleeting glimpses of them during the day. And even if the aircrew received detailed and timely information of a concentration, the tribesmen quickly dispersed when they heard the sound of aircraft overhead. Becoming increasingly air-minded, the warriors never assembled in large groups and confined most of their activity to the hours of darkness, where they could move with a degree of impunity. Moreover, when the opportunity presented itself, the tribesmen

⁸³ Ibid.

⁸⁴ CID 903B, 'Operations in the Sudan (Dec 1927-Feb 1928)', p.6.

⁸⁵ Quoted in: Barltrop, R., 'Lessons from the Past? Approaches to Conflict and Peace in Sudan, 1899-1955' Luce Paper, University of Durham, Institute for Middle Eastern and Islamic Studies, Durham, 30 Jun 15, p.9/24.

were not afraid of fighting back or taking aim at the aircraft overhead. But facing repeated harassment, particularly the bombing of their prized cattle, which were impossible to conceal from the air, the RAF quickly broke down tribal resistance. Surrenders became increasingly commonplace.⁸⁶ By 26 January the Nuer resistance had culminated.

William Porter provides a chilling tally of the 'particulars of killed and captures' during the wider operation from his column's perspective: 18 Nuers killed; 371 Nuers captured and surrendered; 400 cattle killed; and 1,076 cattle captured and surrendered. He does not stipulate the number of villages burned and ransacked, but at least seven settlements were razed to the ground.⁸⁷ Ultimately, the tribesmen came to the conclusion that they had had enough and they were defenceless against the impact of air power. Even so, isolated pockets of disaffected tribesmen attempted to break through the cordon and escape with their cattle. These suffered terribly from rifle fire.⁸⁸ Loyal chiefs cooperated in the task of helping to arrest the men directly responsible for the murder of Fergusson. But even this task proved difficult. For example, Gargek, a suspected ringleader and malcontent, was wounded while resisting arrest and managed to escape his captors. Nonetheless, sufficient evidence was gathered to demonstrate the complicity of Chief Garaluark in the murder of Fergusson. 'By the 3rd February ...' the official report notes '... 9,000 men, 3,000 women and children, and 7,000 head of cattle had been surrendered, or captured ...'89 The patrol was deemed a success, but the murderers remained free. With operations coming to a close, and the flight of No. 47 (B) Squadron returning to Khartoum, via Malakal, on 5 February 1928, a company of the Equatorial Corps, led by a native officer, marched through the country of the Bul Nuers, on the border between the Bahr-el-Ghazal and Kordofan Provinces, with a view to showing the flag in the district. A second company remained behind to supervise the building of a causeway at Lake Jorr. It was not until 1929 and 1930 that two men were convicted of killing Fergusson.⁹⁰ Both were publically hanged; one on a gallows transported by steamer and lorry to his village.91

By 15 February 1928, The Times reported simply that:

The operations against the Nuers in both the areas affected are virtually at an end, and the troops, with few exceptions, are returning to their peace stations, while the R.A.F. aeroplanes which have been cooperating are already back in Khartoum.⁹²

⁸⁷ SAD 700/11/7-15, 'Diary of Number 1 Company'.

⁸⁶ TNA/PRO Air 20/681, Operations Reports on S8 and S9 Patrols, Dec 1927-Mar 1928.

⁸⁸ The Times, 'Sudan Murder: End of Punitive Operations', 15 Feb 1928.

⁸⁹ CID 903B, 'Operations in the Sudan (Dec 1927-Feb 1928)', p.6.

⁹⁰ A memoir by Fergusson was published posthumously under the title *The Story of Fergie Bey* (London: Macmillan, 1930).

⁹¹ Johnson, D. (Ed), 'Governing the Nuer: Documents in Nuer History and Ethnography, 1922-1931', by Percy Coriat, *JASO Occasional Paper*, No. 9, 1993, p.xliii.

⁹² The Times, 'Sudan Murder', 15 Feb 1928.

The total count of Nuer dead from both operations was assessed to be well over 200.⁹³ This included women and children. With no ability to distinguish between combatants, noncombatants, the young and the old from the air, operations were routinely reported in broad order 'bulk' numbers. But this was not the end of matters. The cold shadow of operations against the Nuers in 1927-1928 was long. This was not to be a *tour de force* of the application of air power. And criticism of the RAF's failure to make a lasting impression on the tribesmen was answered in London:

... Trenchard let it be known that what Huddleston [General Officer Commanding Troops in the Sudan] and 'some of the political officers' had 'wanted all along was a stand-up fight with the Nuers which they thought necessary to secure their complete subjection'. He, for his part, saw the chief value of air power 'in a place like Sudan', as morale, to convince recalcitrants that opposition was hopeless.⁹⁴

The Nuers never felt that opposition was a lost cause. Life was certainly not a burden to the warriors and many were happy to endure inconvenience and discomfort. Further unrest and rebellion in the following years would emphasise this. Moreover, events underlined a reoccurring theme of the time: a lack of understanding of the role of air power and the fundamental difference in approach between the RAF and the Army. As details of the operations became clearer, the Air Ministry ... contended that the Sudan authorities 'regarded the air arm from the point of view of its effectiveness in inflicting casualties ... instead of ... as an arm' that should 'achieve its results mainly by affecting' the enemy's morale.⁹⁵ Success was measured in the number of casualties inflicted, by killing as many natives as possible belonging to the rebellious Nuer sections. It was a valid and perhaps uncomfortable criticism for some. There was a need for restraint in the use of aircraft; the keen edge of air power is easily blunted by misuse. As a result, the Air Council requested that any future use of air power be conducted in a humane manner, involving minimal casualties and the precise application of force. From their perspective, the value of the RAF in Sudan was not in support of punitive columns, conducting 'humdrum'⁹⁶ raid and scuttle operations, although it was acknowledged that it would be necessary to support ground formations on such activity. Instead, air power in Sudan was Britain's safeguard against a revival of Mahdism and facilitated country-wide communication and influence. It was also there to intimidate Khartoum's small, but vocal, and increasingly influential intelligentsia which opposed British rule.97

⁹³ TNA/PRO Air 20/681, Operations Reports on S8 and S9 Patrols, Dec 1927-Mar 1928.

⁹⁴ Daly, *Empire on the Nile*, p.401.

⁹⁵ Ibid.

⁹⁶ FO 371/13873, 'Memorandum on the Use of the Air Force', 20 Jun 1928; CID 904B, 'The Use of the Air Arm in the Sudan', 6 Jul 1928.

⁹⁷ Renfrew, Wings of Empire, p.192.

Conclusions

The more you know about the past, the better prepared you are for the future.

Teddy Roosevelt

The employment of air power against the Nuer tribesmen received mixed reviews. On the one hand, a flight of No. 47 (B) Squadron operated with great skill over difficult and unfamiliar terrain, far from its base location in support of two sequential ground patrols. Rudimentary aircraft came through a severe test of climate and working conditions with notable aplomb. Moreover, the Fairey IIIFs helped enforce a broad, temporal moral effect on the tribesmen, provided a degree of interruption to everyday tribal activity and delivered a swift and salutary lesson in punishment to the Nuers. This all occurred in a remote and inaccessible area of the Upper Nile Province that was often virtually impossible for ground troops to penetrate. In a country with very few roads and even fewer railways, the flight offered operational reach, flexibility and tactical lethality. Aircraft underscored the 'long arm' of the Government and its growing technological muscle. It is little surprise that the flight received considerable praise from those on the ground:

The aircraft were without a doubt the deciding factor of the patrol. Without them the operations might have dragged on for weeks, if not for months. There is no doubt that they struck terror into the Nuers and completely unnerved them. The Nuers thought that they were safe from the Government, and being bombed and machine-gunned was a great shock. The utility of aircraft for communication purposes cannot be exaggerated.⁹⁸

On the other hand, air power failed to have a lasting moral effect on the tribesmen – particularly the young firebrands. There was no end to Nuer resistance, the influence of the *kujurs* remained and Wonding roamed free. The flight seemed unsuccessful as a '... quick, clean, incisive sweep of a surgeon's knife in cutting out a cancerous growth'.⁹⁹ Tribesmen learned quickly to be air-minded and to conceal themselves. They also developed effective work arounds. But their cattle were easy prey and increasingly seen as the Nuers' Achilles heel. Tribal life became increasingly problematic, but never intolerable. Predictably, the indiscriminate bombing and machine-gunning of the tribesmen drew considerable criticism, on both ethical and political grounds. Its employment was not judged as a more humane instrument for punishing tribal misbehaviour than a traditional punitive ground expedition. If anything, air power delivered violent and terrifying punishment from above, without an ability to 'feel' its way on the ground. Therefore, the lasting results of the use of air power in early 1927-1928 are difficult to determine and they contributed towards a growing conclusion that Sudan was not a textbook showground for air control. This was a position compounded

⁹⁸ Extract from a report of Major L. C. Bostock M.C., Officer Commanding the Garaluark Nuer Patrol, quoted in CID 903B, 'Operations in the Sudan (Dec 1927-Feb 1928), p.7.

⁹⁹ Kingston-McCloughry, Winged Warfare, p.254.

by civilian officials who wished to retain control of Sudan's defences and not hand them over to the RAF.

Operations against the Nuers, however, illustrate some of the frictions between civil and military authorities in southern Sudan. Fundamentally, they reveal the difference in approach between the Army and the RAF; one thinking tactically, the other thinking strategically. The Army wanted to inflict excessive casualties on the Nuers, as a punitive measure, pacifying them via force in a concentrated area. In contrast, following air control doctrine, the RAF hoped to create in the minds of the tribesmen the belief that they were being confronted with a weapon against which they could not retaliate. The goal was to secure a change of heart with the minimal use of force, via the dislocation of everyday life. It also sought to bar the tribesmen from having a fight on 'equal' terms. Unsurprisingly, the RAF was often criticised for dispersing the tribesmen and not allowing ground forces to inflict heavy casualties on massed warriors. But not all aircrew shared this utopian doctrinal view. Those at the coalface sometimes wanted unrestricted use of offensive air power – seeing any limitations as a foolish waste of capability and firepower. Civilian administrators saw matters very differently. They were horrified at the concept of bombing primitive and defenceless tribesmen, but often failed to recognise the destructive effect of slow-moving punitive patrols, which were also expensive in men, material and money.

To complicate matters further, the RAF flight was auxiliary to the Army patrol commanders and the employment of air power was often well-defined by those on the ground. Indeed, in the Garaluark Nuer operations, local forces deliberately constrained and blockaded the tribesmen in a small area, handing the RAF the baton for the final violent *coup de grâce*. In many ways, it was akin to shooting fish in a barrel. The RAF commander, Wing-Commander Reid, would no doubt be aware that such widespread tribal destruction – i.e. perceived tactical success – would result in a state of famine and deprive the tribesmen of their livestock, thereby creating the very conditions which would lead to further lawlessness. He would probably also recognise that it would increase bitterness towards the Government, rather than creating a lasting peace. And risk the RAF of being accused of being inhumane, due to the 'unsporting' asymmetry of using aircraft against primitive tribesmen. Complex relations between the different Services and a lack of understanding of how to best integrate air and ground efforts also led to miscalculations, distrust and degrees of suspicion. This was further compounded by the RAF's view that air power should be used for a higher dimension, not principally in support of raid and scuttle patrols.¹⁰⁰

Undermining both operations was a fundamental lack of a comprehensive approach to the south. Military operations were not followed by much needed aid and an administrative policy that would eliminate the root causes of unrest. A vicious circle ensued, with a degree of

¹⁰⁰ Daly, Empire on the Nile, p.401.

suspicion that some officials even hankered after traditional ground confrontation with the Nuers. This was further compounded by a lack of accurate tribal intelligence and an unfamiliarity of the political aspects of the problem. Only Percy Coriat spoke the tribal dialect and had a deep understanding of the Nuers.¹⁰¹ Much was lost in translation and an unfamiliarity of the needs and ambitions of the tribes was ubiquitous. Moreover, the operational level - where strategic ideas are turned into tactical realities - was completely absent. This was campaigning by rote and jointery was in its infancy in Sudan. It is perhaps worth leaving the last word to F.D. Kingdon: 'The operations would, no doubt, now be called one of the bad old patrols, but it should not be forgotten that such patrols made the southern Sudan safe for civilian officials. At least they taught me the dangers of one-man rule however efficient, and that an offensive patrol should always be avoided at almost any cost. Like all war it does nearly as much harm as good.'102



The author would like to thank Dr David Jordan and Mr Seb Cox for their assistance in compiling this article and helping ensure historical accuracy.

¹⁰¹ It was during the rains of 1922, cut off from all other British government officials that he learned to speak Nuer.
 He also took the unprecedented, and never repeated, step of staying in his district during the rainy season, establishing many ties of personal friendship and learning the ways of the tribesmen.
 ¹⁰² Kingdon, 'The Western Nuer Patrol 1927-28', p.178.



'Hot Air, Aeroplanes and Arabs': T E Lawrence and Air Power

By Group Captain John Alexander

Biography: John Alexander's RAF career has some connections with T E Lawrence's: he spent two years seconded to an Arab force; served at Tabuk in the Hejaz, in Iraq and Pakistan; was a visiting research fellow at Oxford; and speaks poor Arabic. Unlike Lawrence, Alexander accepted a commission in the RAF's ground fighting force and a civil service appointment with the Air Historical Branch.

Abstract: The ever-expanding Lawrence literature overlooks the link between his concept of warfare and subsequent choice of the RAF for enlistment. Lawrence's fame stemmed from the cultural difference between Romantic heroism in the desert and the industrial warfare on the Western Front. Yet pare away the myth and enigma of 'Lawrence of Arabia' using the official archives and one finds a proponent of air power and a strikingly modern way in warfare, using machines rather than men, and combining aeroplanes and armoured cars with Arab regulars and irregulars. The experience resulted in Lawrence's subsequent post-war support of air power for colonial control in Iraq and probably influenced his choice of Service for enlistment.

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Introduction

n 17 May 1919, a No 58 Squadron RAF Handley Page O/400 bomber crash-landed at Centocelle airfield in Rome, killing the pilot and co-pilot. Lieutenant Colonel Thomas Edward (T E) Lawrence, a passenger en route from Paris to Cairo to collect material for his account of the Arab Revolt, survived with a broken shoulder blade and two broken ribs. By the end of 1919 Lawrence had become probably the most glamorous Briton to emerge from the First World War, matched only by the air aces, whom prime minister David Lloyd George called the 'knights of the air'.¹ More than a million people had watched Lowell Thomas's lecture and film show on the 'uncrowned King of Arabia' in London in 1919 alone, audiences were captivated by the contrast of Lawrence's Romantic heroism with the widespread experience of industrial warfare on the Western Front.² His fame caused his dismissal from the RAF in December 1922, just four months after he had enlisted as an aircraftman, when the Daily Express published the story 'uncrowned king as private solder. Lawrence of Arabia. Famous war hero becomes a private', followed by other national newspapers.³ After re-joining the RAF in 1925, he was recalled from RAF Miranshah in Waziristan in 1929, when a fabricated story about his presence as a British agent alarmed Afghanistan,⁴ an incident later made into a Soviet propaganda film. There was a genuine sense of national loss when Lawrence died in 1935.⁵

One recent reviewer described the ever-expanding Lawrence literature as either hagiography or hatchet job, but in listing Lawrence's contested personae - 'Lawrence the colonial hero and faithful imperial servant; Lawrence the linguist, explorer and spy, pioneer of guerrilla warfare; Lawrence the Machiavellian betrayer of the Arabs; and Lawrence the preening, self-mythologizing sadomasochist' – he omitted Lawrence the airman.⁶ Yet Lawrence spent twelve years in the RAF and, after the difficult start described in *The Mint*, was reluctant to leave. Lawrence told his biographer Robert Graves that enlistment was 'the nearest modern equivalent to going into a monastery in the Middle Ages',⁷ and according to his brother Arnold, Lawrence chose the RAF because he 'obviously enjoyed the companionship and appreciated both the mechanics and pilots dedicated to their jobs and their skill'.⁸ In 1922 Lawrence told his friends Air Marshal Sir Hugh Trenchard, the Chief of the Air Staff, and the architect Harold Baker that he had decided in 1919 to join the RAF, telling Baker his 'ambition to serve in [the air force]

¹ Martin Francis, *The Flyer: British Culture and the Royal Air Force, 1939-1945* (Oxford: Oxford University Press, 2008), 168; David Lloyd George, *War Memoirs of David Lloyd George,* New ed., vol. 2 (London: Odhams Press, 1938), 1115.

² Lowell Thomas, With Allenby in Palestine and Lawrence in Arabia (Lowell Thomas, 1919).

³ Daily Express, 27 December 1922, 1.

⁴ Empire News, 16 December 1928, 3.

⁵ Lawrence James, 'Lawrence, Thomas Edward [Lawrence of Arabia] (1888–1935)', in *The Oxford Dictionary of National Biography*, online edition, Jan 2011 (Oxford University Press, 2004), http://www.oxforddnb.com/view/article/34440.

⁶ Justin Marozzi, 'T.E. Lawrence: From Young Romantic to Shame-Shattered Veteran', *The Spectator*, 16 April 2016. ⁷ T. E Lawrence, Robert Graves, and Basil Henry Liddell Hart, *T. E. Lawrence to His Biographers Robert Graves and Liddell*

Hart (London: Cassell, 1963), 183.

⁸ John E Mack, A Prince of Our Disorder: The Life of T. E. Lawrence (Cambridge, Mass. ; Harvard University Press, 1998), 320.

dates – concretely from 1919, and nebulously from early 1917, before there was an Air Force.'9 1917 is when, as this article will show, Lawrence started utilising British air power in Arabia.

This article examines the evidence that Lawrence chose the RAF for enlistment because air power suited his concept of warfare, as well as being attracted to the new Service's social culture.¹⁰ Strategic studies literature still recognises Lawrence as the first to articulate, at least in English, the use of speed, mobility, depth and patience, in contrast to the early twentieth-century military doctrine of concentration and decisive battle.¹¹ Hence, Basil Liddell Hart, Britain's pre-eminent inter-war strategist and a future biographer of Lawrence's *Evolution of a Revolt*. Writing in Lawrence's name, Liddell Hart sent him the fifteen Guinee fee.¹² Furthermore, Lawrence's conception of warfare was recently rediscovered by twenty-first century soldier-scholars as a totem for cultural understanding and this Journal has previously considered how modern air power might counter an insurgency governed by Lawrence's concept of warfare.¹³

Lawrence's adult life spanned the period of air power's increasing importance to Britain's way in warfare, from Blériot's cross-channel flight in 1909 to the prioritisation of air rearmament in 1934. The article starts by examining Lawrence's exposure to air power before the First World War, Lawrence's increasing reliance on the utility of air power during the Arab Revolt, and considers his claim to have convinced the Secretary of State for War and Air, Winston Churchill, and Trenchard to give the RAF responsibility for military control of Mandate Iraq, thus helping secure the RAF's independence. This article concludes by considering Lawrence's advocacy of air power while serving as an aircraftman.

Before the Arab Revolt

Lawrence made little reference to flying or the utility of air power before 1914, though as his recent biographer Anthony Sattin notes, Lawrence's youth was ideal preparation for

¹² T. E. Lawrence, 'Science of Guerilla Warfare', in *Encyclopaedia Britannica*, 14th edn (London, New York: Encyclopaedia Britannica Co Ltd, 1929), 950–53; T. E. Lawrence, 'Evolution of a Revolt', *Army Quarterly and Defence Journal*, 1.1 (1920), 55–69; Basil Henry Liddell Hart, *The Memoirs of Captain Liddell Hart* (London: Cassell, 1965), 1:84–85.

⁹T. E. Lawrence, *The Letters of T. E. Lawrence*, ed. by Malcolm Brown (London: Dent, 1988), TEL to Trenchard January 1922, 192; *T. E. Lawrence by His Friends*, ed. by A. W Lawrence (London: J. Cape, 1937), 352–54.

 ¹⁰ Air power is defined as 'using air capabilities to influence the behaviour of actors and the course of events.' *Joint Doctrine Publication 0-30 UK Air and Space Power*, Second (Shrivenham: Ministry of Defence, 2017), 5.
 ¹¹ Beatrice Heuser, *The Evolution of Strategy: Thinking War from Antiquity to the Present* (Cambridge: Cambridge University Press, 2010), 400–405.

 ¹³ John A Nagl, Learning to Eat Soup with a Knife: Counterinsurgency Lessons from Malaya and Vietnam (Chicago: University of Chicago Press, 2005); United States. Department of the Army, The U.S. Army/Marine Corps Counterinsurgency Field Manual: U.S. Army Field Manual No. 3-24: Marine Corps Warfighting Publication No. 3-33.5 (Chicago; London: University of Chicago Press, 2007); Caroline Kennedy and Sophia Dingli, 'Lawrence and the Study of War', The Journal of the T. E. Lawrence Society, Vol. XXIII.No. 1 (2013): 28–37; Group Captain Clive Blount, 'Modern Air Power, Counter-Insurgency and Lawrence of Arabia', Air Power Review, 13.2 (2010): 21–32.

his wartime role.¹⁴ Furthermore, Lawrence the warrior and scholar was shaped by his early immersion in military history and archaeology, Romanticism and Chivalry, and ancient and modern military theory.¹⁵ He tested himself in feats of endurance: cycling around France and walking over 1,000 miles through Syria in 1909 while researching Crusader military architecture. In letters home from Syria, however, Lawrence noted Blériot's cross-channel flight without commenting on its strategic impact or the use of air power in the Balkan Wars, despite his interest in warfare.¹⁶

Meanwhile Lawrence developed the traits he would continue in his military service. He acquired his passion for shooting, photography and long-distance cycling from his father.¹⁷ As his wartime colleague Lieutenant Colonel Pierce Joyce noted, 'Lawrence's own equipment was perfection [...] his pistol was of the latest pattern and his field glasses the most powerful made'.¹⁸ For his first expedition to Syria in 1909 Lawrence bought a Mauser automatic pistol, the same model used by Churchill at Omdurman, and used it against bandits.¹⁹ His father bought Lawrence and his brother Frank each a Colt automatic pistol when they joined the British Army in 1914.²⁰ As Lawrence later told Liddell Hart:

If I used a weapon well, it was because I could handle it. Rifles were easy. I put myself under instruction for Lewis, Vickers and Hotchkiss. To use aircraft, I learned to fly. To use armoured cars, I learned to drive and fight them.²¹

There is no evidence Lawrence piloted aircraft during the war though he did fly, privately, when at RAF Mountbatten after 1929.²²

Lawrence first observed the utility of air power after joining the Military Intelligence Department in Cairo in December 1914, receiving reconnaissance reports and aerial photography from the French and Royal Naval Air Service (RNAS) seaplanes reconnoitring Palestine, Syria, Gallipoli and the Red Sea. Over Sinai the seaplanes were critical in detecting Turkish attacks on the Suez Canal before 1916.²³ Lawrence helped develop map-making in

¹⁴ Sattin, Young Lawrence.

¹⁵ Bruce Leigh, Lawrence: Warrior and Scholar (Ticehurst, East Sussex: Tattered Flag Press, 2014).

¹⁶ T. E. Lawrence, W. G. Lawrence, and F. H. Lawrence, *The Home Letters of T. E. Lawrence and His Brothers* (Oxford: B. Blackwell, 1954), 100, 217.

¹⁷ Sattin, Young Lawrence, 24.

¹⁸ Liddell Hart Centre for Military Archives (LHCMA) Joyce/2/18 Television Script, for Transmission at Alexandra Palace. Talk on service with Lawrence in Arabia, dated 30 April 1939.

¹⁹ Lawrence, Lawrence, and Lawrence, *The Home Letters*, 107.

²⁰ Ibid, p.617.

T. E. Lawrence, Graves, and Liddell Hart, *T. E. Lawrence to His Biographers*. Lawrence to Liddell Hart, 26 Jun 1933, 75.
 Jeremy Wilson, *Lawrence of Arabia: The Authorized Biography of T. E. Lawrence* (New York: Atheneum, 1990), 855.

²³ H. A. Jones, *The War in the Air: Being the Story of the Part Played in the Great War by the Royal Air Force*, History of the Great War Based on Official Documents by Direction of the Historical Section of the Committee of Imperial Defence, 5 vols (Oxford: Clarendon Press, 1935), 5:160–66, pp.202-208.

Egypt in 1915 using aerial photography, a topic ripe for further research.²⁴ Lawrence, safe in Cairo, felt guilt when his brothers Frank and Will were killed in France, the latter in a No 13 Squadron B.E.2c after less than a week as a Royal Flying Corps (RFC) observer.

Lawrence will also have observed Geoffrey Salmond's increasingly active 15th Wing RFC after it deployed to Egypt in 1915. Lawrence visited Egypt's Western Desert in early 1916 where aircraft from Nos 14 and 17 Squadrons RFC, in combination with former RNAS Roll Royce armoured cars and Yeomanry, defeated the Ottoman-backed Senussi tribes.²⁵ A flight from No 14 Squadron made a major impact in General Sir Reginald Wingate's Darfur campaign.²⁶ Wingate was the Sirdar (commander-in-chief) of the Egyptian Army, who in June 1916 was appointed British director of operations for the Sharif Hussein of Mecca's revolt against Ottoman suzerainty. After the Darfur campaign Wingate had proposed to Salmond that Britain used aircraft rather than 'expeditionary forces' for colonial control in such difficult terrain.²⁷ Finally Lawrence saw No 30 Squadron RFC's failed attempt to resupply the British 6th (Poona) Division besieged in Kut Al-Amara when he was sent to bribe the Turkish commander in April 1916.²⁸

The Arab Revolt

'Three inefficient and rather antique seaplanes took Jeddah'

Lawrence observed from Cairo the critical role of RNAS seaplanes in the outbreak of the Arab Revolt. Hussein's irregulars quickly captured Mecca, but Jeddah's Turkish garrison repulsed the opening attack on 9 June 1916 and withstood five-days of bombardment from the guns of Captain 'Ginger' Boyle RN's Red Sea Patrol. On 15 June the Turks promptly surrendered when three seaplanes from the newly-arrived seaplane carrier *HMS Ben-My-Chree* bombed and strafed their positions. Commander C R Samson, *Ben-My-Chree's* captain and lead pilot, who had the heel of a shoe shot off in the raid, later wrote 'there is no doubt that three inefficient and rather antique seaplanes took Jeddah'.²⁹ Boyle established a base at Rabegh to support the Sharifian siege of Medina.³⁰ Lawrence later called Boyle's ships the 'fairy godmothers of the Revolt'.³¹

²⁴ Wilson, *Lawrence of Arabia*, 189.

²⁵ See Jones, *The War in the Air*, 5:166–70.

²⁶ Brigadier Andrew Roe, 'Air Power in Darfur, 1916: The Hunt for Sultan Ali Dinar and the Menace of the Fur Army', Air Power Review 20, no. 1 (Spring 2017): 8–25.

²⁷ Sudan Archive Durham (SAD), Wingate Collection, GB-0033-SAD.2013/72, Wingate to Kelly 25th July 16.

²⁸ Warrant Officer Class 2 Paul Barnes, "Complete Failure": The British and Dominion Aerial Re-Supply 1915-16, Air Power Review 20, no. 1 (Spring 2017): 26–43.

²⁹ Jones, 5:219;. Charles Rumney Samson, *Fights and Flights* (London: Ernest Benn, 1930), p.314.

³⁰ John Johnson-Allen, *T. E. Lawrence and the Red Sea Patrol: The Royal Navy's Role in Creating the Legend* (Barnsley, South Yorkshire: Pen & Sword Military, 2015), 74.

³¹ Wester Wemyss and Victoria Moria Wemyss, *The Life and Letters of Lord Wester Wemyss, G.C.B., C. M. G., M V. O., Admiral of the Fleet* (London: Eyre and Spottiswoode, 1935), 359.

'The Enormous Advantage of Aeroplanes'

Lawrence was soon involved from Cairo in the decision to deploy land-based RFC aeroplanes to Rabegh. The British and Arabs realised that Hussein's irregulars could not match the Turks in battle. Hence, Hussein wanted British military support but was concerned Christian troops near Mecca and Medina would reduce his religious authority. In July 1916 Lawrence joined the Arab Bureau, the intelligence group in Cairo co-ordinating British support to Hussein, and where Lawrence's Oxford mentor, the archaeologist David Hogarth, was acting director. One of Lawrence's first tasks was to make recommendations for British military support. Quoting Colonel Charles Wilson, Wingate's liaison officer to Hussein, Lawrence recommended the deployment of a British brigade, complete with artillery and aeroplanes, to Rabegh to block an anticipated Turkish advance from Medina aimed at re-taking Mecca. Lawrence's memorandum also noted the importance of attacking the Hejaz railway to delay or disrupt Turkish communications from Syria.³² Meanwhile, Hussein had asked for British aeroplanes after British signals intelligence indicated the Turks were deploying aircraft to Medina, 'to frighten the Turks'.³³ Hussein's son and local commander, Feisal, also asked for three hundred British soldiers and two aeroplanes for Rabegh.³⁴

Wilson highlighted Hussein's need for the morale effect of British troops and 'the enormous advantage of some aeroplanes' at a conference held by General Sir Archibald Murray, commanding the Egyptian Expeditionary Force (EEF), to decide British support for the Revolt. Murray was firmly against sending a brigade, the minimum viable force. The EEF had only four brigades and the War Office had recently directed he advance into the Sinai and take the port of Aqaba. Murray reminded the conference Britain's main effort was on the Western Front: 'this is a war which covers the whole Empire, more or less. [...] We [the General Staff] have made up our minds that we will concentrate in the West every single man we possibly can.'³⁵ The subsequent decision to deploy C Flight, No 14 Squadron RFC with five B.E.2c aircraft to the Hejaz is significant, therefore, given Murray had only sixteen serviceable RFC aircraft in Egypt and where the newly arrived German Rumpler and Fokker aircraft had control of the air.³⁶ The value of aircraft to the Revolt, however, was increasingly recognised. In September *HMS Anne's* two seaplanes flew repeated sorties over Yanbu and Rabegh 'to impress the Arabs'. Furthermore, the British recognised to reach Medina and the Hejaz railway 100 miles inland required aeroplanes operating from advanced landing grounds, rather than seaplanes.³⁷

³² TNA, FO 882/4. Arab Bureau, Miscellaneous Correspondence, Aug - Sep 16 HRG 16/1 to 16/59, 220.

 ³³ SAD Wingate Collection 5/39 Amir to High Commissioner 31 July 1916 Requesting Aeroplanes to Frighten Turks.
 ³⁴ TNA, FO 882/4/3 Arab Bureau, Vol 4, Miscellaneous Correspondence HRG/16/30 Memorandum T. E. Lawrence Arab Bureau undated July 1916.

 ³⁵ TNA, FO 882/4. Arab Bureau, Miscellaneous Correspondence, Aug - Sep 16 HRG 16/1 to 16/59, Conference held a C-in-C's Residence Ishmailia at 12 noon, Tuesday 12 September 1915 to discuss the Hejaz question, 320.
 ³⁶ Jones, *War in the Air*, 5:179; TNA, WO 33/905, Telegrams; European War: Egypt. 1916-1917, GHQ to 5th Wing 30 September 1916.

³⁷ TNA, AIR 1/1708/204/123/72 Operation Reports: *HMS Anne* 1916; TNA, AIR 1/1711/204/123/89 Administration and Personnel Establishment HMS Anne and Raven II, 1915, Note by Sqn Cdr L'Estrange Malone 10 October 1916.

The Arabian Detachment Royal Flying Corps

Lawrence witnessed at first-hand the Sharifian desire for aeroplanes during his first visit in October 1916, when he had to explain to Hussein's son Abdullah that the British aeroplanes had been recalled. C Flight had sailed for Rabegh on 14 October 1916, after Colonel A C Parker, Wilson's deputy at Rabegh, reported Boyle's willingness to provide a guard ship,³⁸ and Major Bannatyne, commanding No 14 Squadron, fresh from Darfur, had reconnoitred an airfield and found the locals friendly.³⁹ Wingate recalled the Flight before it went ashore, however, because it had a British infantry escort and he feared this would offend religious sensitivity.⁴⁰ Lawrence told Colonel Gilbert Clayton, the Director of Military Intelligence and the Arab Bureau, he thought the decision was pushing religious sensitivity too far, and then adding flippantly that the enemy aircraft would soon crash, in any case, if flown by Turks.⁴¹ But Feisal continued to press for British troops for Rabegh,⁴² and C Flight set sail again, this time under Major A J Ross DSO RE and RFC, landing at Rabegh on 16 November accompanied by two Egyptian infantry companies, and four British Rolls Royce armoured cars and tenders, under Joyce's command, with orders to 'act as escort to this flight and to guard the aeroplane base', and train and assist the Sharifian force.⁴³

Lawrence also witnessed the Bedouin's fear of aeroplanes during his first visit to Feisal's force. Lawrence reported to Clayton the Bedouin's utility as guerrillas, calling them 'an aggregation of snipers', but with a 'living terror of the unknown' particularly 'artillery and aeroplanes'.⁴⁴ Furthermore, General Sir William Robertson, the Chief of the Imperial General Staff (CIGS), circulated a note from Lawrence to Lloyd George's new War Cabinet that argued if the Arab defences at Rabegh collapsed Mecca would fall before a brigade could be deployed. Far better to send aeroplanes and guns.⁴⁵ The War Cabinet agreed to send a brigade only as a last resort, whereas aeroplanes, it seemed, were expendable.⁴⁶ Clayton, Wilson, Parker and Major Norman Bray had all made similar assessments, but it was Captain Lawrence's report that was put to the Cabinet. Meanwhile, the first RFC attack on the Hejaz railway north of Maan was on 24 November 1916 from Salmond's wing in Egypt, dropping delayed fuse 100-pound bombs into railway culverts from a height of twenty feet.⁴⁷

³⁸ TNA, FO 686/53 Defence of Rabegh, dated 30 September 1916.

³⁹ TNA, FO 686/56 Military Operations, Major Bannatyne Report dated 10 October 1916.

⁴⁰ Jones, *The War in the Air*, 5:220.

⁴¹ Lawrence, *The Letters of T. E. Lawrence*, 88. To Clayton dated 18 October 1916.

⁴² TNA, FO 371/2776, Turkey War Code 218321-End Arab Bureau to Sirdar 30 October 1916. 219304.

⁴³ TNA, WO 158/603, GHQ EEF, Operations to Assist Sharif, 1916 Oct.-Nov. November 2017.

⁴⁴ TNA, FO 882/5 Arab Bulletin Miscellaneous Correspondence Oct - Dec 16 HRG/16/48-64 Pt 1, 56–63, TEL to Arab Bureau Military Notes 3 November 1916, TNA.

⁴⁵ TNA, CAB 22/70, Report from Capt Lawrence Intelligence Staff, 17 November 1916.

⁴⁶ TNA, CAB 23/1/1, War Cabinet, Dated 9 December 1916, 7.

⁴⁷ TNA, WO 158/604, Egypt and Palestine. GHQ, Operations and Military Situation, 1916 Nov-Dec, Salmond to CGS EEF 25 November 1916; TNA, WO 33/905, Telegrams; European War: Egypt. 1916-1917, GOC-in-C to CIGS 24 November 1916.

Lawrence was soon working closely with C Flight. To get the aircraft ashore took a combined effort by sailors from the guard ship, *HMS Minerva*, Joyce's Egyptian soldiers, and the airmen. They built a jetty, a road from the jetty to the aerodrome, assembled aircraft hangers, and moved the aircraft, repair facilities and stores ashore by longboat. The first two aircraft were assembled and flown on a photographic reconnaissance sortie on 24 November and from 28 November four machines were flying local reconnaissance flights to produce hand-drawn maps of the challenging terrain.⁴⁸ As the B.E.2'c limited radius was circa 120 miles, C Flight started searching for advanced landing grounds by camel, car and aeroplane, with Lawrence's assistance, to preposition oil, petrol, wheels and propellers.⁴⁹ On 8 December C Flight started reconnaissance flights at Lawrence's request to detect Turkish troops advancing on Rabegh.

Lawrence soon complained to Clayton that RFC aerial reconnaissance was unsatisfactory, in contrast to the 'yeoman work' of the RNAS seaplanes.⁵⁰ Poor weather at Rabegh had prevented C Flight intervening when the Turks advanced on Yanbu and Rabegh in December. Instead *HMS Raven II's* two seaplanes patrolled inland and on 10 December detected three Turkish brigades advancing from Medina towards Yanbu and that the Sharifian covering force of 1,500 men had disappeared.⁵¹ A British brigade was placed on standby at Port Suez on Lawrence's recommendation and Boyle quickly assembled five ships at Yanbu whose searchlights and guns deterred the Turks, while the *Raven's* seaplanes attacked them with bombs and machine-guns.⁵² Lawrence wanted to fly as an observer on reconnaissance himself and was annoyed when Ross refused. Ross subsequently explained that to land at Yanbu would add 90 minutes to a six-and-a-half-hour sortie as it took a B.E.2c an hour to climb to 7,000 feet.⁵³

Such was the high-level interest in the aeroplanes that Robertson signalled Murray on 9 January 1917: 'Cabinet wanted to know if more use can be made of aeroplanes to bomb Turks'. A well-informed Murray replied that to bomb beyond the aircrafts' 100 miles range required advanced refuelling grounds.⁵⁴ Meanwhile C Flight's first attack was on 6 January when three aircraft led by Ross bombed the Turkish camp at El Hajah.

⁴⁸ Captain T Henderson, *The Hejaz Expedition, 1916-1917. A Narrative of the Work Done by the Arabian Detachment of No 14 Squadron R.F.C. While Attached to the Hejaz Expedition.* (Salisbury: 14 Squadron RAF, 1917).

⁴⁹ LHCMA Joyce1/J/3 Ross to Joyce. Limits of Tactical Reconnaissance; 2/Lt Wilkinson, RE and RFC; Reports on Landing Ground Preparation at Yanbu, dated 5 December 16, 1916.

⁵⁰ Lawrence, *The Letters of T. E. Lawrence*, letter to Director, Arab Bureau 11 December 1916, 94.

⁵¹ TNA, WO 158/604, Egypt and Palestine. GHQ, Operations and Military Situation, 1916 Nov.-Dec, SNO to GOC C-in-C 10 December 1916.; TNA, AIR 1/1706/204/123/65 Operation Reports: HMS 'Raven II, 1916.

⁵² TNA, WO 158/604, Egypt and Palestine. GHQ, Operations and Military Situation, 1916 Nov.-Dec, Lawrence to Clayton, 12 December 1916.

⁵³ TNA, WO 158/604, Egypt and Palestine. GHQ, Operations and Military Situation, 1916 Nov.-Dec., Ross to Arbur 13 December 1916.

⁵⁴ TNA, WO 33/905, Telegrams; European War: Egypt. 1916-1917, CIGS to GOC-in-C 9 January 1917 and GOC-in-C to CIGS 10 January 1917.

'Major Ross, who spoke Arabic so adeptly and was so splendid a leader'

Lawrence was often critical of British regular officers; he 'considered them limited in imagination and insufficiently elastic to withstand the shocks of Arab strategy and tactics'.⁵⁵ Lawrence later wrote:

We kindergarten soldiers, we were beginning our war in the atmosphere of the twentieth century, receiving our weapons without prejudice. To the regular officer, with the traditions of forty generations behind him, the antique arms were the most favoured.⁵⁶

Yet most of Lawrence's colleagues were selected by Wingate or his Military Secretary, *Miralai* (Colonel) Robert Rees-Mogg, from regular officers seconded to the Egyptian Army, which, with its generous allowances, could be highly selective. Clayton, Lieutenant Colonel Stewart Newcombe, the Mission's commander and sapper (to attack the railway), Major Charles Vickery, the gunnery advisor, and Major Marshall the medical officer, Joyce and Ross were all Egyptian Army veterans.⁵⁷

Ross was Wingate's first choice as the Mission's commander and sapper but when the Adjutant General's department eventually located him he was already at Rabegh with C Flight, nominally commanding the Mission as he was senior to Joyce.⁵⁸ A Malvern classics scholar, he was second in his Woolwich entry, learnt Arabic on sick leave, and had led an expedition in Sinai in 1914.⁵⁹ Ross was awarded the Order of the Nile and Distinguished Service Order (DSO) for air operations against the Senussi in 1915 as an observer and a second DSO in 1917 for his leadership in the Hejaz.

Lawrence soon changed his mind about Ross, writing in Seven Pillars:

The garrison at Rabegh was reassured by the arrival of four British aeroplanes [sic] under Major Ross, who spoke Arabic so adeptly and was so splendid a leader that there could be no two minds as to the wise direction of his help.⁶⁰

⁵⁵ LHCMA Joyce//2/19 BBC TV Script. Similar to Joyce 2/18 on Hejaz Campaign 1916-18; First and other Meetings with Lawrence. Annotated by AW Lawrence and Corrected. Dated 14 July 1941.

⁵⁶ T. E. Lawrence, Seven Pillars of Wisdom: A Triumph (London: J. Cape, 1935), 148.

⁵⁷ LHCMA, Joyce/1/11 To Rees-Mogg. Complaints Dated 21 December 1916.; TNA, WO 33/905, Telegrams; European War: Egypt. 1916-1917, Sirdar to CGS dated 11 November 16.

⁵⁸ SAD Wingate Collection 3/17 Wingate to Clayton 3 December 1916; TNA, WO 33/905, Telegrams; European War: Egypt. 1916-1917, Sirdar to CGS 11 November 16.

⁵⁹ Obituary of Maj A J Ross DSO RE and RFC, *Flight*, 16 August 1917, 844.; SAD Wingate Collection 193/3/33-43 Route Report by A.J. Ross on a 5 Day Camel Trek through Sinai 22nd October 1914.

⁶⁰ Lawrence, Seven Pillars of Wisdom, 115.

Furthermore, Ross gave Lawrence his Omega RFC watch before handing over C Flight to Major F W Stent, another Arabic speaker, in April 1917.⁶¹ Ross was killed in a flying accident in August 1917. When in 1922 Lawrence first enlisted in the RAF he used the name Ross, though he never explained his choice of name.

The final RNAS seaplane sorties in support of the Revolt were during the capture of the port of Wejh in January 1917. Lawrence, now Feisal's British liaison officer, had convinced him to begin a guerrilla campaign against the Hejaz railway, using Wejh as a base, and so tie down 30,000 Turks.⁶² When Feisal's force missed the rendezvous with Boyle's ships prior to the attack on Wejh, Boyle, realising the utility of aerial reconnaissance, had himself flown over the town in one of *HMS Anne's* seaplanes before deciding to attack without Feisal.⁶³ Boyle's ships landed 400 Arabs and 200 British sailors, who led by Vickery and Bray, captured the town. The only British fatality was a seaplane observer, Lieutenant N C Stewart Royal Scots and RFC, shot from the ground, while spotting for the ships' guns.⁶⁴

Lawrence, as British liaison officer to Feisal, provided liaison between the Arabs and C Flight after it moved to Wejh in March 1917. Ross aborted his first attempt to reconnoitre an advanced landing ground within range of the railway by camel when his Arab escort did not appear,⁶⁵ whereas Air Mechanic George Hynes recalls Lawrence convincing a sheikh to allow C Flight to use his land as an advanced landing ground.⁶⁶ Both the British and Arabs searched for suitable landing grounds, including both Jaafar Askari, the former Ottoman commanding the regular Arab contingent and Newcombe. The terrain and climate were unforgiving, however. Two airmen almost died when their Crossley tender ran out of radiator water reconnoitring a route to a landing ground but fortunately they were found by a lone Bedouin who gave them water and carried them on his camel, refusing to take the gold offered as a reward.

From Wejh, C Flight, reinforced to six aircraft, established a routine of reconnaissance flights of the railway normally from around 4,500 feet and first bombed it on 30 March from around 2,500 feet from a landing ground at Toweira. Sorties were normally launched in the relative

⁶¹ Recorded in *The Gazette* (London Gazette), page 2450, Supplement 29977, 9 March 1917; Recorded in *The Gazette* (London Gazette), Page 8104, Supplement 30222, 7 August 1917; David Dennis, 'Famous Watches: Lawrence of Arabia's Omega Chronograph, Letter from Omega Museum Reference #2885 in Museum Inventory', *Famous Watches*, 7 October 2005, https://famouswatches.blogspot.com/2005/10/lawrence-of-arabias-omega-chronograph.html [accessed 1 December 2018].

⁶² John Fisher, 'The Rabegh Crisis, 1916-17: "A Comparatively Trivial Question" or "A Self-Willed Disaster", *Middle Eastern Studies* 38, no. 3 (1 July 2002): 88.

⁶³ Jones, The War in the Air, 5:222–23.

⁶⁴ TNA, AIR 1/1708/204/123/73 Operation Reports: HMS `Anne', 1916, report for 23rd January 1917.

⁶⁵ TNA, WO 158/605 Egypt and Palestine. GHQ, Operations and Military 1916 Dec.-1917 Apr. Joyce to Arbur via Wilson 1 March 1917.

⁶⁶ James Patrick Hynes, *Lawrence of Arabia's Secret Air Force: Based on the Diary of Flight Sergeant George Hynes* (Barnsley: Pen & Sword Aviation, 2010), 21.



Figure 1: Captain T. E. Lawrence (in uniform, second from the right) and his party, Ford car and RFC Crossley tender during a mission to recover a crashed B.E.2c aircraft at Wadi Hamdh. Photograph taken near Jebel Raal, south east of Wejh, 6 May 1917. © Imperial War Museum (Q 59040).

coolness of dawn. In May, before he left to capture Aqaba, Lawrence accompanied a small party to recover Stent's aeroplane which had crashed when trying to rescue the crew of another aircraft (see Figure 1). The aeroplanes provided communications in the absence of mobile wireless, carrying officers or picking up messages by hook and line, and dropping messages. In early July C Flight bombed the railway and station at El Ula for several successive days from a landing ground at Feisal's headquarters at Gayadah, in preparation for a planned Arab assault. This assault was abandoned when Lieutenant V D Siddons flew in Lawrence from Wejh on 19 July to tell of his capture of Aqaba. This was C Flight's last sortie as on 17 July Stent had declared C Flight's aircraft, already in poor repair, unserviceable after they were hit by a sandstorm at Gayadah. In Siddons' view, C Flight justified its existence despite the logistic effort: the bombing raids were indecisive, but the aerial reconnaissance allowed demolition parties to operate in relative safety, and the aircraft raised Arab morale by keeping Turkish aeroplanes away.⁶⁷

'A holiday, with not an Arab near'

The Arab capture of the port of Aqaba on 17 June 1917 transformed the campaign. Feisal's Northern Arab Army became the right flank of the EEF's advance into Palestine and Syria under the newly arrived General Sir Edmund Allenby. In planning the Aqaba expedition,

⁶⁷ Henderson, *Hejaz Expedition*; Ronald Knight, 'The Reverend Victor Donald Siddons, MBE, DFC, MA and the "Siddons Collection", *Journal of the T. E. Lawrence Society*, XVII.1 (2007): 7–30 (12-14).

Lawrence had access to intelligence from pre-war surveys, including his own visit in 1914, raids by Boyle's ships, and aerial photographs from *HMS Raven II's* aerial reconnaissance in August 1916.⁶⁸ After Aqaba's capture, Lawrence rode 150 miles by camel to Port Suez to get British support. Allenby's chief of staff reported: 'That wild man Lawrence of the Arab Army, has just arrived back today, and the story of his adventures is one the most extraordinary things I have ever read'.⁶⁹ Wingate recommended Lawrence for a VC, but it could not be granted as there was no British officer witness.⁷⁰ He was promoted to temporary major instead.

Allenby re-organised the EEF for modern industrial warfare and immediately recognised the value of Lawrence, Feisal's Arabs and air power. Ordered by Lloyd George to capture Jerusalem before Christmas 1917, to divert public attention from the attrition of the Western Front and secure Britain's post-war position in the Middle East, Allenby asked for modern fighters to gain control of the air and also a dedicated flight for the Arabs, just days after meeting Lawrence for the first time.⁷¹ After three Bristol Fighters arrived, Allenby took evident delight in telling Robertson they had 'bagged two enemy aircraft in the first week'.⁷²

Stent and his men were sent to Aqaba from Wejh to form X Flight RFC. On 11 September 1917, Joyce, now at Aqaba with his Egyptian infantry and armoured cars, signalled: 'send machines at once please. Aerodrome ready and Stent, Aqaba detachment here. EA [enemy aircraft] very active. Advisable to send 3 machines, include one scout [fighter] if possible.' X Flight arrived with two B.E.2e and two B.E.12 reconnaissance aircraft and a DH.2 scout, all becoming increasingly obsolete. A landing ground was soon established at Feisal's advanced base at El Guierra on the plain north of Wadi Itm and on 29 September four X Flight aircraft bombed the railway at Maan in a raid planned with Lawrence.⁷³ Such sorties were to continue until Allenby's offensive at Megiddo in September 1918, typically leaving Aqaba at first light, refuelling at El Gueirra or another landing ground, bombing the railway and reconnoitring on return.⁷⁴ Figure 2 is Siddon's sketch map of a Turkish camp to the north of Gueirra drawn during one such sortie. Aircraft from Brigadier General A E (Biffy) Borton's Palestine Brigade, RFC also raided the railway at Lawrence's instigation. At Aqaba the guard ship *HMS Humber* provided X Flight with distilled water, wireless telegraphy, a bakery and workshop, and aircrew accommodation.

dated 2nd October 1917.

⁶⁸ Johnson-Allen, *Red Sea Patrol*, 57; TNA, AIR 1/2284/209/75/8 Operations in Gulf of Akaba, Red Sea HMS `Raven'II Jul - Aug 16.

⁶⁹ TNA, WO 106/718 Communications between General Staff, War Office and Egypt. Outline of Operations Palestine, 1918, CGS EEF to DMO dated 11 July 1917.

⁷⁰ SAD Wingate Collection SAD 165/1/157-162, Wingate to Wilson 15 July 1917.

⁷¹ TNA, WO 158/611 Appreciation of the Situation in Palestine, 1 July 1917, Allenby to CIGS, Appreciation dated 11 July 1918.

⁷² TNA, WO 33/935 Telegrams, European War: Egypt. 1917, Telegrams 8231, 8422, 8442.

⁷³ TNA, WO 158/635 Arab Forces: Arab Co-Operation in Hejaz and Syria Aircraft Operations 1917 Aug 1918 Mar.
⁷⁴ LMCHA Joyce 1/K/2 Report on Bomb Attack by Detached Flight No 14 Squadron, Akaba by Siddons. Maan,



Figure 2: LHCMA Joyce 1/K/2 Report on bomb attack by Detached Flight No 14 Squadron, Akaba by Siddons. Maan, dated 15 Oct 17 $^{\odot}$ LHCMA

Increasingly the Arab regulars (former prisoners of war) and the British Military Mission's armoured cars and aircraft were at the forefront of Northern Arab Army operations. In January 1918 the Arab regular and irregular forces, advised by Lawrence, won a notable set-piece battle when the Turks attacked the Arab village of Tafileh. In the same month the British finished a road through Wadi Itm and Joyce used his airfield defence armoured cars to raid the railway at Muddawara supported by lorry mounted artillery and X Flight.⁷⁵ In April the Arabs and British planned an integrated air/land operation to capture Maan, a railway town garrisoned by several thousand Turks. The attack was at the insistence of Jaafar Askari but planned by Lieutenant Colonel Alan Dawnay, the British Hejaz Operations HQ senior staff officer, who Lawrence called 'Allenby's greatest gift' to the Arabs. Dawnay led two, five-day motorised reconnaissance patrols to check the going for the same ex-RNAS armoured cars that had captured Jaafar Askari when he led the Senussi. X Flight RAF, as it now was, supported the attack on Maan on 14 April by Arab regulars, the Egyptian Camel Corps and around 200 Arab camel men brought by Lawrence. The aircraft were directed by Popham panel ground-to-air signals. When the attack failed, despite the bravery of the Arab regulars, ⁷⁶ the British raided

⁷⁵ LHCMA Joyce/2/6, Akaba to Dawnay. Report on armoured car reconnaissance of railway line to draw troops from Maan to help Arabs at Abu Lissal, dated 6 January 1918; H. St J. B. Armitage and J J Pascoe, 'The 10 Pounder Motor Section R.F.A. Hedjaz Operations', *Journal of T E Lawrence Society* X, no. 1 (Autumn 2000): 16–17.

⁷⁶ TNA, WO 95/4415 Headquarters Hejaz Operation - EEF War Diary Hejaz Armoured Car Section, 1917; Jones, *The War in the Air*, 6:193.

Tel El Shahim, Ramleh and Muddawara stations, destroying around 20 miles of railway in armoured cars, tenders and lorry mounted artillery, supported by X Flight's ground attack. Lawrence called it 'a holiday, with not an Arab near' and raiding in armoured cars 'fighting de luxe'.⁷⁷ Whereas previously Lawrence would have co-ordinated with the Arab irregulars by camel, he now used the Rolls Royce tenders 'Blast' or 'Blue Mist' or a Ford car, and aeroplanes to visit Allenby's HQ in Palestine.⁷⁸

As well as respecting the RFC/RAF flight commanders, Lawrence was comfortable in the company of air mechanics and armoured car crews. Salmond had hand-picked Stent, Ross' replacement:

They had experience of forced landing on desert surfaces and could pick out an unknown destination across unmapped hills: Stent spoke Arabic perfectly. The flight had to be air-contained, but its commander was full of resource and display.⁷⁹

Air Mechanic Hynes refers to a cohesive 'desert spirit' amongst the Flight, such as when Lawrence encouraged his colleague Captain Lord Winterton MP to make the air mechanics breakfast: 'Yes! What about you Winterton making breakfast this morning? These men have had a rough time getting here!'. Winterton did so though burnt the bacon.⁸⁰ At Christmas 1917 each man got fresh potatoes and a bottle of beer, flown from Egypt by Stent's replacement, Captain Furness-Williams. Driver S C Rolls describes Lawrence's ease with the car drivers and his efforts to help fix Blast's broken rear axle.⁸¹ Hynes modified a Lewis Mk II aircraft machine gun for Lawrence to carry on his camel.⁸² When Lawrence, now a General Staff Officer Grade 2, had a forced landing in Sinai in June 1918 when being flown by Borton, the RAF Brigade commander, he was rescued by Furness-Williams and Hynes.⁸³ Graves later wrote 'it was these friendly outings with the Armoured Car and Air Force fellows that persuaded him, even then, that his best future, if he survived the war, was to enlist.'⁸⁴

'The RAF lost four killed. The Turks lost a corps'

The climax of Lawrence's involvement with air power during the War was Allenby's great victory at the Battle of Megiddo, 19-23 September 1918. The Northern Arab Army was to both

⁷⁷ T. E. Lawrence, Seven Pillars of Wisdom: A Triumph (London: J. Cape, 1935), 521–42.

⁷⁸ S. C. Rolls, Steel Chariots in the Desert: The First World War Experiences of a Rolls Royce Armoured Car Driver with the Duke of Westminster in Libya and in Arabia with T. E. Lawrence, (Place of publication not identified: Lenour, 2005), 144–45, 136.

⁷⁹ Lawrence, Seven Pillars of Wisdom, 341–42.

⁸⁰ Hynes, *Lawrence of Arabia's Secret Air Force*, 22.

⁸¹ Rolls, Steel Chariots in the Desert, 232–35.

⁸² Hynes, Lawrence of Arabia's Secret Air Force, 75.

⁸³ James Patrick Hynes, *Lawrence of Arabia's Secret Air Force: Based on the Diary of Flight Sergeant George Hynes* (Barnsley: Pen & Sword Aviation, 2010), 65–66.

⁸⁴ Robert Graves, *Lawrence and the Arabs*, Concise edition (London: J. Cape, 1927), p.203.

cover Allenby's right flank and provide a feint by threatening Deraa. Lawrence accompanied to Azrak a 1,000-strong task force of Arab regular, Egyptian and Gurkha camel corps, Arab and French artillery, machine guns, three British armoured cars and a Bristol Fighter and obsolete B.E.12 from X Flight, now commanded by Siddons.⁸⁵ The Arab feint on 16-17 September, covered by 144 Squadron's DH.9s bombing Deraa, worked so well that German aircraft were redeployed to Deraa, away from facing Allenby's army in Palestine, and the only sorties flown by German aircraft during the battle were against the Arabs.

When X Flight's sole Bristol Fighter was damaged and sent to Palestine for repair, nine enemy aircraft attacked the Arab force. The remaining B.E.12 from Azrak engaged them but it overturned on landing after running out of fuel and was destroyed by an enemy bomb (see Figure 3 below). The pilot, Lieutenant Junor, joined the Arab force, fitting his Lewis gun to a Ford car.⁸⁶ Lawrence in his final report to the Arab Bureau called the situation 'air helplessness', noting 'armoured car work is fighting de luxe, but they give a sitting shot to a well-handled plane'.⁸⁷ Lawrence, now a temporary Lieutenant Colonel, hitched a lift to the EEF HQ at Ramleh in an aircraft delivering messages and met Allenby to request air support for the Arabs.



Figure 3: Lieutenant Junor's B.E.12 after making a forced landing © Imperial War Museum Q 58703

⁸⁵ Knight, 'Siddons', 19; *Lawrence, Pillars of Wisdom*, 590.; Jones, *The War in the Air*, 6:204–5.

⁸⁶ Jones, *The War in the Air*, 6:213–14; Lawrence, *Seven Pillars of Wisdom*, 596.

⁸⁷ T. E. Lawrence, "The Destruction of the Fourth Army" Arab Bulletin No. 106, 22 October 1918.

Lawrence describes what happened next in *Seven Pillars*, largely drafted before he enlisted. Allenby 'pressed a bell and in a few minutes Salmond (now commanding the RAF in the Middle East) and Borton were conferring with us':

Salmond and Borton were men of avid novelty. They worked our loads for DH.9 and Handley-Page, while Allenby sat by, listening and smiling, sure it would be done. The co-operation of the air with his [General Allenby's] unfolding scheme had been so ready and elastic, the liaison so complete and informed and quick. It was the RAF which had converted the Turkish retreat into rout, which had abolished their telephone and telegraph connections, had blocked their lorry columns, scattered their infantry units.⁸⁸

Lawrence adds a further, graphic section, on the RAF's pursuit of the Turkish Seventh Army in *Revolt of the Desert*, the abridged *Seven Pillars*, published when Lawrence was an airman in India and Salmond was his Air Officer Commanding:

But the climax of the air attack, and the holocaust of the miserable Turks, fell in the valley by which Esdraelon drained to the Jordan by Beisan. [...] For four hours our aeroplanes replaced one another in series above the doomed columns: nine tons of small bombs and grenades and fifty thousand rounds of S.A.A were rained upon them. When the smoke cleared it was seen that the organization of the enemy had melted away. They were a dispersed horde of trembling individuals, hiding for their lives in every fold of the vast hills. Nor did their commanders ever rally them again. When our cavalry entered the silent valley next day they could count ninety guns, fifty lorries, nearly a thousand carts abandoned with all their belongings. The RAF lost four killed. The Turks lost a corps.⁸⁹

As a result of Lawrence's request, Borton ordered No 1 Squadron Australian Flying Corps to send on 'a special mission to Azrak' on 22 September 1918 three Bristol Fighters and the theatre's sole Handley Page O/400, which Borton himself had flown out from England.⁹⁰ Borton and Captain Ross Smith flew the Handley Page loaded with a ton of petrol, armoured car spares, mechanics and bombs.⁹¹ Before breakfast the Bristol Fighters had downed four enemy aircraft. The official military historian called the mission 'brilliant and unceasing support of Lawrence's Arabs, who would have been well-nigh helpless without it for the bolder enterprise in which they were to engage'.⁹² The Australian aircraft continued to reconnoitre

⁸⁸ Lawrence, Seven Pillars of Wisdom, 615–17.

⁸⁹ T. E. Lawrence, *Revolt in the Desert* (London: Cape, 1927), 92. SAA is small arms ammunition.

⁹⁰ AIR 1/2329/226/1/16 War Diary Palestine Brigade, Op Order of 22 September 1018 to 40th Wing RAF: 4 machines will be sent on a special mission to Azrak; Peter Dye, 'Biffy Borton's Bomber', *Cross and Cockade International* 34, no. 2 (Summer 2003): 71–78.

⁹¹ Jones, The War in the Air, 6:229–30.

⁹² Cyril Falls, Armageddon: 1918, Great Battles of History. (London: Weidenfeld and Nicolson, 1964), 32.

for the Arab Army in their advance to Damascus. After the fall of Damascus Lawrence returned to Egypt via Akaba, travelling with X Flight.

Air Control

'Armoured Cars and Aeroplanes could rule the desert, but they must be under non-army control'

Perhaps Lawrence's greatest air power achievement was after the First World War in shaping the decision to give the RAF military control of Britain's new Middle Eastern Mandates, a policy known as air control, which also helped secure the RAF's future. In his early post-war writing Lawrence hardly mentioned the role of air power in the Revolt. His first three letters to *The Times* in November 1918 focused on the beginnings of the Revolt, the Arabs and the Royal Navy's critical role. His first detailed account, in the first volume of *Army Quarterly*, noted the utility of armoured cars supported by aircraft.⁹³ Yet Lawrence told Liddell Hart he had originated the policy of air control:

As for the effect of the bombing, the war showed me that a combination of armoured cars and aircraft could rule the desert: but that they must be under non-army control, and without infantry support. You rightly trace the origin of the RAF control in Irak [sic], Aden and Palestine to this experience. As soon as I was able to have my own way in the Middle East I approached Trenchard on the point, converted Winston easily, persuaded the Cabinet swiftly into approving, (against the wiles of Henry Wilson) and it has worked very well. The system is not capable of universal application.⁹⁴

Lawrence exaggerates his role as he joined the Colonial Office as Churchill's Middle Eastern advisor in December 1920, after the operations against the Mad Mullah in Somaliland in January 1920, commonly cited as the first demonstration of air control.⁹⁵ Yet the utility of air power for colonial control had long been recognised, the very first aerial bombing was by Italy in Libya 1911, Wingate proposed air control in the Sudan in 1916, and a single raid on Kabul in May 1919 had been instrumental in ending the Third Afghan War. Furthermore, when Lloyd George's War Cabinet had directed in August 1919 'that the British Empire will not be engaged in any great war during the next ten-years', in what became known as the ten-year rule, it also directed 'Army and Air Forces' to police the Empire 'making the utmost use of mechanical contrivances', a term frequently used by Churchill.⁹⁶

⁹³ From a Correspondent, 'The Arab Campaign. Land and Sea Operations', *The Times*, 26 November 1918, 5; From a Correspondent, 'The Arab Epic. Feisal's Battles in the Desert. On the Threshold of Syria', *The Times*, 27 November 1918, 7; 'The Arab Epic. Doom of Turk Power in Syria. Wrecking the Hejaz Railway', *The Times*, 28 November 1918;

T. E. Lawrence, 'Evolution of a Revolt', 55–69.

⁹⁴ Lawrence, Graves and Liddell Hart, *T. E. Lawrence to His Biographers*, 112.

⁹⁵ Brigadier Andrew Roe, 'Air Power in British Somaliland, 1920: The Arrival of Gordon's Birdmen, Independent Operations and Unearthly Retributions', *Air Power Review* 21, no. 1 (Spring 2018): 74–93.

⁹⁶ TNA, CAB 23/15, WC 616A Naval, War and Air Estimates Dated 15 August 1919.

Churchill, as Secretary of State for War and Air, first proposed 'the great value of the Air Force as factor in the control of vast areas like Mesopotamia' to the Cabinet Finance Committee on 4 January 1920, and in February Biffy Borton told the Royal United Services Institute of air power's proven effectiveness in the Middle East and potential in small wars.⁹⁷ Churchill asked Trenchard if he would be prepared to take on Mesopotamia on 19 February. Lawrence must have heard of the scheme as in March he arranged to discuss it with Trenchard on 21 April, suggesting Air Vice-Marshal Sir John Salmond (Geoffrey's younger brother) should be both military commander and High Commissioner, with a political deputy.⁹⁸ The following day Lawrence told Winterton 'I think he [Trenchard] is right on all points [...] and I feel inclined to back his scheme.[...] Trenchard sounded to me clean and honest. [...] He thinks as little of the worth of bombing as we did!'⁹⁹ In his 22 August 1920 letter to *The Sunday Times* criticizing the British colonial administration for causing the great Iraq revolt of 1920, bloodily suppressed in part by air power, Lawrence referred to the cost of the Army garrison and the RAF's offer to do it for 'one fourth the price.'¹⁰⁰

'Sir Hugh is right and the rest of you are wrong'

Lawrence's key intervention came when the policy was considered at Churchill's Cairo Conference in March 1921 where the first agenda item was military control of Iraq and the second a king for Iraq. Lawrence joined Churchill, Trenchard and John Salmond on 11 March 1921 in the Ship Inn in Westminster to agree the line to take at the Conference.¹⁰¹ Lawrence is hardly mentioned in the Conference minutes and the only account is Trenchard's authorised biography; which D C Watt famously called the 'Air Force View of History'.¹⁰² At the Conference, held in the Semiramis Hotel, Trenchard, socially ostracised by the generals, dined with Lawrence and Gertrude Bell. When the Conference discussed military control, Sir Percy Cox, British High Commissioner in Bagdad, echoed the waspish CIGS Sir Henry Wilson's description of the RAF 'coming from God knows where, dropping its bombs on God knows what, and going off God knows where'. Whereas Gertrude Bell, the British Oriental Secretary in Baghdad, and who had visited Lawrence at Carchemish in 1911, supported air control as long as it was used with 'civilized restraint'. Lawrence 'who had seen something of the RAF's power and mobility in action, went further', contradicting Cox, declaring that 'air control would help Britain as much as the Arabs, a small force keeping out of sight until a cause for intervention arose', concluding 'Sir Hugh is right and the rest of you are wrong'.¹⁰³ The Conference and Cabinet decided the RAF should assume responsibility in October 1922 with eight flying squadrons, two RAF armoured cars companies, and nine battalions of infantry to replace over

⁹⁷ TNA, CAB 27/71/FC 31(2). Finance Committee Minutes', 1920.

⁹⁸ Wilson, Lawrence of Arabia, 632.

 ⁹⁹ T. E. Lawrence, *The Letters of T. E. Lawrence* (London: World Books/Reprint Society London, 1941), 100–101.
 ¹⁰⁰ Wilson, *Lawrence of Arabia*, 634.

¹⁰¹ Richard Aldington, Lawrence of Arabia: A Biographical Enquiry (London: Collins, 1955), 522.

¹⁰² D. C. Watt, 'The Air Force View of History', *Quarterly Review* 300, no. 4 (1962): 488–525.

¹⁰³ Andrew Boyle, Trenchard (London: Collins, 1962), 382-4.

fifty battalions, much to the General Staff's disgust.¹⁰⁴ Of note, Trenchard offered Lawrence a commission as an RAF armoured car officer in Palestine when dismissing him as an airman in 1922.¹⁰⁵

Air control was and remains controversial. One post-colonial historian recently called it 'a new form of imperial rule, invisible, barely existing on paper, designed for an increasingly antiimperial post-war world, both at home and abroad'. The crime was 'empire' and air control 'was merely its most technologically advanced instrument'.¹⁰⁶ At the time Wilson called it a plan based on 'Hot Air, Aeroplanes and Arabs'.¹⁰⁷ Yet for the Air Ministry pacification from the air was less destructive than a punitive ground expedition and avoided costly and vulnerable lines of communication. Churchill claimed in 1929' that the change has proved an immense success'.¹⁰⁸

Lawrence's own view was typically inconsistent depending on who he was telling and when. In 1927 he told Robert Graves he thought 'it has worked very well'.¹⁰⁹ Graves wrote:

Lawrence, who advocated the change with all his might, believed that such early responsibility would be the making of the young service; but this policy would only be practicable if it were joined with a liberal measure of Arab self-government controlled by a treaty between Irak [sic] and Great Britain.¹¹⁰

Yet Lawrence told Colonel Archibald Wavell in 1923 that 'bombing tribes is ineffective. I fancy air power may be effective against elaborate armies but against irregulars it has no more than moral value. [...] Guerrilla tactics are a complete muffing of air-force [sic].'¹¹¹ Whereas he told Liddell Hart the Arab reaction was complex, but the policy was more merciful than military action:

I think they feel our own intense irritation and vain rage at an attack to which there can be no response. There is something odd, chilling, impersonally fateful about air bombing. It is not punishment, but a misfortune from heaven striking the community. [...] The RAF recognises this, and bombs only after 24 hours notice is given. So the damage falls only on immovables. [...] It is of course infinitely more merciful than police or military action, as hardly anyone is ever killed - and the killed are as likely to be negligible women and

¹¹⁰ Ibid, 111.

¹⁰⁴ David E Omissi, Air Power and Colonial Control: The Royal Air Force 1919-1939 (Manchester: Manchester University Press, 1990), 18–29.

¹⁰⁵T. E. Lawrence, *The Letters of T.E. Lawrence* (London: J. Cape, 1938), 222–23. Letter to H W Bailey.

¹⁰⁶ Priya Satia, *Spies in Arabia: The Great War and the Cultural Foundations of Britain's Covert Empire in the Middle East* (New York: Oxford University Press, 2008), 7, 11.

 ¹⁰⁷ Sir C. E. Callwell (Charles Edward), *Field-Marshall Sir Henry Wilson : His Life and Diaries.*, vol. 2 (London: Cassell, 1927), 316.
 ¹⁰⁸ Winston Churchill, *The World Crisis, The Aftermath* (London: Thornton Butterworth, 1929), 464.

¹⁰⁹ Lawrence, Graves, and Liddell Hart, T. E. Lawrence to His Biographers, 112.

¹¹¹ T. E. Lawrence, *The Letters of T. E. Lawrence*, ed. Malcolm Brown (London: Dent, 1988), 238.
children. [...] Only this is too oriental a mood for us to feel very clearly. An Arab would rather offer up his wife than himself, to expiate a civil offence.¹¹²

Lawrence as an Airman

Lawrence's surviving correspondence as an airman, and briefly soldier, predominantly concerns his literary work and most concerning the RAF is focused on his attempts to re-enlist after his dismissal. Lawrence corresponded with, visited, and often captivated, many leading writers, poets, artists, publishers, and politicians, as well as his war-time colleagues. It is clear from his correspondence and the second part of *The Mint*, written after he re-joined, that he venerated the RAF and Trenchard. Yet despite Lawrence, in his aircraftman's uniform, often calling on Churchill, who was in awe of him,¹¹³ routinely corresponding with Trenchard, and Geoffrey Salmond, who visited him at Clouds Hill on Lawrence's 36th birthday, little survives of any discussions about air power that they presumably had.¹¹⁴

Lawrence made much of his dislike of serving in the Army, in contrast to the RAF. He presumably chose to enlist in Tank Corps in March 1923, after his dismissal from the RAF, because of his wartime comradeship, 'fighting de luxe', with the armoured car crews, and because he was helped by General Sir Philip Chetwode, one of Allenby's corps commanders and now Adjutant General. Lawrence did well pistol shooting and technically, claiming to get ninety-three per cent in his Rolls Royce course, the highest ever.¹¹⁵ But in one of many similar letters he told Liddell Hart:

I did not like the Army much, but the RAF is as different from the Army as the air is from the earth. In the Army the person is at a discount: the combined movement, the body of men, is the ideal.¹¹⁶

He told Trenchard the RAF had twice the vitality of the Army.¹¹⁷

'I took thought for a night and then declined'

Lawrence declined an opportunity to influence British air power when he refused Trenchard's offer in 1924 to write the official history of the British air services in the war, *The War in the Air*, and replace his Oxford mentor Hogarth, who was giving up through ill-health. Hogarth had briefly taken over when the author of the first volume, Oxford professor of English literature, Sir Walter Raleigh, had died of cholera in 1922, contracted while researching the RAF in Iraq.¹¹⁸

¹¹⁷ Lawrence, *The Letters of T. E. Lawrence*, 258. Sir Hugh Trenchard 1 March 1924.

¹¹²Lawrence, Graves, and Liddell Hart, T. E. Lawrence to His Biographers, 41.

¹¹³ Lawrence was one of Churchill's 'Great Contemporaries'.

¹¹⁴ Harry Broughton, Lawrence of Arabia and Dorset (Wareham (Dorset): Pictorial Museum, 1966), 'GBS' section.

¹¹⁵ Lawrence, *The Letters of T. E. Lawrence*, p.276. Sir Hugh Trenchard dated 6 February 1925.

¹¹⁶ T. E. Lawrence and Basil Henry Liddell Hart, *T. E. Lawrence to His Biographer, Liddell Hart: Information about Himself, in the Form of Letters, Notes, Answers to Questions and Conversations*. (London: Faber and Faber, 1938), 123.

¹¹⁸ Jones, The War in the Air, 2: Preface.

Trenchard had asked his former personal staff officer and 'English merchant', the poet Maurice Baring, but Baring was publishing his own history of the RFC in France. Lawrence told Hogarth, 'I took thought for a night and then declined', thinking it impossible to balance the technical history the Committee for Imperial Defence required and the literary history Trenchard wanted.¹¹⁹ The six volumes of *The War in the Air* were completed by Raleigh's assistant, H A Jones MC, a former No 47 Squadron observer, in 1937. Ironically, the only air power history in Lawrence's 600 book library at Clouds Hill at his death were two editions of Baring's book, and an RFC ace's photo diary.¹²⁰



Figure 4: Members of 27 Squadron RAF prepare a DH.9A at Miranshaw in 1929 © AHB

Lawrence's correspondence with Liddell Hart mainly focused on Lawrence's wartime experience, in support of Liddell Hart's own concept of the 'indirect approach'. For Liddell Hart, Lawrence was 'at once his authority and his subject'.¹²¹ Lawrence told Liddell Hart 'What the Arabs did yesterday the Air Forces could do tomorrow. And in the same way yet more swiftly.'¹²² Lawrence also advocated air power's potential to his wartime colleague, the politician Lord Winterton: 'get the [Secretary of State for] Air for yourself. Good job, as big as the holder, the only one with growth unlimited.'¹²³ When Britain started to rearm against

¹²² Basil Liddell Hart, T. E. Lawrence in Arabia and After (London: Cape, 1934), 438.

¹¹⁹Boyle, Trenchard, 515.

¹²⁰ Maurice Baring, *R. F. C. H. Q., 1914-1918* (London: G Bell and sons, 1920); Maurice Baring, *Flying Corps Headquarters, 1914-1918* (London: W Heinemann Ltd, 1930); Leigh, *Lawrence*, 137–54; Wesley David Archer, *Death in the Air; the War Diary and Photographs of a Flying Corps Pilot* (London: W Heinemann Ltd, 1933).

¹²¹ Alex Danchev, Alchemist of War: The Life of Basil Liddell Hart (London: Weidenfeld & Nicolson, 1998), 178.

¹²³ T. E. Lawrence, *The Letters of T. E. Lawrence*, ed. by Malcolm Brown (London: Dent, 1988), TEL to Winterton 5 November 1923 Bovington, p.248.

the German air threat Lawrence properly recognised Britain needed a means of detecting enemy bombers and remote controlled aircraft, whereas his desire for more floatplanes seems anachronistic.¹²⁴ Yet Lawrence's published correspondence from RAF Miranshah makes no mention of air operations despite it being a forward operating base for RAF squadrons just ten-miles from the Afghan border and protected by 600 Tochi Scouts.

Lawrence's achievements in the RAF should not be forgotten either, though outside the scope of this article. He advocated to Trenchard and then John Salmond relaxing dress regulations for airmen, getting rid of puttees and walking out canes. He gave the substantial profits from *Revolt in the Desert* to the RAF Benevolent Fund to educate the sons of officers killed on duty. Most notably he helped transform the RAF's rescue launches after witnessing six flying boat aircrew drown in accident at RAF Mountbatten in 1929, when the Admiralty pattern barges in use were too slow to rescue them. Lawrence, as an aircraftman, was instrumental in ensuring by 1935 RAF rescue launches had speedboat hulls.

Conclusions

The article demonstrates the British and Arabs, with Lawrence in a central role, were quick to identify the utility of air power in supporting Sharif Hussein's Arab Revolt. British aircraft provided critical intelligence, surveillance and reconnaissance over a vast unpopulated and unmapped area, in challenging climate and terrain. They provided control of the air and reassuring presence to an Arab force 'frightened of the unknown' and, when in 1916 and 1917, the German Air Service supporting the Turks had superior aircraft. British aircraft attacked the Hejaz railway and supported ground attacks on it, increasingly so as the Northern Arab Army became Allenby's right flank. Lawrence increasingly used aircraft to move between headquarters and the front line, and for delivering messages, or scribbles as Lawrence called them. Another finding is the British archival sources verify Lawrence's own, often questioned, accounts in *Seven Pillars*, its abridgement and his letters.

Significantly, the article shows the British, from the Cabinet, through long-serving generals like Wingate and Murray, to the regular naval and army officers in the Hejaz, and Lawrence himself, immediately recognised the utility of air power as a means of supporting Hussein and limiting Christian 'boots on the ground'. Hence, the British deployed a significant proportion of the few aircraft available in the theatre in 1916 under hand-picked flight commanders. Furthermore, notwithstanding Lawrence's Romantic conception of war and his heroic fame, he and the British Military Mission were quick to use the same technology that had transformed warfare on the Western Front and under Allenby in Palestine, creating the three-dimensional modern system of battle recognisable today.¹²⁵ As a close reading of *Seven Pillars* shows, in the empty spaces of Arabia air power suited Lawrence's concept

¹²⁴ T. E. Lawrence, *The Letters of T. E. Lawrence*, p.482. To Lionel Curtis, 19 March 1934.

¹²⁵ J. B. A Bailey, *The First World War and the Birth of the Modern Style of Warfare*, Occasional Paper (Strategic and Combat Studies Institute); 22.

of warfare, using machines rather than men, and firepower, speed, mobility and depth, in a strikingly modern looking proxy war.

For the same reasons Lawrence supported the use of air power for colonial control in the Middle East, arguably his most important contribution to the RAF. It seems highly likely this belief in the utility of air power, coupled with the opportunity for comradeship and interesting technical work, influenced Lawrence's choice of the RAF for enlistment. Presumably he joined the Tank Corps when dismissed from the RAF for similar reasons, though he subsequently made of much the differences between the two services. Airman and proponent of air power should therefore be included in any list of Lawrence's personae. As King George V told his brother Arnold on Lawrence's death: his name 'will live in English letters; *it will live in the traditions of the Royal Air Force*; it will live in the annals of war and in the legends of Arabia.'¹²⁶

The author wishes to thank the Liddell Hart Centre for Military Archives and the Sudan Archive Durham for their kind permission to quote from material in their possession or copyright.

¹²⁶ Winston Churchill 1874-1965., Great Contemporaries, Rev. (London: Thornton Butterworth Ltd., 1937), 167.



'... They could be a Jolly Nuisance': The Littorio-Class Battleships and RAF Bomber Command's Bombing of Spezia, January-June 1943

By Dr Richard John Worrall

Biography: Dr. Richard John Worrall studied history at the LSE and received his Masters' in History from King's College London. He undertook his DPhil at the University of Oxford, which was received in 2008. He has taught at the LSE, and currently works at Manchester Metropolitan University. He has recently published an article on Bomber Command and the Magdeburg operation of early-1944 and is currently working on the Battle of Berlin.

Abstract: RAF Bomber Command's attacks on Italy remains a curiously neglected topic. This is a considerable oversight given that Harris' strategic bombing force made a considerable number of attacks on Milan, Turin and Genoa, with these operations being conducted during particularly critical junctures of the Mediterranean war, namely Autumn 1942 and Spring and Summer 1943. The focus of this article is on Bomber Command's attacks on the major Italian naval base of Spezia. It will explore the reasons as to why these raids were undertaken, how the Spezia operation evolved over time, and how Bomber Command was able to operate in a theatre where it was not subject to the authority of any commander. So how, therefore, were operations against Italian targets allowed to take place? The article will explore this issue and will show that Harris proved a lot more compliant over 'diversions' than has commonly been presumed.

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¹ Quoted from J. Greene/A. Massignani, The Naval War in the Mediterranean 1940-1943 (Chatham, 2002 ed.), p.285.

Introduction

The Italians apparently are afraid of air attacks upon their naval units, as they moved quickly out of Taranto and Naples after the first attacks. It is believed they would go to Trieste if Spezia were heavily-bombed.²

Bufton to Bottomley, 12 March 1943

ertain historical documents have exerted an almost magnetic effect on successive historians, in which a certain sentence, paragraph or section has been often cited. Some documents on RAF Bomber Command during the Second World War prove no exception and this has been particularly shown by the memorandum from the Commander-in-Chief Bomber Command (C-in-C) Air Chief Marshal Sir Arthur Harris to Prime Minister Winston Churchill on 3 November 1943, and its much-guoted final three lines.³ Yet a closer examination of this document reveals issues that inexplicably remain overlooked. For below an inventory of German cities and towns – which Harris classified as either 'Virtually Destroyed', 'Seriously Damaged' or 'Damaged' - was a further list: Turin, Milan, Genoa and Spezia.⁴ All in Italy, the attention of this article is focused on the latter target and, in so doing, raises several key questions: why did Harris undertake attacks on Spezia (twice) that he did not like; and how did the operations materialize when he was under no formal obligation to undertake them, given that Bomber Command did not come directly under any Mediterranean theatre commander's authority? Addressing such issues allows us to examine how, and why, external pressure was exerted on Harris, and by whom, particularly as it involved the participation of a force from outside the Mediterranean theatre. In so doing, this revealed the 'additional' role of the Chief of the Air Staff (CAS), Air Chief Marshal Sir Charles Portal, beyond being the professional head of the Air Force. For Portal was also a member of the Chiefs of Staff (COS) Committee and was therefore involved in taking decisions that affected Britain's other Services and their campaigns in other theatres. Moreover, Bomber Command's operations in the Mediterranean would reveal the limits of Harris' role as the C-in-C of Bomber Command. Harris had to cooperate and, ultimately, he did so, despite holding some valid views on 'diversions', for the Mediterranean theatre saw him up against the Prime Minister, the COS and the Royal Navy. Finally, this article will also examine the specific - and differing - reasons for Bomber Command's attacks on Italian targets and their place in the Mediterranean campaign from Autumn 1942 to Summer 1943.

Bomber Command's participation in the war in the Mediterranean has remained a longneglected campaign. This is a consequence of the still limited historiography on the strategic

²The National Archives [hereafter TNA], Kew, AIR20/5323, Bufton-Bottomley, 12/03/43.

³ This was: 'We can wreck Berlin from end to end if the USA Air Force will come in on it. It will cost between us 400 – 500 aircraft. It will cost Germany the war'.

⁴ TNA, PREM3/14/1, Harris-Churchill, 3/11/43. (*Note*: Spezia was used in this document; this article will use this and not "La Spezia").

bombing of Italy – the pattern having been set by the 'British Official History'. Comprising four volumes and published in 1961, the overwhelming focus on Germany meant the treatment of Italy amounted to no more than a handful of pages.⁵ Moreover, the writings by Harris and other senior airmen offered little on this topic either.⁶ Given that many subsequent books on Bomber Command have relied heavily on the 'British Official History', together with Harris' Despatch and post-war account, it is little surprise that a detailed examination of the strategic bombing of Italy has continued to remain almost non-existent.⁷ An exception is the article on the bombing of Italy by Stephen Harvey, yet while it does mention the American bombing of the Italian southern ports the operations of Bomber Command against Spezia go unmentioned.⁸ More recently, Richard Overy's majestic account on the bombing war in Europe does contain a chapter on the bombing of Italy, though this is not tied to the wider war in the Mediterranean between the Royal Navy and the Regia Marina Italiana (RMI). Consequently, the narrative on Genoa overlooks its importance as a major naval-base while the target of Spezia is not mentioned at all.⁹ The account by Claudia Baldoli and Andrew Knapp, though readable and very interesting, focuses primarily on the civilian experience in Italy (and France) of aerial bombardment.¹⁰ Behind this is a further category of scholarship, namely those books that examine the wider conflict in the Mediterranean, but these still overlook the use of Bomber Command against the RMI's battlefleet.¹¹ This remains a significant omission, particularly as a recent article has argued the RMI 'played a greater role in shaping the Allied prosecution of the Second World War than is commonly accepted . . . Far from being seen as a 'huge joke', the RMI maintained this influence consistently over 1935-1943'.¹² This is certainly true, and explains why the perceived threat from Italy's battleships came to involve the aircraft of Bomber Command. Overall, the existing literature on Bomber Command's operations against Italian targets represents slim pickings. Yet under-researched should be held to not mean unimportant. On closer scrutiny, the Spezia operations highlight the decision-making process

⁹ R. Overy, *The Bombing War: Europe 1939-1945* (London, 2013), pp.510-28.

⁵ C. Webster/N. Frankland, *The Strategic Air Offensive against Germany 1939-1945, Vol. I, Preparation & Vol. II, Endeavour* (London, 1961).

⁶ A.T. Harris, *Bomber Offensive* (Barnsley, 2005 ed.); A.T. Harris, *Despatch on War Operations 23rd February 1942 to 8th May 1945* (London, 1995); R. Saundby, *Air Bombardment: The Story of its Development* (London, 1961); A. Tedder, *With Prejudice: The War Memoirs of Marshal of the Royal Air Force Lord Tedder* (London, 1966); D.C.T. Bennett, *Pathfinder* (London, 1988 ed.).

⁷ D. Richards, *RAF Bomber Command in the Second World War: The Hardest Victory* (London, 1994); B. Greenhous, S.J. Harris *et al*, *The Crucible of War 1939-1945: The Official History of the Royal Canadian Air Force Volume III* (Toronto, 1994); M. Hastings, *Bomber Command* (London, 1999 ed.); H. Probert, *Bomber Harris: His Life and Times* (London, 2006 ed.).

⁸ S. Harvey, 'The Italian War Effort and the Strategic Bombing of Italy', *History*, Vol. 70, No. 2 (1985), pp.32-45.

¹⁰ C. Baldoli/A. Knapp, Forgotten Blitzes: France and Italy under Allied Air Attack, 1940-1945 (London, 2012).
¹¹ Greene/Massignani, Naval War in the Mediterranean; J. Winton, Cunningham: The greatest admiral since Nelson (London, 1999); D. Porch, Hitler's Mediterranean Gamble: The North African and the Mediterranean Campaigns in World War II (London, 2004); V.P. O'Hara, Struggle for the Middle Sea: The Great Navies at War in the Mediterranean Theater, 1940-1945 (Annapolis, 2009); S.J. Ball, The Bitter Sea: The Struggle for Mastery in the Mediterranean 1935-1949 (London, 2009).

¹² R. Hammond, 'An Enduring Influence on Imperial Defence and Grand Strategy: British Perceptions of the Italian Navy, 1935-1943', *International History Review*, Vol. 39, No. 5 (2017), pp.810-13; 824.

behind Britain's military operations and, as one Admiralty telegram stated, the 'co-ordination and policy between Naval Forces in the Mediterranean and Bomber Command targets in Italy'.¹³ Bomber Command's strength of its growing operational flexibility and capability also proved a significant weakness, that only served to encourage the many 'diversions' and 'outside' demands on Harris' bomber force.

Defeating Italian Naval-Power (1940-42)

On 4 September 1940, the last British Ambassador to Rome, Sir Percy Lorraine, wrote a minute as to how the war against Fascist Italy should be waged. In this assessment, he stated 'the proper strategical and political objective ... is to force an Italian capitulation, and that the primary condition of success in that regard is the destruction of Italian seapower.¹⁴ Air power was soon used towards achieving this goal: in June 1940, RAF bombers attacked Naples for the first time, whilst in November 1940 the Fleet Air Arm (FAA) famously immobilized three Italian battleships in Taranto. The attack of Italy's ports was thereafter a strategy consistently pursued as the Italian battleships were stalked and targeted in their naval bases throughout southern Italy. On 8-9 January 1941, to prevent the RMI's interference with British convoys to Greece, the FAA and RAF (based in Malta) attacked the Italian battlefleet at Naples.¹⁵ By the year's end, such bombing raids had only increased in importance. For 1941, it must be remembered, had been dreadfully costly for the Royal Navy's capital-ships, with the loss of HMS Hood (24 May), HMS Ark Royal (13 November), HMS Barham (25 November), and HMS Prince of Wales and HMS Repulse (10 December). This meant no major warships could be spared for the Mediterranean. It was little surprise the Air Ministry informed HQ RAF Middle East that 'in view of present Naval strategical situation effort should be directed to damage or destruction of Littorios at Naples'.¹⁶ Moreover, this demand came just a week before calamity occurred in Britain's naval war in the Mediterranean. On 19 December, frogmen from the RMI penetrated Alexandria harbour and planted limpet-mines that sunk the battleships, HMS Queen Elizabeth and HMS Valiant. This action unfavourably tilted the naval balance in the Mediterranean against the British, with its all-important effects on the wider campaign, allowing the Axis to sail their convoys to North Africa unaffected by the Royal Navy, whereas the British resupply of Malta by sea became difficult. It was little wonder the Commander-in-Chief Mediterranean Fleet, Admiral Sir Andrew Cunningham, told the First Sea Lord, Admiral Sir Dudley Pound, that 'the damage to the battleships at this time is a disaster.¹⁷ Consequently, Britain entered 1942 with aerial bombardment as the only option to combat the RMI's battlefleet in the Mediterranean. By Autumn, as Operation Torch loomed, Allied bombers from Malta and North Africa were

¹³ TNA, AIR20/1081, Admiralty-N.C.X.F. rep. Air Ministry, 10/02/43.

¹⁴ TNA, PREM3/242/11A, Minute by P. Lorraine, 4/09/40.

¹⁵ TNA, AIR2/7397, Coryton-Harris, 18/01/41. (Note: Harris was the DCAS at this time).

¹⁶ TNA, AIR2/7397, Air Ministry-HQ RAF Middle East, 10/12/41.

¹⁷ Quoted from V. O'Hara/E. Cernuschi, 'Frogman against a Fleet: The Italian Attack on Alexandria on 18-19 December 1941', Naval War College Review, Vol. 68, No. 3 (2015), p.133.

fully engaged in attacks on the naval bases of southern Italy. It now became necessary to encourage RAF Bomber Command to attack the ports of the north.

The Strategic Bombing of Italy from Autumn 1942

As documented within Appendix I, this article identifies that Bomber Command's campaign against Italy comprised six phases, with each phase having its own particular aim that influenced the target(s) selection and demonstrated the contours of the wider military and naval campaign in the Mediterranean from Autumn 1942 to Summer 1943. Common throughout were a high-level of civilian and naval influence/control over target-selection, the gradual increase in the bombing's intensity and geographical scope, and ever-present political objections to attacks on certain targets (such as Rome). Harris undertook attacks on Italian targets with little dissention, though he was dismissive about the operations of Phases IV and V – the bombing of Spezia.

At the beginning, the aim of attacking the RMI was enshrined in the bombing programme that was scheduled to begin five days prior to Operation Torch. Under this, Mediterraneanbased aircraft were to bomb either Taranto or Naples, 'whichever port the main body of the Italian Fleet is assembled'. In anticipation of the possible movement of the Italian battleships to Italy's northern ports, Bomber Command was to simultaneously conduct mine-laying operations off Genoa and Spezia. Tellingly, Admiral Cunningham told Admiral Pound that he would 'be grateful if you would bring these requirements to the notice of the Chiefs of Staff, so that all possible direct assistance to Torch may be given by Air Forces outside the Torch area'.¹⁸This was recognition that Bomber Command's participation had to be ordered by the British military's highest authority. In a letter to Air Chief Marshal Portal, on 21 October, Harris displayed a scepticism about Bomber Command's involvement in the Mediterranean and railed against 'the ever-increasing dispersion of our bombing effort by piece-meal instructions' – with Torch being the key example – that spelled 'the end of our effective Bomber offensive against Germany proper'.¹⁹ However, such sentiments fell on unsympathetic ears, given the Mediterranean's central place in Britain's war strategy at this time. A day later, Churchill told [General Sir Harold] Alexander that 'Torch [is proceeding] steadily and punctually [but] all our hopes are centred upon the battle you and Montgomery are going to fight.²⁰ It would be the 'Battle for Egypt' that took centre-stage first. As a result, Harris was forced to switch the focus of his bombing effort away from Germany and on to Italy in order to support General Montgomery's offensive at El Alamein (Operation Lightfoot), which began on 23 October. So began Phase I of Bomber Command's operations against Italy and, given that the Axis armies in North Africa were reliant on supplies delivered by maritime convoys, the major port of Genoa – with its large docks and shipbuilding yards – was bombed on 22-23 October by

¹⁸ TNA, AIR20/4515, Cunningham-Pound, Operation Torch – Air Action against Italy, 19/10/42.

¹⁹ Christ Churchill College Archives, Oxford, Portal Papers [hereafter PP], File 9, Harris-Portal, 21/10/42.

²⁰ Quoted from M. Gilbert, Road to Victory: Winston S. Churchill 1941-1945 (London, 1986), p.241.

112 aircraft from 5 and 8 Groups causing 'very heavy damage' to the city centre and eastern districts.²¹ Genoa was attacked again the following night, before Harris made a switch to the war industries of Milan on 24 and 25 October,²² which concluded the opening phase of Bomber Command's attacks on Italy.

Nevertheless, attacks on Italian targets would be set to continue. On 24 October, Churchill wrote that until Summer 1943 the focus of the war 'will be waged in the Mediterranean theatre', with the invasions of Sicily and southern Italy.²³ For one senior airman, this prospect was hardly pleasing. The Assistant Chief of the Air Staff Policy Air Vice-Marshal Sir John Slessor wrote that 'once we concede to the Mediterranean Front any higher place than a running sore ... I am sure that we will find ourselves on the slippery slope'.²⁴ Indeed, the Air Staff was itself divided between those who, like Slessor, thought purely in terms of the air force's interests and Portal who, as a member of the COS Committee, also had to consider the wider strategic context of the war that included the wishes of the other Services. As the Mediterranean campaign progressed, the Chiefs pressed for greater effort by the Air Force on Italian targets, in response the CAS produced a memorandum that promised more of the same. Attacks by Bomber Command on northern Italy would be intensified while Malta-based aircraft would continue the bombing of Taranto and Naples in the south. I will arrange for targets in Italy to be bombed', Portal promised, 'if we get conditions as we did on the night 22-23rd October'.²⁵ As a result, Harris received a Directive from the Air Ministry that stipulated a week-long bombing programme against:

(i) First priority sea-mining of ports Genoa and Spezia . . . (ii) Second priority bombing Genoa, Milan and Turin up to scale of your recent operations against these targets.²⁶

Thus, this was the operational schedule for Phase II of Bomber Command's offensive against Italy. The instruction was modified to be the 'first priority sea-mining commitment' at Spezia only; Genoa was instead 'transferred [purely] to bombing'.²⁷ The effort got underway on 6-7 November and lasted until 15-16 November, designed to support the simultaneous Torch landings. The target was no surprise. For given the need to thwart Axis reinforcements to North Africa, the Admiralty informed the Air Ministry that 'great importance is now attached air attack on Genoa where there is a heavy concentration potential transports [and it] . . . is necessary to deter these from sailing'.²⁸ Bomber Command had bombed Genoa on

²¹ M. Middlebrook/C. Everitt, *Bomber Command War Diaries* [hereafter *B.C.W.D.*] (Leicester, 1996), p.318.

²² TNA, AIR20/5304, [Draft Paper], November 1942.

²³ Gilbert, Road to Victory, p.242.

²⁴ TNA, AIR20/3718, Slessor-Portal, 25/10/42.

²⁵ TNA, AIR20/4515, COS(42)346 (Revise), "Torch" – Air Action against Italy, Note by the CAS, 29/10/42.

²⁶ TNA, AIR20/4515, Air Ministry-Bomber Command, 2/11/42.

²⁷ TNA, AIR20/4515, Air Ministry-Bomber Command, 5/11/42.

²⁸ TNA, AIR20/4515, Admiralty-Air Ministry rep. Bomber Command, 7/11/42.

6-7 November and this port city would be attacked a further three times over the next nine days in what one might term as the 'Battle of Genoa', Harris had certainly complied; he had little choice. This showed that bombing Italy – the timing of the operation, the effort required, and the choice of target – had been forced on Bomber Command by senior figures from outside the Air Force.

For Harris, the raids on Italy remained a useful diversion when weather conditions prohibited further attack against his prime objective, Germany. However, it should be noted that this did not signify any change in British bombing policy.²⁹ This may account for the focus purely on a single Italian target during Phases II and III, be it Genoa or Turin respectively. For attacks on multiple locations, including the mining of Spezia habour, could have given the appearance that an intense bombing offensive against Italy was now taking place. Harris always believed that Italian targets – which were designed to complement the land-sea campaigns of the other Services in the Mediterranean – were a distant second to the cities of Germany, if not to be attacked at all. Such opinions were always going to be an awkward fit especially as, at this time, Churchill was very much in 'a Mediterranean mood' when it came to British strategy. On 17 November, Churchill told the COS the goal was to push the Axis out of North Africa so that airbases could be established there to facilitate the bombing of the under-belly of the Axis', particularly against targets in southern Italy. All this would be the prelude, after the fall of Tunis, to the capture of either Sardinia or Sicily – Churchill believed the latter was 'by far the greater prize'³⁰ – before the invasion of mainland Italy itself. Whatever Harris thought, the defeat of Italy was the priority in British strategic thinking in late-1942 and therefore operations against Italian targets were an inescapable commitment for Bomber Command during this period. If Harris had not complied then this would have placed him on a collision course with The Prime Minister, the Chiefs of Staff, the Navy and the Chief of the Air Staff.

Consequently, Phase III began on 18-19 November and lasted to 11-12 December 1942. Tellingly, the Assistant-Chief of Air Staff-Operations (ACAS Ops) Air Vice-Marshal Sir Norman Bottomley admitted 'the directive issued to the C-in-C Bomber Command for the attack of objectives in Italy to assist in 'Torch' operations was for a period of seven days and there had been no extension of this period'. The C-in-C's continuance of attacks on Italian objectives is presumably *as a result of some direct order from the CAS*³¹ (author's emphasis). Once again, Portal was acting in the wider remit of the COS. However, this time Harris concentrated his effort on Turin rather than on Italy's northern ports, such as Genoa. This change no doubt reflected the C-in-C's wishes in attacking targets in Italy (such as industrial cities) that conformed to the strategy of strategic bombing as opposed to attacking those targets that simply aided the Navy's strategy in the Mediterranean. Indeed, this switch of target far from pleased Cunningham, now the Naval Commander Allied Expeditionary Force (NCXF)

²⁹ TNA, AIR8/777, Harris-Portal, 13/11/42.

³⁰ Gilbert, Road to Victory, pp.258-9.

³¹ TNA, AIR20/5304, Bottomley-Medhurst, 27/11/42.

for North Africa and the Mediterranean, who believed the priority of operations in the Mediterranean was shaped by the fact that 'the enemy is getting supplies into Bizerta and Tunis by sea' and was therefore 'the vital factor in determining whether or not the Axis are to be evicted completely from Africa'.³² As a result, the NCXF advocated a concerted effort by Allied sea and air forces in order to 'strangle' these supplies, which, for Bomber Command, meant a continuation of attacks on Genoa. For Harris this represented following the naval lead far too much. In his view, operations against Italy had to remain consistent with *air force strategy*, which meant the bombing of Italy's major cities to destroy war industry and weaken civilian morale. The ports of Genoa, Spezia and Leghorn were therefore ignored by Bomber Command at this time. Instead, Turin – with its Armeria Reale, Fiat factory and Lancia works – was bombed a total of eight times over the next five weeks in yet another 'battle' by Bomber Command against an Italian city.

As CAS, Portal still prioritised attacks on Italy's naval bases. On 29 November, Portal informed The Prime Minister that 'on the assumption that Italy is to be treated as Target No.1' (once the fighting in North Africa had finished) bombing attacks 'should be concentrated against a selection of the most important cities 'and naval bases' (author's emphasis), namely Milan, Rome, Naples, Turin, Genoa, Taranto, Spezia and Brindisi³³ Attacks on the southern ports had already been undertaken by RAF Wellingtons (based in Malta) and American heavy-mediumbomber groups (based in North Africa). As for Bomber Command, The Prime Minister clearly in a vengeful mood against Italy – wanted something much more extensive. He was dissatisfied by the Air Ministry's Directive to Harris of 2 December³⁴ because it advocated a form of 'light-bombing' against Italy's war production and civilian morale, not an all-out assault. The following day, Churchill expressly stated 'the heat should be turned on Italy'³⁵ and, in response, the Secretary of State for Air, Sir Archibald Sinclair, produced a paper for the War Cabinet that advocated a more sustained bombing programme against Italy. He wrote that the utilisation of bomber forces based in the UK, North Africa and Malta meant 'all important Italian towns will have been brought within the range of effective attack'.³⁶ This, of course, included Spezia. Once again, this showed how the timing, intensity and target selection of the bombing campaign against Italy were determined more by others, especially Britain's civilian and senior military leadership, rather than by the C-in-C Bomber Command. Yet Harris did comply, for some willingness to attack Italian targets seemed a small price to pay in exchange for Churchill's support of a bombing Directive that would give Harris considerable latitude to attack Germany's cities throughout 1943. Indeed, provision for

²⁹ TNA, AIR8/777, Harris-Portal, 13/11/42.

³⁰ Gilbert, Road to Victory, pp.258-9.

³¹ TNA, AIR20/5304, Bottomley-Medhurst, 27/11/42.

³²TNA, AIR20/1081, NCXF-Admiralty, 24/11/42.

³³ P.P., File 3, Portal-Churchill, 29/11/42.

³⁴ TNA, AIR14/778, Air Ministry-Bomber Command, 2/12/42.

³⁵ TNA, PREM3/14/3, Churchill-Sinclair, 3/12/42.

³⁶ TNA, AIR20/4515, WP(42)598, The Bombing of Italy, Memorandum by the Secretary of State for Air, 17/12/42.

both the bombing campaign against Germany and the requirements of the Mediterranean campaign for bombing attacks on Italy would be seen in the subsequent Casablanca Directive.

The Target

Italy possessed several naval bases on which the prosecution of both its naval war in the Mediterranean and land war in North Africa were heavily dependent. In November 1942, a draft paper by the Air Staff, under the heading 'Objectives in Italy', listed the major cities of Milan, Rome and Turin alongside the ports of:

Naples	chief port of Italy and exceeded only by Milan, Turin and Genoa as an industrial base.
Genoa	seaport and centre of Ansaldo industries.
Taranto	chief naval base for the Ionian Sea, and second only in importance to Spezia as a Naval base.
Spezia	most important Naval Base in Italy; many industries, mostly connected with shipping.
Brindisi	seaport having best anchorage for large vessels on West side of the Adriatic. ³⁷

At these locations, the RMI's battleships would be anchored before their deployment on missions to protect the Axis supply convoys sailing to North Africa.

Specifically, the port of Spezia was built on the Gulf of Spezia (see Map I) and lay about 50 miles from Genoa on the Ligurian Coast. Its harbour entrance, between Tino Island and Corvo Point, was 5 miles wide, while the distance from the breakwater to the head of the harbour was 5,200 yards. Spezia was therefore a large harbour able to accommodate numerous major warships. According to the Regia Marina's Disposition Plan at the outbreak of war, it was the home port of the 2nd Naval Squadron, which was made-up of heavy cruisers (*Pola, Trento, Bolzano, Trieste*), light cruisers (*Eugenio di Savoia, Duca d'Aosta, Attendola, Montecuccoli*) and various destroyers; the 1st Submarine Group (comprising 26 vessels); and the Upper-Tyrrhenian Sector group that comprised a number of motor torpedo boat squadrons.³⁸ Beyond the harbour, by early-1943 the surrounding dockyard area contained a host of important naval facilities: shipbuilding yards,³⁹ two major arsenals, a torpedo factory, a submarine base, a submarine building-yard, and an oil-refinery and storage tanks.⁴⁰

³⁷TNA, AIR20/5304, [Draft Paper], November 1942.

³⁸ R. Mallett, *The Italian Navy and Fascist Expansionism 1935-1940* (London, 1998), pp.197-204.

 ³⁹ These had built some fine dreadnoughts for the RMI, such as the Conte di Cavour (1915) and Andrea Doria (1916).
 ⁴⁰ TNA, AIR2/4476, Bottomley-Harris, 20/02/43.



Map I: Plan of Spezia Naval Base⁴¹

By April 1943 the target-intelligence section of the Mediterranean Allied Air Forces (MAAF) had labelled Spezia as 'the most important Italian Naval Base . . . [and] one of the biggest manufacturer towns for the Italian maritime war'.⁴² In fact, British attention had already focused on this port because Allied air attacks on Italy's southern naval bases had forced the RMI's most modern battleships, together with the remnants of its battered heavy cruiser fleet, up to Spezia during Winter 1942-3. This movement was considered serious because just as the *Tirpitz* tied-up major units of the British Home Fleet (including three ships of the King George V-class) so the Littorios continued to keep the Royal Navy's battleships in the Mediterranean, denying a possible reinforcement of the Home Fleet or deployment to the Indian Ocean (see Appendix II). For Churchill and the Admiralty, the modern Italian battleships, the Littorios were ordered in 1934 and 1938 (see Appendix III) and constituted an impressive combination of firepower, speed and protection – a real testimony to Italian warship design. Representing a

⁴¹TNA, AIR40/1711, [Attached Map to] Spezia Information Sheet, 15/03/43.

⁴² TNA, AIR51/240/3898, Spezia – Italy, [Target-Briefing, M.A.A.F. Intelligence Section, undated].

serious violation of the Washington Treaty's limitations, the Littorios weighed over 45,000 tons (fully-loaded) and carried nine 15-inch guns housed in three turrets. Their only possible weaknesses were the thickness of their armour protection, a limited-range (4,580 miles at 16 knots) and restricted ammunition storage for the main guns, although given that their likely operating zone was the central Mediterranean these weaknesses mattered less because the battleships would always be close to their home-bases in Italy.

For once war broke out, the Littorios were to challenge the Royal Navy's battleships for command of the sea, particularly in the central Mediterranean south of Sicily where the Italian convoy routes to North Africa were dissected by British maritime communication-lines to Malta.⁴³ On 20 November 1942, Admiral Cunningham told Admiral Pound that 'the Italian Fleet will be a constant nuisance and menace to through convoys in the Mediterranean and it must be our object to render it ineffective as soon as possible'.⁴⁴ Such was the concern, Pound asked the COS for an increased number of long-range reconnaissance aircraft precisely because 'of the importance of locating the Italian battleships'.⁴⁵ By January 1943, photographic evidence had revealed that two vessels, *Littorio* and *Vittorio Veneto*, had moved to Spezia after having been damaged by American heavy bomber attacks on Naples. Further reconnaissance showed they had soon been joined by a third battleship, *Roma*, ⁴⁶ and also the presence of two heavy cruisers, the *Bolzano* and *Gorizia*, two light cruisers and 19 submarines.⁴⁷ To British naval-planners, a significant build-up of Italian naval power had developed at Spezia and now had to be neutralised, particularly in view of the Allied amphibious operations that were set to take place in the Mediterranean during mid-1943.

The First Spezia Directive (January 1943)

On 20 January, a telegram from Foreign Secretary Anthony Eden and Deputy Prime Minister Clement Attlee, both senior members of the War Cabinet, informed the absent Churchill (then at the Casablanca conference) that 'knowledge of all rough stuff coming to them' would have a drastic effect on Italian morale.⁴⁸ Epitomising part of this 'rough stuff' was the appearance of two Directives concerning the bombing of Italy. The first, dated 20 January, concerned the attack on Italian targets by heavy-bombers based in North Africa, which were designed to help with the eviction of Axis forces from North Africa and to support the invasion of Sicily (Operation Husky) later on.⁴⁹ The following day, a second instruction was approved, namely the

⁴³ Willmott, *Battleship*, pp.144-5.

⁴⁴ TNA, AIR8/719, Cunningham-Pound, 20/11/42.

⁴⁵ TNA, AIR20/4508, Extract from COS(42)344th Meeting, Long-Range Photographic-Reconnaissance Aircraft, 14/12/42.

⁴⁶ At Spezia, the *Roma* replaced the *Littorio* as the fleet-flagship.

⁴⁷ TNA, AIR23/6984, Photographic-Interpretation Report No. A.14, Summary of Recent Activity, Spezia, 5/05/43.

⁴⁸ Gilbert, *Road to Victory*, pp.301-2.

⁴⁹ TNA, AIR20/3720, CCS 159/1, The Bomber Offensive from North Africa, Memorandum by the Combined Chiefs of Staff, 20/01/43.

Directive for the Anglo-American strategic air forces based in the UK. Known as the Casablanca Directive, its primary focus was on the Combined Bombing Offensive (CBO) against Germany, but on Italy it specifically stated that:

... you [Harris] may be required, at the appropriate time, to attack objectives in Northern Italy in connection with amphibious operations in the Mediterranean theatre.⁵⁰

This was in fact a reference to providing support to the other part of the 'rough stuff' destined for Italy, namely Operation Husky.⁵¹ All this fitted together of course: Italy's unconditional surrender was to be facilitated by the invasions of Sicily and southern Italy, which in turn meant the need for Allied bombers to attack Italy's major ports. For the Joint Planning Staff (JPS) had already observed that:

... an Allied convoy in the Mediterranean will not meet with strong opposition from Italian surface forces if it is heavily escorted. Sicily, however, is close to the heart of Italy, and an increased boldness on the part of the Italians must therefore be expected.

Consequently, they recommended that a concentrated bombing effort designed 'to inflict the maximum damage' on the RMI's battlefleet had to be undertaken because should it 'interfere with either of the simultaneous landings at Catania and Palermo, it will be necessary to provide a second covering force of somewhat similar strength, or, alternatively, to delay the Palermo landing [altogether]'.⁵² 'The RMI', as Hammond comments, had consequently been 're-designated as a primary target for air attack, in order to immobilise it or force it to take refuge in the Adriatic'.⁵³

Given the primacy of attacking Italy's battleships, it was little surprise the Air Ministry's Targets Committee was informed by the Admiralty representative, Commander Stileman, that the presence of the Littorios at Spezia meant 'great importance' was attached to the bombing of this naval base.⁵⁴ The Air Ministry agreed – no doubt influenced by Portal who continued to see things from the COS' perspective – and on 17 January a Directive was sent to Bomber Command that stated the industrial centres of northern Italy, namely Milan, Turin, Genoa, were the first-priority targets after Berlin and an 'important German objective' (probably Schweinfurt). As Air Marshal Bottomley told Harris, this instruction constituted a direct order from the Minister of Defence (Churchill). Moreover, The Prime Minister – clearly concerned about Italian naval power – had also specifically requested that Harris should 'examine the

⁵⁰ TNA, AIR20/4476, Bottomley-Harris, 4/02/43.

 ⁵¹ W.S. Churchill, *The Second World War* [hereafter: *T.S.W.W.*]: *Vol. IV, The Hinge of Fate* (London, 2005 ed.), pp.665-7.
 ⁵² TNA, AIR20/4531, J.P.(42)944, Operation "Husky", Report by J.P.S., 11/11/42. The British believed the RMI by late-1942 consisted of 6 battleships; 2 heavy-cruisers; 6 light-cruisers; 16 destroyers; and 1 aircraft-carrier.
 ⁵³ Hammond, *Enduring Influence*', pp.827-8.

⁵⁴ TNA, AIR20/4772, Report of the 81st Meeting held at the Air Ministry on Friday, 15th January, 1943, 19/01/43.

feasibility of extending your operations to Spezia' without violating Swiss airspace.⁵⁵ The C-in-C's response came a week later; a heavy-attack on Spezia without encroaching on Swiss neutrality was'considered feasible'.⁵⁶ Once again, this demonstrated that pressure on Harris came right from the top when it came to Italian targets.

It now remained for Spezia to be placed formally on the target-list of the Italy Directive. On 29 January, Stileman further told the Targets Committee that notwithstanding the 'concentration of naval units', the port facilities, oil-refinery and storage installations 'constituted most important targets'. The Navy clearly wanted all aspects of Italian naval power destroyed, not just the battleships. As a result, Spezia 'should take precedence over Genoa'. The Committee's Chairman, the Deputy Director of Bomber Operations (DDB Ops) Air Commodore Sydney Bufton, replied that, as HQ Bomber Command 'had now confirmed the feasibility of attacking Spezia from this country', he now would approach ACAS(Ops) about adding it to the target-list of the 17 January letter.⁵⁷ Bottomley told Harris that Spezia normally came behind Milan and Turin in order of priority, though 'a concentration of enemy naval units within the base would automatically increase its relative importance^{.58} Thus, in allowing little scope for debate (Harris had only been asked to confirm Spezia's 'feasibility' not to express his reservations), an attack on Spezia had quickly become enshrined in an Air Ministry Directive. Yet Bottomley was also being disingenuous here. The 'concentration' of the Italian battleships at this major naval base had already occurred, as the ACAS(Ops) well knew. By implication – and owing to some degree of sleight of hand – Harris was now confronted by Spezia having in effect become the first-priority Italian target.

Bottomley had done this for good reason, however. For the Air Ministry's instruction on Spezia had come at the end of a period of nearly 12 months in which the C-in-C had received many irritating – and ever-increasing – demands from the Navy. Harris' antipathy towards the Navy's wishes generally, and bombing ships specifically, had roots that stretched back to the beginning of his tenure as C-in-C Bomber Command in February 1942. Only a month into his new command, Harris produced a paper on bombing warships, which he described as 'a difficult one' owing to the ineffectiveness of the weapon carried, the location of the target, and the weather. His preference was instead for 'the use of magnetic mines in a sustained indirect offensive against enemy warships'.⁵⁹ The rest of 1942 was riddled with 'spiky' disputes between HQ Bomber Command and the Admiralty over a variety of issues, such as a perceived lack of recognition by the Navy of Bomber Command's attacks on the *Scharnhorst, Gneisenau* and *Prinz Eugen* (moored at Brest, Kiel and Gdynia respectively).⁶⁰

⁵⁵TNA, AIR20/6109, Bottomley-Harris, 17/01/43.

⁵⁶ TNA, AIR2/4476, Saundby-Street, 24/01/43.

 ⁵⁷ TNA, AIR20/4772, Report of the 82nd Meeting held at the Air Ministry on Friday, 29th January, 1943, 2/02/43.
 ⁵⁸ TNA, AIR14/1220, Bottomley-Harris, 29/01/43.

⁵⁹ P.P., File 9, Harris-Portal, 25/03/42; Enclosure: 'The Attack of Enemy Naval Ships by Aircraft of Bomber Command', 19/03/42.

⁶⁰ P.P., File 9, Harris-Portal, 24/04/42.

By Autumn, Harris was condemning the Navy for draining everything (including American heavy-bomber reinforcements) away from the bombing of Germany 'for the futile purpose of bombing impenetrable concrete submarine pens on the West Coast in support of that Operation [Torch]'.⁶¹ At the time of being asked to bomb Spezia, therefore, the C-in-C was railing against the Navy's demand for the bombing of U-boat bases on the French West Coast. On 27 January, Harris stated it was a 'mis-employment of my force on a type of operation which cannot achieve the intended object[ive]' and it remained 'a vast waste of bombing effort . . . [on a] useless operation'.⁶² At the heart of this was the C-in-C's major concern – held with good reason – that the efforts of his force (now being prepared for the commencement of the 'Main Offensive' against Germany), was in danger of becoming subordinate to the Navy's ever-growing list of requirements, be it for the anti-U-boat war in the Atlantic, the sinking of Germany's remaining capital ships or for support of the Navy's operations in the Mediterranean.

The Second Spezia Directive (February 1943)

By 4 February, the Axis armies had withdrawn from Tripolitania to a position on the Mareth Line in southern Tunisia. To drive home their defeat in Libya to Italy's population, Harris attacked Turin that night.⁶³ The clear weather allowed the Newhaven technique to be used – visual ground-marking – and this achieved 'a fair concentration of bombing', which 'devastated '415 acres of Turin' including the Fiat Works. Yet that night's operations also included an attack on Spezia.⁶⁴ Only four Pathfinder Lancasters took part, in what was a 'test' of a new-type of proximity-fused 4,000-lb. bomb – an early form of air-burst weapon. This exploded between 190-600ft. above the ground precisely in order 'to widen the effects of the resulting blast' and have a more detrimental effect on civilian morale.⁶⁵ A split-attack on Italy was repeated on 14-15 February (to coincide with German-Italian counter-offensive against the Americans at the Battle of Sidi Bou Zid), in which another four Pathfinder aircraft dropped air-burst bombs on Spezia. The main raid was on Milan, which left 'many well-concentrated fires . . . being visible up to 100 miles away.⁶⁶ The post-raid report on Spezia noted 'severe local destruction'

⁶¹ P.P., File 9, Harris-Portal, 21/10/42.

⁶² RAF Museum Archive Collection, Hendon, Harris Papers (hereafter H.P.), H27, Harris-Street, 27/01/43. Such sentiments about the "utter waste" of bombing French ports continued into the Spring. See P.P., File 10, Harris-Portal, 30/03/43.

⁶³ The anti-aircraft defences of Turin were strengthened during Winter 1942-3. Largely for political reasons, Hitler had agreed to send 150 Flak-batteries to Italy, which included one-hundred batteries of the ferocious "88s" and fifty searchlight-batteries (this decision was rescinded in Spring 1943). One airman recalled the air-defences of Turin had become as strong as Düsseldorf's. See Air Ministry, *The Rise and Fall of the German Air Force (1933-1945)* (London, 2008ed.), p.284; D. Charlwood, *No Moon Tonight* (London, 1990 ed.), pp.120-1.

⁶⁴ Spezia's flak-defences were very-light – astonishing when one considers it was the RMI's major-base. One recent account suggests the anti-aircraft battery was nicknamed '*la Tosca*' because, like Puccini's melodramatic heroine, 'it never harmed a living soul'. See Baldoli/Knapp, *Forgotten Blitzes*, p.202.

⁶⁵ TNA, AIR14/3409, Report on Night-Operations, 4-5th February, 1943, undated; Middlebrook/Everett, *B.C.W.D.*, pp.351-2.

⁶⁶ TNA, AIR14/3440, Report on Operational-Sorties for Period Ending 0730 Hours 15th February, 1943, undated.

and minor roof damage over a wide-area.⁶⁷ These two split-attacks show that, although Harris had cooperated in attacking Italian targets, there was a limit to his effort to assist the Navy's objectives in the Mediterranean. Italy's war industries and civilian morale remained Bomber Command's true targets, not its naval bases.



Photograph 1: Reconnaissance photograph of Spezia harbour (note: two battleships can be seen top left)⁶⁸

Nonetheless, these raids on Spezia, as light as they had been, complemented the simultaneous bombing campaign of Mediterranean Air Command (MAC). On 28 February, Portal was informed this had comprised attacks on Palermo, Messina and Naples – the latter having suffered 11 attacks since December 1942.⁶⁹ The net had clearly tightened around Italy's ports yet despite – or, perhaps, because of – the intense effort against these targets by MAC, the Admiralty felt that Bomber Command's efforts against Spezia had simply not been

⁶⁷ TNA, AIR14/3409, Report on Night-Operations, 14-15th February, 1943, 5/05/43.

⁶⁸ TNA, AIR14/1772, Attached Reconnaissance-Photograph, Interpretation Report No. KS.78A, 21/02/43.
⁶⁹ TNA, AIR20/788, Dry-Crawford, 28/02/43; Enclosure: Resume of Overseas Operations December, 1942 to 24 February, 1943, undated.

good enough. It was particularly galling to the senior Naval Staff because Bomber Command now seemed to possess the technological means to undertake large-scale attacks against enemy ports successfully. For the 11-12 February operation against Wilhelmshaven had shown that the Pathfinders could use H2S to identify and mark the Aiming-Point; the Main Force of Bomber Command had then accurately bombed the target-markers causing widespread devastation to the dockyard area.⁷⁰ As a result, the Admiralty pressed for a major attack by Bomber Command on Spezia – and, in so doing, they made a further demand.

On 7 February, Cunningham requested that, owing to 'the effect' that bombing 'usually has on the movement of [the] Italian Fleet' (attacks on Naples had after all driven the Littorios up to Spezia in the first place) he had to 'be forewarned' about an impending heavy bombing attack so that submarines could be deployed to outside Spezia's harbour to lie in wait for the departing battleships.⁷¹ This request was examined by two committees on 15 February. The first was a meeting of the Vice-Chiefs of Staff, and here the Vice-Chief of the Naval Staff (VCNS) Vice-Admiral Sir Henry Moore explained that the NCXF's request for a warning had come about because 'the Admiralty feared that the very light scale of attack may only cause the Littorio battleships to scuttle for shelter to the embarrassment of our Naval forces in the Mediterranean'; in contrast, a heavier attack might 'drive the battleships out of Spezia' and into the path of the waiting submarines. Consequently, 'Spezia should not be tickled up by a small number of bombers', the VCNS stated, 'but should be dealt with by an overwhelming attack'.⁷² In an attempt to force Bomber Command's compliance, the matter was then discussed in a second meeting that day, namely at the Chiefs of Staff Committee. Here, Moore reiterated that:

While heavy air attacks might achieve considerable damage to the battleships, very small-scale attacks might only make the battleships move . . . Admiral Cunningham had raised this matter in order that, with prior information of an air attack on Spezia, he could arrange his submarine patrols in case the battleships put to sea... ⁷³

Reading between the lines, the Admiralty were presenting Bomber Command with a stark choice: agree to issue a prior warning of an impending small-scale attack (to allow for British submarine deployment outside Spezia) or proceed with a large-scale attack on the battleships and port. In response, the Vice-Chief of the Air Staff (VCAS) Air Vice-Marshal Charles Medhurst discounted giving a 24-hour warning to Cunningham about an impending attack on grounds that the weather forecast meant it was difficult to sanction a bombing operation so far in advance.⁷⁴ It was therefore clear as to which way things were going. As shown by his response

⁷⁰ P.P., File 4, Portal-Churchill, 15/02/43. Churchill replied: 'Good'.

⁷¹ TNA, AIR20/1081, NCXF-Admiralty, 7/02/43.

⁷² TNA, AIR20/2565, Medhurst-Bottomley, 15/02/43.

⁷³ CAB79/25/40, COS (43) 40th Meeting, Item 2: Bombing of Spezia, 15/02/43.

⁷⁴ TNA, AIR20/2565, Medhurst-Moore, 16/02/43.

the following day, the VCNS did not hesitate to take the opportunity to press for a major attack on Spezia. In so doing, Moore presented the target as a whole: Spezia was not just about the Littorio-class battleships but a naval base that contained many important installations. Therefore, 'a full-scale attack should be delivered against the port as early as possible', the VCNS argued, because light-scale raids would 'achieve very little' beyond warning the Italians 'we are interested in the place' and result in strengthened air-defences and the escape of the Littorios into the Tyrrhenian Sea unhindered by submarine attack. Should this happen, the VCNS concluded, '[this] would have important repercussions on our future operations'.⁷⁵

As a result of the Admiralty's request, behind which lay the authority of the COS, Bottomley sent Harris a Directive on 20 February that ordered 'a heavy scale attack' on the Spezia naval base because of its shipbuilding yards, two arsenals, torpedo factory, submarine building yard, submarine base and oil refinery and storage tanks. This part of the Directive was, of course, tantamount to promoting the virtues of area-bombing for destroying the many war-related activities of the port area. Much less palatable to the C-in-C was its second part, with its emphasis on helping the Navy and its wider strategy of the Mediterranean war.⁷⁶ Initially unmoved by this instruction, Harris attacked ports in Germany instead, namely Bremen (21-22 February) and Wilhelmshaven (24-25 February), and finished the month with attacks on Nuremburg (25-26 February), Cologne (26-27 February) and St. Nazaire (28 February-1 March). Yet simply ignoring this Directive – owing to its high-level backing – could not be continued indefinitely. Consequently, on 4 March, Harris formally registered his opposition to heavy-attacks on Spezia. Tellingly, this letter was not addressed to Portal but to the Permanent Under-Secretary of State for Air, Sir Arthur Street who, the C-in-C felt, would give his objections a fairer hearing. Harris stated that past operations against enemy battleships, namely on the Scharnhorst and Gneisenau at Brest, showed 'the chances of doing serious damage to the naval units at Spezia during a single attack would be negligible'. Notwithstanding the tactical objections of attacking enemy battleships, the heart of Harris' argument was that the order to bomb Spezia was 'only one of several such proposals for diverting effort from our main objective, Germany, which have recently been received'. Such a judgment was in fact a very correct one, for by this time the Air Ministry had dispatched fresh bombing instructions on an almost weekly basis. To quash this particular 'diversion', Harris argued forcefully that 'the project of bombing Spezia is ill-advised and inconsistent with agreed policy as to the proper employment of our Bomber Force⁷⁷ This 'agreed policy' referred, of course, to the primary objective of the Casablanca Directive, namely the attack on the German military, industrial and economic systems, and civilian morale. Harris was about to undertake the 'Main Offensive' against Germany but he was on shaky ground in arguing this: the Casablanca Directive had, after all, contained provision for attacks on Italy.

⁷⁵ TNA, AIR20/2565, Moore-Medhurst, 17/02/43.

⁷⁶ TNA, AIR2/4476, Bottomley-Harris, 20/02/43.

⁷⁷ TNA, AIR14/778, Harris-Street, 4/03/43.

Further complaint about the multitude of Directives that he had received over the previous six months was contained in another letter by the C-in-C Bomber Command. Though originally dated 4 March, Harris would send it to Street two days later as, by that time, he had commenced the 'Battle of the Ruhr'. This only served to add greater sharpness to his criticism about 'the lure of alternative objectives which, however attractive in themselves, contribute nothing to our primary object' (particularly cited were the French U-boat bases). Harris concluded by stating emphatically that Bomber Command 'should be adamantly protected against further illconceived and ill-considered distractions which cripple our offensive effort without inflicting noticeable damage on the enemy.⁷⁸ This view drew a more sympathetic response from Bufton who agreed entirely 'with the C-in-C's theme - concentration on Germany', which remained 'our real enemy . . . [requiring] every ounce of effort we can muster'. The War Cabinet and COS, he continued, did not understand fully 'the great [bombing] effort needed to produce really damaging results, and hence the vital need to concentrate all available effort on the task', rather than on 'the innumerable requests from many sources for the attack of a wide variety of targets'. Therefore, Bufton recommended the abandonment of attacks on Italy, which 'should be left to the MAC', and the curtailment of the bombing of U-boat pens in France. Of course, the DDB Ops possessed his own, ever-strengthening, view about the direction of British bombing policy, namely the need for a concentrated effort on German aircraft production (a source of bitter dispute with Harris later on).⁷⁹ Nonetheless, Bufton was fully alive to the Navy's increasing demands; indeed, the following day he reiterated his view about 'timewasting maritime diversions' in the Mediterranean in response to a proposal from Cunningham for the bombing of Toulon and Marseille. The DDB Ops wrote:

We know from bitter experience the waste of effort involved in the attack of submarine bases and naval units in harbour. Although it may be important to upset the Axis' naval plans in the Mediterranean, it is unsound to attempt to do it by bombing . . . In my view, the Admirals are squandering our bomber force against targets for which it is quite unsuited.⁸⁰

However, this should not be read as meaning the Air Ministry and HQ Bomber Command were in complete agreement. Though all were agreed on the principle of no unnecessary 'diversions', privately the Air Staff believed Bomber Command's operations needed some flexibility. This showed the difference of opinion between most of the Air Staff, who embraced fully the Casablanca Directive *and* its provision for legitimate 'diversions', (that included attacks on Italy) and the C-in-C Bomber Command who interpreted his instructions

⁷⁸ H.P., H67, Harris-Street, 4/03/43.

⁷⁹ TNA, AIR20/8146, Bufton-Bottomley, 9/03/43.

⁸⁰ TNA, AIR20/8146, Bufton-Bottomley, 10/03/43. See also TNA, AIR20/8146, Bottomley-Portal, 10/03/43. The A.C.A.S. (Ops.) told the C.A.S.: 'I feel it would be wise to scotch this with all the force we can at the outset ... The C-in-C. Bomber Command has already written a strong letter ... protesting at the many diversions which are made from ... the primary task of attacking Germany ... [The] attack of submarine bases in the Mediterranean has therefore no place in the directive of Bomber Command'. See also TNA, AIR20/1081, M.A.C.-Air Ministry, 8/03/43.

as meaning the exclusive bombing of Germany – a point of divergence that became ever wider throughout 1943. As the Casablanca Directive *had* stipulated that attacks on northern Italy could be requested, Harris' complaints about bombing Spezia were dismissed.⁸¹ Consequently, on 12 March Bottomley was informed by Bufton, now promoted to Director of Bomber Operations (DB Ops), that a response to Harris' letter of 4 March had been crafted. The DB Ops had now, seemingly, fallen into line with the thinking in the Air Ministry, for the reply avoided disputing the rights or wrongs of bombing Spezia and highlighted instead the likely consequence of the operation. The Italians, 'afraid of air attacks upon their naval units' given that they had 'moved quickly' out of Taranto and Naples after the first raids, would probably move the Littorios to Trieste should Spezia be heavily attacked.⁸² Bottomley concurred; and it was now up to him to tell Harris that the operation, despite being a 'diversion', could be ordered *legitimately*. The following day, the ACAS(Ops) informed the C-in-C that:

Whilst it is realised that such an attack [on Spezia] is not at the moment within the general directive issued to you under cover of Air Ministry letter . . . dated 4th February 1943, the occasion may arise when it is necessary to attack objectives in Northern Italy in connection with amphibious operations in the Mediterranean theatre – see paragraph 3 of the directive.

Harris' objections had simply been overridden by a particular clause of the Casablanca Directive, and he was now forced to work more closely with the Naval Liaison Officer at HQ Bomber Command in keeping the Admiralty informed of an impending attack.⁸³

Harris' objections had been dismissed not a moment too soon because a more practical issue had to be quickly resolved. Owing to the distance between the UK and Spezia, it had to be ascertained the last night by which an attack on this target could be made under the cover of darkness. On 19 March, Bottomley informed Portal that HQ Bomber Command had stated this would be 15 April. Any night up-to-then allowed about 'twenty minutes to half an hour over the target'⁸⁴ – a vital consideration given the need for the visual identification of the battleships and key installations around the dockyard area. This date was passed onto Pound later that day.⁸⁵ Thus, the stage was set for a heavy attack on Spezia, with Phase V of the bombing offensive against Italy having to be carried out sooner rather than later.

⁸¹ TNA, AIR2/8694, Bottomley-Portal, 11/03/43. In reply, Portal wrote 'I don't understand what the C in C has to complain about. He is given tremendous latitude for 9/10ths of his bombing'. See TNA, AIR2/8694, Portal-Bottomley, 11/03/43.

⁸² TNA, AIR20/5323, Bufton-Bottomley, 12/03/43.

⁸³ TNA, AIR20/5323, Bottomley-Harris, 13/03/43.

⁸⁴ TNA, AIR20/5323, Bottomley-Dry, 19/03/43.

⁸⁵ TNA, AIR8/777, Portal-Pound, 19/03/43.

Phase V: The Heavy-Attacks on Spezia (April 1943)

The urgency of attacking Spezia was not just because of the onset of the lighter nights after mid-April, but also because of the strategic requirements of the conflict in the Mediterranean by this time. The war in North Africa – then entering its final phase – had now centred on the elimination of the Axis bridgehead in Tunisia. Specifically, the British perceived the destruction or surrender of much of the German and Italian armies, which had a combined strength of some 250,000 soldiers, was considered vital to the success of Operation Husky. They could not be allowed to escape and deployed in the tough terrain of Sicily where, in Churchill's words, 'the still numerous Italian Army might fight desperately in defence of its homeland.'⁸⁶ On 2 April the Prime Minister therefore stated at the Chiefs of Staff Committee that:

It now becomes a matter of capital importance to prevent any large escape of the enemy from the Tunisian tip by sea. No doubt this is engaging the attention of the North African High Command in all its branches. But that is not enough.⁸⁷

The words 'not enough' was Churchill's way of stating that *all* relevant branches of the Allied armed forces should be used to prevent the Axis escape from Tunisia. And one major force from outside the Mediterranean theatre that could provide some assistance was, of course, Bomber Command.

Specifically, heavy attacks on Spezia would thwart the deployment of the RMI's battleships and heavy cruisers as escorts for the troopships taking the Axis armies from Tunisia back to Sicily. This conformed to the Casablanca Directive's clause about attacks on northern Italy being undertaken 'in connection with amphibious operations in the Mediterranean theatre',⁸⁸ although in this case it was not about supporting Allied amphibious operations but instead about jeopardising the maritime evacuation of Axis forces from Tunisia. In so doing, Harris' force would be complementing the efforts of the US Ninth Air Force (based in North Africa), whose B-24 Liberators were conducting intense attacks on the ports of Catania, Messina, Naples, Palermo and Bari during April 1943.⁸⁹

At 09:35 on 13 April, Harris finally took the decision to bomb Spezia during the morning conference at HQ Bomber Command. That night, a total of 207 Lancasters from 1, 5 and 8 Groups, together with four PFF Halifaxes, undertook the operation.⁹⁰ Though considered by the aircrews to be another 'soft' target in Italy, an attack on Spezia still had its challenges. The flight engineer needed to carefully regulate the fuel load for the long distance involved

⁸⁶ Churchill, T.S.W.W.: Vol. V, Closing the Ring, p. 23.

⁸⁷ Churchill, T.S.W.W.: Vol. IV, p. 840.

⁸⁸TNA, AIR20/4476, Bottomley-Harris, 4/02/43.

⁸⁹ TNA, AIR23/925, Operational-Research Section (Middle East) Report No. R.39, Review of Bomber Operations in the Middle East, April 1943, 9/06/43.

⁹⁰ TNA, AIR14/3440, Report on Operational-Sorties for Period Ending 0730 Hours 14th April, 1943, 1943, undated.

(even a Lancaster was at the maximum extent of its range) while making sure all four engines worked properly to safely navigate a heavily-laden bomber over the formidable barrier of the Alps.



Map II: Bomb-Plot chart for 13-14 raid⁹¹

Once at Spezia, the Operational Plan (OPLAN) stated it was to be a concentrated-attack of 17 minutes' duration (from 0130-0147 hours) with the stipulation that 'if the ships lying to the south of the aiming point in the dock area could be seen they were to be attacked with HE, and the incendiaries reserved for the dock area'. Ten Lancasters of 5 Group were also to lay mines 'to prevent the battleships in the harbour from escaping [out to sea]'. Despite 'an effective smoke screen', evidence showed that a 'fairly accurate attack' had been carried out (see Map II). Indeed, daylight reconnaissance revealed the devastation in the dock area that included five acres of storehouses and hits on the heavy cruiser, *Gorizia*.⁹² There was also damage to the shipyard industries, residential areas and the town's gasworks, but there were

⁹¹ TNA, AIR14/3409, [Attached Map to] Report on Night-Operations, 13-14th April 1943, 21/07/43.

⁹² Gorizia was the third ship of the Zara-class heavy-cruisers, the others being Zara, Fiume and Pola, which were all sunk at the Battle of Cape Matapan (29 March 1941).

no hits on the three Littorio class (battle)ships.⁹³ One hundred and seventy-three Lancasters from 1, 3, 5 and 8 Groups, and five PFF Halifaxes, returned five nights later.⁹⁴ The post-raid report observed that 'a good concentration, a little north west of the aiming point, was achieved' (see Map III) in which 'the Naval Dockyard and the town suffered more severely than on the night of 13-14th April'. Through a combination of HE and incendiary bombs, serious damage was done to the industrial and residential areas of the town, with direct hits on the San Vito arsenal and main railway station. A ship of the RMI was sunk but it was an Orlani-class destroyer (*Aviere*), not a Littorio-class battleship, which all went unharmed again.⁹⁵



Map III: Bomb-Plot chart for 18-19 raid 96

⁹⁴ TNA, AIR14/3440, Report on Operational-Sorties for Period Ending 0730 Hours 19th April 1943, undated.
 ⁹⁵ TNA, AIR14/3410, Report on Night-Operations, 18-19th April, 1943, 24/07/43. For an Italian account, see TNA, AIR20/5396, Report of Enemy-Bombardments of 14th and 19th April, Spezia, 10/05/43.

⁹³ TNA, AIR14/3409, Report on Night-Operations, 13-14th April 1943, 21/07/43. See also TNA, AIR20/3366, Bomber Command Digest No. 53, For Week ending 1200 hours, Sunday, 18th April 1943; and Middlebrook/Everitt, *B.C.W.D.*, p.376. For a descriptive account, see W.R. Thompson, *Lancaster to Berlin* (Manchester, 1997 ed.), pp.90-6.

⁹⁶ TNA, AIR14/3410, [Attached Map to] Report on Night-Operations, 18-19th April 1943, 24/07/43.

Notwithstanding these heavy raids, the pressure on Harris to continue the Spezia attacks specifically, and on naval targets generally, remained. This was proof of Harris' suspicions that raids on this target would become a more permanent commitment and, more widely, that naval influence on bombing policy was always liable to increase. In late-April, the Air Ministry's Targets Committee agreed to an Admiralty request that an up-to-date list of naval targets should be sent from the Air Ministry to Bomber, Fighter and Coastal Commands (and the US Eighth) as a weekly signal. The committee agreed to this, though the signals were to be 'purely informative' and not to alter the objectives of the Casablanca Directive.⁹⁷ Nonetheless these signals, known as NAVTARs, were to give the order of priority for 'general classes of naval targets', which comprised U-Boat construction yards, U-Boat operational bases, and Axis naval units and merchant shipping in harbour.⁹⁸ The first, second and third NAVTAR signals (covering the 7-20 May, 21 May-3 June and 4-17 June, respectively) stated a priority-target were the:

Littorio Class Battleships at Spezia – of great importance in view of forthcoming operations in the Mediterranean.⁹⁹

Despite these signals, further large-scale raids on Spezia would only be undertaken by the American B-17s of the Northwest African Air Force (NAAF). Their precision-attack on 5 June saw the RMI suffer considerably: a light cruiser of the Capitani Romani-class had a large hole blown through its starboard side and one of the battleships, *Roma*, suffered bow damage and severe flooding (this was repaired in Genoa).¹⁰⁰ On 14 June, the NAAF's heavy bombers returned and scored a direct hit on the Littorio's port side (this being repaired at Spezia).¹⁰¹ However, Bomber Command's focus remained on the 'Battle of the Ruhr' at this time. Harris would not resume heavy attacks on Spezia, but he would sanction Operation Bellicose.

Phase V: Operation Bellicose (May-July 1943)

From May to July 1943, Fascist Italy's war entered its final stage. On 13 May, the Axis armies in Tunisia finally surrendered. As part of the increasing pressure on Italy, the Allies turned their attention towards preparations for the next move, namely Operation Husky, which, of course, included a programme of aerial bombardment.

Within the Mediterranean theatre, the RAF did have its own bomber force. But the aircraft was the increasingly dated Wellington and its limitations – in terms of range, bombload and numbers available – precluded heavy attacks on targets beyond southern Italy.

⁹⁷ TNA, AIR20/775, Bottomley-Evill, 27/04/43.

⁹⁸ TNA, AIR20/775, Air Ministry-H.Q. Bomber, Coastal, Fighter Commands and Eighth U.S. Air-Force, draft signal, undated.

⁹⁹ TNA, AIR20/4772, Appendix to 89th Target-Committee Meeting, NAVTAR No. 1, undated; Appendix to 90th Target-Committee Meeting, NAVTAR No. 2, undated; Appendix to 91st Target-Committee Meeting, NAVTAR No. 3, undated.
¹⁰⁰ TNA, AIR34/429, Detailed Interpretation-Report No. D.56, Locality: Spezia, 8/06/43.

¹⁰¹ M. Stilie, Italian Battleships of World War II (Oxford, 2011), pp.41-2.

Consequently, on 25 May MAC sent a request to the Air Ministry that stated, 'we are most anxious to have Bomber Command support during Husky operation', which included a programme of heavy attacks on the civilian morale and war-industries of Italy's northern cities, the major railways between southern Germany and northern Italy, the oil refineries at Leghorn and Venice, and the naval bases at Spezia and Genoa. Yet the Mediterranean airmen were also aware of the limitation on Bomber Command's operations against Italian targets, namely the short hours of darkness during the period in which Operation Husky was 'due to take place'. As a result, Operation Bellicose – the brainchild of the C-in-C Mediterranean Air Command, Air Chief Marshal Sir Arthur Tedder – was developed. This stated that Bomber Command would attack '[the] targets mentioned'¹⁰² through either a 'shuttle service' (in which the bombers used airfields in North Africa) or by a temporary detachment to the region.

In London, the senior Air Staff remained lukewarm about this operation, however. Bottomley was dismissve because it would 'have little effect on the military situation as affecting the conduct of Operation Husky'. 'The decision', the ACAS(Ops) concluded, 'turns on the extent to which the additional pressure on Italian morale can affect the political situation' which, he believed, remained doubtful.¹⁰³ Consequently, the Air Ministry informed MAC that 'we consider . . . your project uneconomical particularly the shuttle service'. The alternative, namely a temporary detachment based in North Africa, was also considered undesirable because every Lancaster was needed to maintain '[the] crescendo of attacks against the Ruhr'. MAC had to utilize the bombers it had already, together with the American reinforcements being sent, for these were considered 'sufficient to meet the needs you outline in your proposal'.¹⁰⁴ The Air Ministry had vetoed the idea.

But not for long. Ironically, the Bellicose plan was soon resurrected by the need to attack an important target in southern Germany, namely Friedrichshafen. On 11 June, the Air Ministry informed MAC (and HQ Bomber Command) that 'owing to location of target and short hours of darkness aircraft will have to land in North Africa after delivering attack ... They will however be available to carry out an attack on an objective in Italy on the return flight'.¹⁰⁵ Suddenly, 'shuttle bombing' – a proposition that had so underwhelmed the Air Staff only weeks before – had now been accepted. On 23-24 June, after having bombed Friedrichshafen three nights earlier, some 52 Lancasters from 5 and 8 Groups left North Africa for their return to the UK. As Tedder had planned, these aircaft commenced a 30-minute attack on Spezia *en route* in order to keep the Littorios bottled-up in port. Though the target-marking by the PFF and selected 5 Group aircraft was inaccurate, the British then enjoyed an enormous slice of luck. A stray bomb set an oil-tank ablaze and this inferno acted as a huge 'ground-marker' for the other Lancasters who were then ordered 'to bomb 500 yards north of the oil fire'. Many did

¹⁰² TNA, AIR20/3372, H.Q. M.A.C.-Air Ministry, 25/05/43.

¹⁰³ TNA, AIR20/3720, Bottomley-Evill, 27/05/43.

¹⁰⁴ TNA, AIR20/3720, Air Ministry-H.Q. M.A.C., undated.

¹⁰⁵ TNA, AIR20/782, Air Ministry-M.A.C. rep. Bomber Command, 11/06/43.

so, and a concentrated attack on the dockyard area was delivered, ¹⁰⁶ although the Italian battleships were undamaged once again. Tedder sent to Harris his gratitude: 'Thanks for your Lancaster party. They are a fine lot and on return trip did job which is most useful to us at this juncture'.¹⁰⁷

Given that the bombing of Friedrichshafen had provided the circumstances for undertaking Bellicose, ACAS(Ops)'s morning conference on 24 June reviewed the possibility of continuing this operation. The Air Staff agreed that Bellicose had assisted with the spread of Germany's air defences and 'enabled' attacks to be made, 'without prohibitive losses', on targets in both Germany and Italy that would otherwise have been 'off-limits' due to the limited hours of darkness during the Summer months. Yet it was decided that a regular undertaking of Bellicose operations required proper base facilities in North Africa and this was considered 'not practicable in the present manpower situation'.¹⁰⁸ The message was therefore clear; Bellicose, whilst having been a useful exercise, could not become a more permanent fixture. It was repeated on only one more occasion – and the target was not Spezia but another Italian port. On 24-25 July, the night the 'Battle of Hamburg' commenced, 33 Lancasters from 5 Group, having attacked the transformer-station at Cislago the previous week, bombed the harbour facilities and oil refinery at Leghorn (Livorno) on their way to the UK.¹⁰⁹

Thereafter, Harris would return to the area bombing of Italian cities on a heavy scale. The longstanding British aim – namely 'to bring about the collapse of Italy by air action alone'¹¹⁰ – and, by Summer 1943, the climatic – and most violent – phase of Bomber Command's offensive against Italy, was about to begin. Already, on 12 July, Harris had taken a mid-morning decision to switch that night's target from a German one to Turin – as part of something called the 'alternative programme' – in order to worsen Italian morale after the shock of the Operation Husky landings (these having commenced three days previously).¹¹¹ In late-July, Harris was specifically asked by Portal to 'heat up the fire' against Italy,¹¹² and fulfil an Air Ministry's Directive that stated:

On Demand: Targets in Italy . . . Major objectives in Milan, Turin and Genoa. Method: Scale of attack as high as possible.¹¹³

Mussolini had fallen but Italy was about to suffer its final, agonising, ordeal under the bombs of

¹⁰⁷ TNA, AIR20/782, Tedder-Harris (thru Evill), 27/06/43.

¹¹² TNA, AIR20/5323, Portal-Bottomley, 28/07/43.

¹⁰⁶ TNA, AIR14/3409, Report on Night-Operations, 23-24 June 1943, 12/09/43.

¹⁰⁸ TNA, AIR20/3372, Minutes of A.C.A.S.(Ops.) Conference 24 June 1943, 24/06/43.

¹⁰⁹ TNA, AIR14/3410, Report on Night-Operations, 24-25th July, 1943, 6/10/43.

¹¹⁰ TNA, AIR20/3720, Course "B" – Air Action Alone, 14/04/43.

¹¹¹TNA, AIR14/1819, Reasons for Major Night-Operations not taking place April, June, July, August 1943, undated.

¹¹³TNA, AIR14/779, Air Ministry-Bomber Command, 29/07/43.

Bomber Command, as the Allies sought to pressure the new Italian government into signing an armistice.¹¹⁴

Conclusion

On 3 September, at a Sicilian village called Cassibile, the Badoglio government signed a peace agreement with the Allies, which was announced publicly five days later. Under its terms, the RMI's ships were to surrender by sailing to a North African port or to Malta. On 9 September, the three Littorio battleships moved out of Spezia to comply with this order; only two ever made it. En route, the *Roma* was sunk by two German guided glider-bombs; an inglorious end to a very fine ship at the hands of Italy's erstwhile ally. The *Italia* (formerly the Littorio) was badly damaged by another *Fritz-X* but it did reach Malta.

Italy had come under the cross-hairs of Bomber Command from Autumn 1942 and the subsequent bombing campaign, which evolved through six-phases. At every stage these air attacks were fully complementary to Allied strategy and operations in the Mediterranean theatre, be it the 'Battle of El Alamein', Operation Torch, the fall of Tunisia, the Husky landings in Sicily, or the securing of Italy's final capitulation. In supporting these operations, Harris had little objection to the bombing of Italy's major cities – Milan, Turin and even Genoa – for he considered these were suitable targets when bad weather precluded attacks on Germany and kept the Luftwaffe's air-defences fully stretched.

Yet operations against Italian ports remained a different matter. Such attacks came from all geographical directions: in the south, the bombing of such places as Naples and Brindisi was the responsibility of British and American bombers based in Malta and North Africa; in the north, it would be Bomber Command that was assigned to attack the RMI's major fleet base at Spezia. The specific reason for doing so – namely to sink, damage or prevent the operational deployment of the powerful Littorios battleships – meant the attacks were Phases IV & V of Bomber Command's air offensive against Italy. Advocated by an Admiralty which was only too aware of its weakness in capital-ships, both in the Mediterranean and beyond (see Appendix II), the plan for Bomber Command's attacks on Spezia evolved over time from mining the harbour, to small-scale raids, to heavy attacks and, finally, to the 'shuttle-raids' of Bellicose. This varied approach towards operational planning showed, in microcosm, the operational flexibility of Britain's strategic bombing force by mid-1943.

More specifically, the operations against Spezia allow us to investigate the issue of command and control of Bomber Command during the Second World War. Harris was only too aware of presiding over the only Command in any Service that was capable of operating against a multitude of target sets in a multitude of different theatres. No other commander, Army,

¹¹⁴ The raids were: *7/8 August* – Genoa, Milan, Turin; *12-13 August* – Milan, Turin; *14-15 August* – Milan; *15-16 August* – Milan; and *16-17 August* – Turin. See Middlebrook/Everitt, *B.C.W.D.*, pp.419-22.

Navy or Air Force, was faced with so many competing demands on his operational pie – and the C-in-C frequently lamented. Yet in the Mediterranean theatre, this problem became more complicated. This is ironic given that Harris' force did not come under any Mediterranean commander – and therein lay the problem. For the Navy's aspiration for Bomber Command's support meant the use of a force from outside the Mediterranean theatre. Such a deployment had to be sanctioned by the Chiefs of Staff, via the supreme decision-making body for British military operations, The Prime Minister and Government. Consequently, this meant that the pressure on Harris to undertake operations against Spezia came from a host of 'outside' parties: The Prime Minister; the other Service Chiefs; and the Chief of the Air Staff – powerful voices that were very difficult to 'buy off'. This was deemed a real danger, in Harris' eyes, of his Command becoming increasingly subject to 'waging war by committee'. Yet he did attack Spezia – an indication of the C-in-C's awareness as to how far he could push back against 'official' orders. Despite holding very valid views on 'diversions' generally, and Spezia specifically, Harris ultimately had a modus operandi that was a lot more cooperative than has been readily acknowledged. He did follow his Directives, especially when they were couched in language that was specific enough to not allow him any 'wriggle room', and Harris' record in this respect was actually very good. Spezia proved no exception.

Acknowledgements: I would like to thank the very helpful staff at the following archives: The National Archives (Kew), Archive & Library RAF Museum (Hendon), and Christ Church College (Oxford), whose help with catalogue queries, reference checks, photocopying orders and image copyright has been invaluable. I would also like to thank the Head of the Air Historical Branch, Mr Sebastian Cox, for permission to quote from the Portal Papers. Finally, I am grateful to the Department of History, Politics & Philosophy at Manchester Metropolitan University for funding for the purchase of the image rights for the scanned documents from the National Archives, and for being such a pleasant place to teach and research.

	Date:	Targets:	No. of aircraft despatched:	Rationale for bombing:
Phase I	Late-October 1942	Genoa – 22-23 October Genoa – 23-24 October Milan – 24 October Milan – 24-25 October	112 122 88 71	 To coincide with the start of the Second 'Battle of El Alamein' (23 October – 11 November)
Phase II	Early to mid-November 1942 ('The Battle of Genoa')	Genoa – 6-7 November Genoa – 7-8 November Genoa – 13-14 November Genoa – 15-16 November	72 175 67 78	 To coincide with start of Operation Torch (8-16 November) and later part of the Second 'Battle of El Alamein'
Phase III	Mid-November-December 1942 ('The Battle of Turin')	Turin – 18-19 November Turin – 20-21 November Turin – 28-29 November Turin – 29-30 November Turin – 8-9 December Turin – 9-10 December Turin – 11-12 December Turin – 23-24 December	77 232 228 29 133 227 82 Cancelled	 To coincide with the general deterioration of the Italian/Axis position in North Africa; and To sabotage Italy's war-production
Phase IV	February 1943	Turin and Spezia – 4-5 February Milan and Spezia – 14-15 February	188/4 142/4	 To worsen the resupply situation of Axis forces in Tunisia
Phase V	April-July 1943	Spezia – 13-14 April Spezia – 18-19 April Spezia – 23-24 June Turin – 12-13 July Leghorn – 24-25 July	208 173 52 295 33	 To hinder the Axis evacuation from Tunisia; and To aid Operation Husky
Phase VI	August 1943	Genoa, Milan and Turin – 7-8 August Milan and Turin – 12-13 August Milan – 14-15 August Milan – 15-16 August Turin – 16-17 August	197 504/152 140 199 154	To secure an armistice from the new Italian government under Marshal Badoglio

Appendix I: The Phases of Bomber Command's Strategic Air Offensive against Italy

Summary	of Proposals unlikely to been omitte	e ships though operate have	•	
British			Enemy	
4 - K.G.58.	10 - 14*	Home	TIRFITZ SCHARNHORST SCHEER LUTZOW	8 - 15" 9 - 11" 6 - 11" 6 - 11"
RENOWN MALAYA VALLANT	6 - 15" 8 - 15" 8 - 15" (or	Western Med.	3 LITTORICS 3 CAVOURS	9 - 15" 10 - 12.6"
Home if not re W.Med.)	quired in		STRASBOURG DUNKERQUE	8 - 13" 8 - 13"
3 "Rs."	8 - 15*	Indian Ccean or Atlantic depending on raider situation	s on.	
MELSON RODNEY WARS PITE	9 - 16" 9 - 16" 8 - 15"	10	YAMATO MUSASHI 1 YAMATO	9 - 16.
U.S. S.DAKOTA) WASHINGTON)	a second	S.W.Facific.	MUISU NAGATO	} 8 - 16*
N.CAROLINA) INDIANA) MASSACHUBETTS) ALABAMA)	9 - 16*		FUSO ISE HYUGA YAMASHIRO) 12 - 14*
COLORADO MARYLAND NEW MEXICO MISSISSIPPI	8 - 16" 8 - 16" 12 - 14" 12 - 14"	Hawaii Force.	KIRISHIMA HARUNA KONCO HIYEI) 8 - 14") in Japanese) Waters.
TENNESSEE PENNSYLVANIA NEVADA IDAHO	$12 - 14^{\circ} \\ 12 - 14^{\circ} \\ 12 - 14^{\circ} \\ 12 - 14^{\circ} \\ 10 - 14^{\circ} \\ $	• •		
ARKANSAS NUN YORK	$12 - 12^{n}$ $10 - 14^{n}$ $10 - 14^{n}$	Western Atlantic.		

Appendix II: Predicted global naval balance by April 1943¹

¹TNA, ADM205/14, Summary of Proposals by April 1943 [Worldwide Battleship Deployments], 5/11/42.

Appendix III: The battleships of the Littorio-class²

Battleship: Littorio

1934 programme. Cantieri Ansaldo, Genoa. Laid down: 28 October 1943. Launched: 22 August 1937. Completed: 6 May 1940.

Battleship: Vittorio Veneto

1934 programme. Cantieri Rinunti dell'Adriatico, Trieste. Laid down: 28 October 1934. Launched: 22 July 1937. Completed: 28 April 1940.

Battleship: Roma

1938 programme. Cantieri Rinunti dell'Adriatico, Trieste. Laid down: 18 September 1938. Launched: 9 June 1940. Completed: 14 June 1942.

Battleship: Impero

1938 programme. Cantieri Ansaldo, Genoa. Laid down: 15 May 1938. Launched: 15 November 1939. Never fully completed.

Dimensions:	780-ft./238.5-m. (Roma and Impero): 789.5-ft./241.43-m.)
Displacement:	40,714 tons (standard); 45,236 tons (full load)
Main armament:	Nine (three triple turrets) 15-in./380-mm. 50 calibre
Trial speeds:	Littorio: 31.29 knots; Vittorio Veneto: 31.43 knots
Range:	4,580 n.m. at 16 knots



¹ H.P. Willmott, *Battleship* (Cassell, London, 2002), p.283.

Viewpoint

'Spiritual Resilience'

By The Reverend (Wing Commander) David Richardson

Biography: David Richardson is a chaplain in the Royal Air Force, originally ordained into the Church of Ireland. A CAS Fellow and graduate of the University of Edinburgh, Trinity College Dublin, Queen's University Belfast and King's College London, he has served on a variety of RAF stations. His operational experience includes tours across Afghanistan and Iraq.

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Introduction

During the final months of RAF100, Air Publication (AP) 9012, 'Stress and Resilience Policy', was updated to include a chapter on 'Spiritual Resilience'. At first sight, this may appear to be a rather odd development for a modern air force more at home with electrons than the ethereal. However, this Viewpoint will argue that identity, meaning and morality – the key components of spiritual resilience – have a vital part to play in modern military thinking. As the policy states:

The armed forces have long recognised the importance of transcendence – the sense of belonging to something greater than self - and meaning. Music, ceremonial, colours, mess life and medallic recognition all contribute to spiritual resilience. These things help us to develop common values, a sense of belonging and shared purpose. Their goal is to imbue military personnel with the background awareness that service and sacrifice is an honourable and worthwhile calling.¹

This 'background awareness' is not a given and cannot simply be assumed. The 'common values' so easily taken for granted are in fact dependent on a wider context of meaning. The aim of this Viewpoint is to elucidate some of this context and to highlight its ongoing importance.

The Royal Air Force reached its largest numerical strength, in 1944 at the height of the Second World War, and some of its most iconic images date from that conflict, from Spitfires in sunny skies to Lancasters in flame-torn darkness. Whilst the readers of this journal are likely to be fluent in the strategic and tactical issues of the War, it is worth pausing to reflect on the cultural context in which the RAF made such great sacrifices. When Churchill and Roosevelt invoked 'Christian Civilization' in their public statements as the grand cause worthy of such commitment, they were not so much making a religious statement as appealing to a shared sense of identity and liberal democracy, which they expected their listeners to understand and relate to. Seventy-five years later, it is by no means obvious that this shared identity still holds.

This is the result of historical changes over many centuries. Pre-modern people could find their certainties in religious truth, framing their lives in the context of the church's teaching and hope of eternity. Enthusiasts for the Enlightenment could base their philosophy on a confidence that the truth was here on earth, for any rational person to discover through empirical analysis. Although these two views were divergent in almost every respect, they had this in common: a belief in a transcendent universe which provided a framework for understanding the place of human beings in the world.² As James Davison Hunter expresses

¹ AP9012, Chapter 12.

² James Davison Hunter, 'Liberal Democracy and the Unravelling of the Enlightenment Project', *The Hedgehog Review* (Vol 19 No 3 Fall 2017).

it, there was a 'common grammar for recognizing the natural affections and moral sentiments shared by all humanity...the seeds of social solidarity could be found in human sentiments, the public good within private interests, the universal within the individual'.³ This is a concise interpretation of the transcendent worldview assumed by Churchill and Roosevelt in 1945. One of the tragic ironies of recent history, *pace* Fukuyama, is that, just as the liberal democratic project appeared to triumph in the wake of the Cold War, its internal coherence began to dissolve.

To put it crudely, liberal democracy bifurcated into liberal and democratic elements. In terms of liberalism, this is not simply a description of economic and social freedom in the traditions of Adam Smith and John Stuart Mill. Rather it is something new, literally neoliberalism. The basic assumption behind this concept is that the market is sovereign – and not simply over economic issues. Based on the theory of Friedrich Hayek, nothing has a given and immutable value, even those aspects of human significance and meaning that previous generations would have treated as normative. Objective truth is no longer 'out there' to be revealed to the religious, discovered by the scientist or reasoned out by the philosopher, but is determined by what the market will bear.

There is, in sum, no longer a shared, transcendent *mise en scène* for human existence. Virtues have transformed into values, both individually held and formulated, but of no binding or enduring significance. The very use of the word 'value' is worth pausing to reflect on. To paraphrase the small print of any financial product, 'the value of your morality may go up or down'; it has no innate or enduring worth of its own. The moral values of one's society will fluctuate dependent on what the market will bear – take Germany's 20-year moral odyssey from Weimar Republic to *Grundgesetz*⁴ as a crude heuristic for such a process. As the Chinese historian Jung Chang remarks, 'if you have no God then your moral code is that of society. If society is turned upside down, then so is your moral code'.⁵ One may debate what can and could be meant by 'God' here, but her point is cogent. The 'moral compass' avowed by many military personnel is arguably a useless if not downright dangerous device if the arrow has no external lodestone and simply swings along with market forces. If, for instance, the market is currently trading in personal peace and affluence, more abstract values such as loyalty and character may prove unattractive investments.⁶

In terms of democracy, the individual now has an unprecedented status. Once seen in relation to a divinity or wider society, human beings are now increasingly regarded as independent, free and sovereign agents. As the public sphere has become eviscerated of a shared cultural story, the individual is now free to decide his or her path through life. The individual may be

³ Ibid.

⁴ The 'Basic Law' of the Federal Republic of Germany, established in 1949 to safeguard human rights and democracy.

⁵ Quoted in Jonathan Glover, *Humanity*, (Pimlico, London, 2001), p.405.

⁶ Francis Schaeffer, How Should We Then Live? (Crossway, Wheaton, 1982), p.227.

freer to choose than ever before, but also carries an increasingly heavy burden for their own destiny.⁷ Lacking the safeguards of a benevolent Providence (or a paternalistic society), – the individual must shift for themselves. The mantra that every schoolchild knows so well - 'follow your dreams and you can achieve whatever you want' has a darker side that few, if any, primary school assemblies ever spell out. Failure to achieve those dreams or ambitions will be the responsibility of the individual alone. In such a culture, one faces an unrelenting pressure to boost one's own image and status above all else. An intriguing textual analysis of Norway's main national newspaper between 1984 and 2005 revealed that, as the occurrence of self-referencing words such as 'l' and 'my' increased, instances of other-focused concepts such as 'duty' and 'obligation' declined.⁸ The linkage between this cultural shift and the realities of twenty-first century warfare may not be obvious at first sight but can be easily traced.

The forces operating alongside the RAF in western Europe in 1944-45 did so against a broadly shared cultural outlook. The British, French and US national embodiments – Britannia, Marianne and Columbia – are hardly identical sisters, but begueathed a remarkably similar legacy of shared understanding to their descendants and the freedoms for which the dead of two world wars gave their lives had a transcendent quality. This situation, it may be argued, no longer obtains. As the Canadian philosopher Charles Taylor observes, 'the individual has been taken out of a rich community life and now enters instead into a series of mobile, changing, revocable associations'.⁹ Holding their fragile future in their hands, each person makes their way through life via a series of short term contracts, which run the gamut of human existence from car insurance to employment. What matters most in such a culture is the utilitarian and the instrumental, an epistemic ecology where traditional concepts such as humility, duty and sacrifice seem anachronistic surds. And, as analysts of our neoliberal world have suggested, the promised blessings of prosperity and success have not trickled down universally, leading to a considerable degree of cynicism about public life, from fake news to the political establishment. This is not a development which augurs well for a strong common existence. If citizens withdraw from political and civic engagement into a private sphere of personal fulfilment, the liberal freedoms we take for granted are at risk.¹⁰

One of the founding principles of modern democracy is that the individual citizen surrenders certain freedoms and benefits to the state in exchange for protection and stability. This relationship is perhaps seen in its starkest form when a nation sends its citizens to war. In the West's post-2001 interventions, when the legitimacy of the campaigns was subject to intense public scrutiny, this affected the commemoration of those citizens who had given their lives. As Walklate, Jenkings and others have observed, British repatriation ceremonies

⁷ Jackson Lears, 'The long con of Neoliberalism', *The Hedgehog Review* (Vol 19 No 3 Fall 2017).

⁸ Jean Twenge and Keith Campbell, The Narcissism Epidemic, (Free Press, New York, 2010), p.264.

⁹ Charles Taylor, Sources of the Self (Cambridge University Press, Cambridge, 1992), p.502.

¹⁰ Larry Siedentop, Inventing the Individual (Penguin, London, 2014), p.363.

became 'deeply political acts' protesting against military action, where those who died were remembered as victims of government policy.¹¹ Anthony King, in his analysis of the obituaries of British service personnel, comments that the death of a soldier is not seen so much as an act of service for the nation as 'the meaningful expression of a man who defined himself by his profession'.¹² A strong relationship of trust between citizen and society is vital should that citizen be required to sacrifice everything for a bigger purpose.¹³ This is especially the case if that purpose involves intangible issues such as freedom and democracy which defy inclusion in a bare economic calculus. If, however, there is no bigger purpose beyond personal fulfilment, then the citizen may well wonder whether the sacrifice is worthwhile.

One of the most fascinating commentaries on what may be at stake is provided by Yuval Noah Harari in his book Homo Deus. Harari's contention is that modern human beings have exchanged meaning for power; or, as we might express it, context for choice. Having once created an elaborate system of gods and religions to give meaning to our existence, we have now sloughed these off to live unfettered lives of self-determination. In Harari's view, however, even this freedom is itself illusory, as humans are simply driven by bio-chemical processes that are deterministic or random but most assuredly not free. Such a view could have significant consequences for military ethos, not least the entire honours and discipline structure. If valour and vice alike are merely responses to the chemical impulses in one's brain, the only distinction between them is that the former is currently more socially acceptable than the latter. According to such a calculus, to ascribe moral worth or censure to such actions is about as meaningful as condemning perspiration or praising frostbite: all are simply bio-chemical reactions to external stimuli. Harari comments that 'the sacred word 'freedom' turns out to be, just like 'soul', a hollow term empty of any discernible meaning. Free will exists only in the imaginary stories we humans have invented'.¹⁴ Following his argument through, if free will is a chimera then, by extension, so is moral responsibility.

Harari even predicts that human beings as we know them may be gradually evolving out of existence as the algorithms which drive our universe improve and take new, more efficient forms. Intriguingly, however, Harari seems unable to live with the consequences of his own argument, implying in his conclusion that the evolutionary process should somehow be resisted to preserve human distinctiveness. He proves unable, however, to provide a convincing basis on which to do so. His philosophy suggests that even seemingly obvious ethical datum lines such as human equality are simply temporally limited by-products of a process which places no inherent worth on humans *qua* humans. Indeed, he explicitly

¹¹ S. Walklate, G. Mythen, and R. McGarry. 'Witnessing Wootton Bassett; An Exploration in Cultural Victimology', *Crime, Media and Culture* 7 (2), pp.149-165. K. N. Jenkings, N. Megoran, R. Woodward and D. Bos, 'Wootton Bassett and the political spaces of remembrance and mourning' *Area* 44.3, pp.356-363.

¹² A. King, 'The Afghan War and 'postmodern' memory: commemoration and the dead of Helmand', *The British Journal of Sociology*, Volume 61 Issue 1, pp.1-25.

¹³ Lears, op.cit.

¹⁴ J.N. Harari, *Homo Deus* (London, Penguin, 2016), p.329 and *passim*.

argues that human equality may soon slip away to be replaced by a hierarchal dystopia much worse than anything envisaged by Wells, Huxley or Orwell. Much as he may personally value the liberal world in which he currently lives, Harari has no way of justifying its superiority or desirability from his own trajectory of thought. For if freedom, democracy and equality are simply random grace notes generated by the blind music of the spheres, then there is no logical reason to prefer them above the alternatives. Nor, it follows, are they worth the sacrifice of blood and treasure. And if, as Harari maintains, there really is nothing ultimately sacred about human life, there may be drastic future implications for costly battlefield medical evacuation.

Harari's futurecast demonstrates the need for spiritual resilience, an awareness that human existence cannot be reduced to mere process – be that economic or biological without serious consequences. The free society which values the individual did not, and arguably could not, arise from a reductionistic, instrumentalist worldview. Indeed, Oxford academic Larry Siedentop has recently published a fascinating volume which explicitly traces the development of modern liberal equality right back to Christian thinkers in the middle ages, who translated Biblical views of humanity into practical political application.¹⁵ One does not need to share the faith of these mediaeval scholars to appreciate their insights, which have shaped the cultural milieu we take for granted. Thus the openly agnostic Gunter Lewy has argued that 'reason alone ... is ... clearly not enough to provide moral inspiration'.¹⁶ Perhaps it is time to pause in our relentless pursuit of ends-driven individualism to consider the possibility that there are bigger truths in the world to which we belong. Davison Hunter remarks that our current cultural trajectory is likely set to bend us away from the very concepts of justice, freedom and tolerance that we avowedly treasure.¹⁷ Without spiritual resilience, we have no firm basis for even those ethical and moral principles which seem so obvious and self-evident. Before we are called upon to defend these convictions in conflict, it is surely worth reflecting on why they are worth defending in the first place.

This Viewpoint is a development of a brief hypothesis originally aired on the Australian air power website The Central Blue. It also includes some material from a paper delivered at the International Military Ethics Symposium held in Washington DC during August 2018; the full paper is due to be published with a selection of others from the symposium by the National Defense University Press during 2019.

¹⁷ Hunter, op. cit.



¹⁵ Siedentop, *op.cit*.

¹⁶ G. Lewy, Why America Needs Religion, (Eerdmans, Grand Rapids, 1996), p.146.

The Flatpack Bombers – The Royal Navy and the Zeppelin Menace



By Ian Gardiner Publisher: Pen and Sword Aviation (12th May 2014) (ISBN-13: 978-1473822801) 176 pages

Reviewed by Squadron Leader David Tucker

Biography: Squadron Leader David Tucker completed an MLitt in Strategic Studies at the University of Aberdeen in 2004, winning the Gordon Shephard Memorial prize that year for his essay published in the *Air Power Review* on European Defence Integration. He is an RAF fast-jet navigator, currently serving in a staff appointment at HQ Allied Air Command in Ramstein.

Introduction

Following the centenary of the Royal Air Force, it is fitting that we, as a Service, reflect upon our antecedents. There is a wealth of material about the exploits of the Royal Flying Corps (RFC) between 1914 and 1918, largely because of its full commitment to the support of the British Army on the Western Front. Material on the Royal Naval Air Service (RNAS) for the same period is less common, yet it was the RFC's resoluteness to the war in the trenches that led to the RNAS's involvement in arguably some of the more cuttingedge developments in air warfare elsewhere. Ian Gardiner's book deals with this subject and fills the gap in an entertaining and informative manner.

In a well-structured book, Gardiner makes a convincing case that the exigencies of the First World War led the RNAS to develop many of the roles that were later to become recognised as intrinsic parts of air power. The Service was at the forefront of seaplane development, and pioneered the very earliest aircraft carrier operations, first from converted merchant ships and later from purpose-built warships. However, the most interesting claim for the student of air power is that the RNAS flew the first strategic bombing raids. Gardiner makes a convincing case for this as follows: at the First World War's outbreak, the Germans had a key advantage over the allies in terms of sea power through their possession of an airship fleet. 'Possession of the Zeppelin gave Germany potential strategic supremecy in the air' (p.1). The UK had had an unhappy relationship with its own airships up to this point and so did not have the capability to provide air support to its surface fleet in the way that the Germans did. This gave the Germans an unopposed capability which mitigated the RN's superiority in terms of warships. In those days before radar the Zeppelins allowed the Germans to pinpoint the position of the British fleet before the British could locate the German ships. The British had no immediate response to this threat as the heavier-than-air aircraft at the time could not fly high enough to intercept the Zeppelins, and in any case 'airships could go at speeds which were not greatly exceeded by aircraft until well into the First World War' (p.13). In addition, the British public, fresh from the release of H G Wells' *The War in the Air*, had an irrational fear of the threat posed to the civil population by the Zeppelin ('The Public's Hysteria' (p.38)). The solution, proposed by Charles Samson (an early pioneer of naval aviation) and championed by Winston Churchill (First Lord of the Admiralty) was to bomb the airships in their sheds, and thus tackle the problem at source certainly bombing raids with strategic effect.

Gardiner goes on to chart the numerous developments in the early years of naval aviation, and links them to theoretical aspects of air power. Indeed, he discusses the relevance of a number of air power theories of the period and relates them to subsequent developments and shows how the RNAS activities at the time laid the foundations for many aspects of modern air power.

His understanding of the subject is clear, and he draws upon numerous sources, from contemporary records to conversations with some of the protagonists while they were still alive. He also gives us an insight into the relationships between Sykes, Henderson and Trenchard during the First World War. All can claim some level of parentage for the new service (p.19). Furthermore, he gives an interesting treatment of the development of Carrier Strike Operations in 'Cuxhaven – The First Carrier Strike' (p.85). In addition, he argues convincingly that the presence of General Smuts 'in London when the second (Zeppelin) raid on that city took place' (p.132) had an influence on his recommendation that an independent air force should be formed in 1918 in his eponymous report to the war cabinet.

The Flatpack Bombers – The Royal Navy and the Zeppelin Menace goes some way towards redressing the balance of understanding of the origins of the RAF. Gardiner has achieved the unusual feat of writing an academically rigorous and well-researched book which is also entertaining to read. It will fascinate both the academic and the casual reader and is highly recommended to anyone wishing to learn some of the less well-known facets of the early days of air power in the UK.



The Mint



By T. E. Lawrence Publisher: Penguin Books (1978) (ISBN-13: 978-0140045055) 232 pages

Reviewed by Wing Commander Matthew Smith

Biography: Wing Commander Matt Smith is an Aerosytems Engineer with a broad base of experience in airworthiness and capability development, particularly for Fast Jets. He is currently serving as the MOD Saudi Armed Forces Project's Senior Team Representative at King Fahad Air Base, Taif. He is a Chief of the Air Staff's Fellow, having graduated with an MA in Air Power in the Modern World from King's College London in 2016.

Introduction

In 1922 the world of aviation was one of excitement, of invention and of romance as man sought to further his mastery of this new domain. It is little surprise, therefore, that T. E. Lawrence sought sanctuary in the fledgling Royal Air Force to escape the unwanted fame his exploits in Arabia had attracted. Lawrence had written to Sir Hugh Trenchard requesting he support his anonymous enlistment as an airman. Lawrence also felt that the development of this new Force would offer a perfect literary subject and that only in the ranks would he be able to see it clearly. His objective was to write a portrait of the Royal Air Force.

Lawrence's objective was curtailed, as just 5 months after initial enlistment his identity was revealed by the press and he was discharged. *The Mint* was created from notes he had taken during recruit training at Uxbridge, kept only to create the introduction to a larger novel. The Uxbridge notes are curated into two sections: 'The Raw Material', which describes the early part of the harsh depot regime; and 'In The Mill', which details his experiences with his Flight prior to assignment from the depot. Following Lawrence's later re-enlistment he drafted

'Service', which, contained within the Uxbridge section, forms a reflection upon his time as an aircraft mechanic at the Cadet College, Cranwell.

To this reviewer, the value of *The Mint* stems from three facets: First, it offers a vivid contemporaneous insight into the nascent Service written by an exceptional author. It may, therefore, be considered by some to be significant. Second, Lawrence, regarded as an exceptional leader, provides an honest critique of those charged with leading and developing the future stock of the RAF. Finally, Lawrence offers open observations of the inter-personal dynamics at play within his Flight. The lessons that may be drawn from these observations, which are rooted in human nature, are timeless.

There are some inevitable imperfections given that the book failed to reach its intended form. The Cranwell chapters sit incongruously with the Uxbridge notes. Their overwhelming positivity contrasting sharply with the character of the bleak depot chapters. Lawrence's self-doubts are frequently mentioned and the self-pitying tone can, at times, wear thin. Finally, the author's truthful descriptions extend to a frank account of barrack room language and behaviour which some readers may find distasteful.

There is much to commend *The Mint* as a historical record. Lawrence depicts a Service that was still under the influence of it parents, with the Non-Commissioned Officers and Officers generally all having transferred from the Navy or Army. The author notes the Air Ministry's deliberate and punctilious efforts, to the point of folly, to make its Service unlike the other two Services. Beyond the descriptions of the brutalities of training, which were much removed from actual Service life, the Cranwell chapters give us a valuable insight into the living and working conditions of the average airman of the time. *The Mint* offers a rare account of the development of the RAF's cultures, rituals and symbols from an airman's perspective.

There is little doubt that Lawrence was an exceptionally capable commander and therefore his analysis of the qualities of his leaders is one that carries great credibility. He judges that the pervading attitudes of the Depot leadership are anachronistic (even for the times) and much is said of the resultant poor leadership. His vignette on the Depot's Commanding Officer is particularly damning. He displays an arbitrary brutality towards his charges and so commands little respect from them. The rest of the Officer cadre are conspicuous by their anonymity to the recruits, yet in his analysis, 'to know the troops' mentality and nature and outlook is the main part of their duty'.

Lawrence's thoughts on the traits that the Service ought to be nurturing in its officers and airmen were prescient. He posited that the soldier, which the depot sought to create, and the technician, that the Service required, were mutually destructive ideals. The Service required people who were intelligent, free thinking and passionate about the air. His favoured leaders were those who could imbue and develop those qualities in their airmen. Lawrence was really

describing the necessity for the leadership of a technologically driven Service to embrace the principles of mission command to harness the intelligence of its workforce.

The transformation of a diverse group of civilians to airmen is described in minute detail. Lawrence brings out the tensions created by the environment and identifies those that are the product of the squad members' characters. His thoughts on the delicate maintenance of harmony within a group sharpened the mind of the reviewer to the minor frictions, that if left unchecked, can lead to a destructive dissonance. This lesson is pertinent to leaders and followers alike, in any given environment.

Lawrence charts the evolution of the Flight from a group that arrives at opinions through debate to one which was able to instinctively think, decide and act without a word said, attaining 'a flight-entity which is outside our individualities'. He largely sees this being achieved through the suppression of individual feelings, 'we jettison our realities...or cover them so deep we fail to hear their voice'. Whilst this may be true, what is not acknowledged are the dangers of this psychological regime to the individual. In an effort to preserve harmony they may instead destroy something of themselves.

The Mint offers a unique observation of life in the early Air Force produced by a renowned academic who was also an authority on military leadership. Whilst there are some minor shortfalls it is nevertheless an excellent work. It is highly commended to all those with an interest in the history of the Royal Air Force and to those who have the responsibility to lead at whatever level.



21st Century Patton: Strategic Insights for the Modern Era



By J. Furman Daniel III Publisher: Naval Institute Press (15th September 2016) (ISBN-13: 978-1682470633) 176 pages

Reviewed by Brigadier Andrew Roe

Biography: Brigadier Andrew Roe is the Director of the Higher Command and Staff Course and Assistant Commandant (Land) at the Joint Services Command and Staff College, Shrivenham. He is a graduate of the United States Army Command and General Staff College, the School of Advanced Military Studies and the Higher Command and Staff College. He holds a doctorate from King's College London and is the author of two books and numerous articles.

Introduction

Few World War II generals invoke more controversy than the unorthodox, seemingly old-fashioned and swashbuckling American General George Smith Patton Jr. Patton, known to his men as 'Old Blood and Guts', was a man of notable military achievements (North Africa, Sicily and on the Western Front) and a master of unprintable expressiveness. He was imbued with a ruthless drive and offensive spirit; no-one wanted to cross him and he had a larger-than-life character, masterfully portrayed by George C Scott in the 1970 eponymously titled film, *Patton*. His unique brand of brash, creative and energetic leadership drew both praise and criticism, exposing, on occasion, a deeply flawed personality. He was indisputably a challenging, unpredictable and confident general, prone to political gaffes, like the Knutsford Incident (where he failed (intentionally) to mention the Russians). Tact and diplomacy were not his strengths. Additionally, he was inclined to serious errors of judgement and impulsive acts. It is impossible to overlook the 'slapping' of two battle-fatigued Seventh Army soldiers during the Sicily Campaign in 1943. But, he was also one of the most successful generals of the twentieth century – and this reality cannot be ignored.

Therefore, separating the myth from the man is challenging. What J. Furman Daniel III, an assistant professor at the College of Security and Intelligence at Embry-Riddle University, seeks to prove in *21st Century Patton* is that Patton was a true military genius and one of the finest leaders the United States has ever produced. Looking beyond the stereotypical and carefully crafted images of the officer who ruffled feathers by pushing too hard, he exposes a man of intense thought and wisdom, who appears, at first glance, to have a mystical ability to unpick and grasp complex military problems. What the author uncovers in his study is not a romantic warrior trapped in the past; instead, he reveals a considerate, nuanced officer committed to continuous self-improvement and professional betterment. The underlying thesis of Daniel's scholarship is that Patton was primarily a product of his own efforts, who worked industriously to hone himself into a deep and original thinker. In so doing, it allowed him to transition seamlessly and with great agility between tactical action and strategic thought – mastering operational art. This, the author suggests, is a hidden but essential element of Patton's palpable military success.

Throughout this short study, Daniel introduces a side of Patton's character that is little known and competently exposes his contributions to the enduring debates on military affairs and strategy. Patton used formal written submissions to help clarify and elucidate his thinking, exposing his logic and rationale to a broader audience. More widely, he was a dedicated reader and possessed an extensive military library – including an early English translation of Carl von Clausewitz's On War. He made wide-ranging notes in the margins of these books or on reference cards and would often read and re-read important sections to help internalise their meaning. His musings on the Gallipoli campaign alone amounted to an entire notebook. He also sought to gain a wider cultural understanding from his studies. For example, prior to Operation Torch (the British-U.S. invasion of French North Africa) he read the Koran in detail, hoping to gain a broader theological insight into the peoples and cultures he would encounter and improve his ability to create a viable 'peace'. He similarly read widely on the history of the region, immersing himself in the realities and traditions of times past. Searching for insights, he was equally a hands-on and proactive learner. As his wife recalled: 'First he studied the battles; then, when possible, played them out on the ground in a way no-one who ever participated in the game can forget' (p.153). Furthermore, he was thoroughly modern in approach, understanding the importance of new technologies and had a lifelong love of speed and innovation. It perhaps comes as no surprise that he earned a pilot's licence during the interwar period; Patton was convinced that aircraft would provide a more accurate and timely overview of the battlefield.

Over seven chapters (based on 'The Form and Use of the Saber', 1913; 'Why Men Fight', 1927; 'The Effect of Weapons on War', 1930; 'Success in War', 1931; 'The Probable Characteristics of the Next War and the Organisation, Tactics, and Equipment Necessary to Meet Them', 1932; 'Mechanised Forces: A Lecture', 1933; and 'Desert Training Corps', 1942) and a conclusion, centred on 'A Soldier's Reading', written in 1952 by Patton's wife, Beatrice, Daniel exposes the intellectual side of Patton's character. He also exposes a rich body of work that lays bare

his vision of warfare – providing some of his best writings on the military and strategic art. What quickly becomes clear is that Patton had a rare ability to identify key strategic trends and then engage the subject with critical analysis. Although much of his writings are focused on solving the tactical and strategic problems of the first half of the twentieth century, he covers such relevant topics as: the qualities of leadership; the importance of history, culture, politics and technical knowledge; the need for continuous education and self-betterment; and the importance of critical thought and challenge when dealing with complex challenges. Daniel provides a brief outline to each chapter, seeking to set the scene by placing the following in the proper context. The remainder of the chapter comprises the unedited words of Patton.

21st Century Patton, a volume in the Naval Institute series 21st Century Foundations, skilfully uncovers Patton's intellect, philosophy and lifelong dedication to mastering the military profession. It reveals how he researched, organised and prepared his thoughts. And this informs the reader about how the lessons of history, through careful analysis and reflection, can shine a supportive light on future conflict. It also helps explain why Patton appeared to be able to anticipate the enemy's next move, arguably one of his greatest trademarks. The reality was that Patton used historical investigation and detailed analysis to allow him to think multiple steps ahead of his adversary rather than just simply responding to an unanticipated tactical move; it had nothing to do with his beliefs in mysticism or reincarnation. All told, *21st Century Patton* is a rich, compelling and enjoyable read. It is genuinely worthy of a place in anyone's professional military library and sheds light on one of the most rumbustious – and perhaps misunderstood – U.S. military commanders.



Bolts From The Blue: From Cold War Warrior to Chief of the Air Staff



By Sir Richard Johns GCB KCVO CBE FRAeS Publisher: Grub Street Publishing (1st October 2018) (ISBN-13: 978-1911621092), 320 Pages

Reviewed by Group Captain James Beldon

Biography: Group Captain James Beldon currently serves as the RAF's Director of Defence Studies. A graduate of the UK Advanced Command and Staff Course, and holding an MPhil in International Relations from the University of Cambridge, he oversees the RAF's engagement with academia and co-ordinates the Chief of the Air Staff's Fellowship Scheme. An Intelligence, Surveillance and Reconnaissance expert, he previously commanded 8 Squadron (AWACS) and has flown on operations in the Balkans, Afghanistan and Iraq, amassing more than 3,000 flying hours in the process.

Introduction

n its centenary year, the Royal Air Force was treated to a tsunami of publishing attention, but of the many titles surfing the wave of public interest in the Service, only a few, including Professor Richard Overy's *Birth of the RAF 1918* and Patrick Bishop's *Air Force Blue*, seem in their own right to have broken genuinely new ground and look set, therefore, to stand the test of time on merit rather than coffee table appeal alone. Another, and perhaps the most important of all, is Air Chief Marshal Sir Richard Johns' masterly example of an autobiography, *Bolts From The Blue*. Launched after the bunting and logos of RAF100 had been consigned fondly to the souvenir drawer, Sir Richard Johns' book served as a literary bolt from the blue itself: it is, in this reviewer's opinion, the most significant contribution to the Royal Air Force's historiography made by one of its senior commanders for many years.

By any definition, *Bolts From The Blue* is an enjoyable read: Sir Richard's personality and sense of humour shine throughout, and engagingly propel the reader along. There are some colourful,

and occasionally surreal, vignettes, which inform and amuse in equal measure – his 500-knots duel with a Yemeni tribesman and a bizarre mess ball committee meeting in the middle of nowhere are examples of the latter! But contained within the prose too is evidence of a man whose determination and 'stickability' were even more profound. Whilst the title of Sir Richard's book is derived from his interpretation that he was fortunate to be delivered a great number of opportunities by chance, the reader cannot but reach a different conclusion than that this was a man who took a unique road to the top of the Service he regarded as the best in the world, and which the Service ultimately regarded him as the best it had. Both were right, and Sir Richard's account bears testimony not only to the 43-year epoch in which he served, but to the ethos of potential, merit and recognition that has been the sacred bond exemplifying the Royal Air Force and its people for more than a century.

There was no assured destiny for the young Richard Johns to reach air rank when he joined the Royal Air Force as a Cranwell flight cadet in 1957; but the door was open, as it was, indeed, for his fellow intake member, Michael Graydon, who as Air Chief Marshal Sir Michael Graydon would later precede him as Chief of the Air Staff in the 1990s. But reflecting six decades after his experience of Cranwell in the 1950s, Sir Richard offers a not-uncritical, but nevertheless balanced, assessment of the College in those days; somewhat tellingly he states bluntly that he 'did not enjoy his first year at Cranwell', and his critique of some of the staff there is deservedly sharp. Furthermore, the wastage rate during training was simply ridiculous and economically scandalous – imagine today an initial training system with a 50% suspension rate! Nevertheless, and one surmises that this is true for all who have gone through tough initial military training of one sort or another, it cultivated 'that certain bloody-mindedness which is the bedrock of determination to succeed. It is this comment, perhaps more than any other in the book, that calibrates the reader's assessment of Dick Johns' rise to the top: because, although the author's inherent modesty and entertaining prose are apt in seducing the reader into believing that each career step he took forward was a fortuitous 'bolt from the blue' or evidence of his 'talent for good luck', there are reminders throughout the book which point to the steel core of a man with whom the buck stopped at each level of command he held. All will enjoy the sections dealing with Aden (his descriptions of flying at ultra-low level among the terraced mountains are simply a joy), and those officers approaching or serving in mid-level command appointments will find something useful to extract from every sentence concerning his command of 3(F) Squadron and as Harrier Force Commander and Station Commander of RAF Gütersloh in Germany.

Sections of the book concerning staff and ground-based command appointments are no less interesting, nor the exposure of the challenges he faced any less revealing. Throughout, he is absolutely frank, and his ability to take in the full historical sweep of events is extremely useful to the military scholar. For example, he provides a superb insight into Britain's response to Turkey's invasion of Northern Cyprus in 1974 and offers a succinct and interesting comparison of British strategic myopia in departing Aden in the manner it did in 1967 with the British withdrawal from Iraq in 2009.

Sir Richard's account contains a wide-ranging cast, from the Prince of Wales – whom Flight Lieutenant Johns served as qualified flying instructor – to Prime Minister Margaret Thatcher, Sir Michael Palin, and every senior figure in Defence and the Royal Air Force in the 1990s. It is fair, I think, to say that Sir Richard was not enamoured with the political class (with the notable exceptions of Margaret Thatcher and the team of Ministers under George Robertson in the 1997 New Labour Government). He was certainly frustrated by the relative lack of authority he considered the Service Chiefs of Staff could wield, which may come as a surprise to more junior members of the Service today.

A genuinely 'joint' officer – after all, he is the proud son of a Royal Marines officer – Sir Richard Johns was the epitome of the professionally adept, ruthlessly efficient airman, who could 'mix it' credibly with his peers from each Service (including the Civil Service). He was the product of a Royal Air Force flying and staff education system that prepared him well for every level of command, and to which he made considerable personal investment himself – not least through the creation in 1998 of *Air Power Review*. Notwithstanding, throughout *Bolts From the Blue*, one never loses touch with the young Richard Johns, whose love for flying was just as evident on his final sortie in a Hercules with son Douglas at the end of his career as it was the beginning. One absolutely gets the sense that the thrill of flying such a wide variety of types (with the possible exception of a Romanian MiG-21!) more than adequately compensated for the occasional tribulation.

Through his autobiography, Sir Richard has made another – perhaps his most valuable – gift to the conceptual capital of the Royal Air Force so far. Entertaining and persuasive, such carefully distilled advice has found superb form in the shape of *Bolts From The Blue*.



Spitfire Over Everest



By Kenneth D Neame Publisher: Hayloft Publishing (12th November 2018) (ISBN: 978-1-910237-39-7), 262 Pages

Reviewed by Honorary Group Captain Paul Beaver

Biography: Paul Beaver is an Honorary Group Captain in No 601 Squadron, author of *Spitfire People* and Vice-President of the Spitfire Society. He has written over 65 books. Until 2013, he was the senior flying reservist in the British armed forces as Colonel (Reserves) in the Joint Helicopter Command.

Introduction

This account of Spitfire operations in India in the immediate post-war period has a delightful period feel to the narrative and it is clear from the start that this account was originally penned for a private audience. In fact, the book was previously published as a private memoire for the benefit of the author's family in 1992.

Added to the fact that the Everest sortie is a very small part of the story which starts with selection, flying training and an initial squadron posting to Occupied Germany, the book is perhaps misnamed. The tales of flying Tiger Moth and Harvard, as well as a glimpse of contemporary life in the Royal Air Force College, Cranwell are delightful. There is no doubt that the author was a well-motivated, skilled and adaptable pilot; ideally suited to the mainly solo operations demanded by Spitfire photo-reconnaissance operations even after the end of hostilities.

Neame was clearly rated by his superiors and returned their trust with some of the first pictures of Mount Everest. These pictures were used in the great expedition of 1953 which finally conquered the world's greatest peak albeit that they were unofficial and acquired by illegally overflying Tibet (prior to its annexation by China). His story gets out in 1951 when the *Daily*

Express headlines: "Lone Pilot keeps Secret Five Years" using some of his own pictures from a hand-held Leica camera. There is no doubt that Neame was proud of his achievement, given that he was a National Service pilot who played a part in the final mountaineering challenge, this is not surprising.

What particularly appeals to both the Spitfire enthusiast and the historian of the period, as well as those who just love a flying yarn, is that it is written from the heart. There is an attention to detail which informs and only occasionally distracts from the narrative. That detail includes schematics of various sorties which are firmly in the author's lifetime memory. Some of these, like work for the snow catchment study which requires detailed flying in Sikkim, north of Darjeeling in marginal weather. Together with some clear photographs, the sketches are useful indicators of the huge scale of flying in northern India at the time. For the historian of India immediately before Partition, it has much historical merit. The last days of the Raj still included servants, bearers and the various *wallahs* with their restricted practices and job identity. One charming piece is about the lack of space in the Spitfire. This meant travelling from an air station without bedding caused confusion when arriving at an Officers' Mess in need of towels and other essentials; civilians turning up at Officers' Messes today are not alone in their embarrassment.

This is a book of its era and is typical of the genre of family memoir. A personal account of a rarely described period, told with care and affection, at a time when most couldn't wait to leave the Service. For Kenneth Neame, it was a time of pure excitement and he thrived.

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