

ROYAL AIR FORCE

HISTORICAL SOCIETY



JOURNAL

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First published in the UK in 2013 by the Royal Air Force Historical Society

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ISSN 1361 4231

Printed by Windrush Group
Windrush House
Avenue Two
Station Lane
Witney
OX28 4XW

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SELECTED ABBREVIATIONS

ABM	Anti-ballistic missile
ADCC	Air Defence Cadet Corps
ADMA	Assistant Director of Military Aeronautics
AGS	Air Gunners School
AMP	Air Member for Personnel
AOS	Air Observers School
ATC	Air Training Corps
B&GS	Bombing and Gunnery School
BEF	British Expeditionary Force
BMEWS	Ballistic Missile Early Warning System
CCAC	Churchill College Archive Centre
DDMA	Deputy Director of Military Aeronautics
DGMA	Director General of Military Aeronautics
DZ	Drop Zone
IED	Improvised explosive device
ISAF	International Security Assistance Force
ISTAR	Intelligence, Surveillance, Target Acquisition, and Reconnaissance.
IUKADGE	Improved UK Air Defence Ground Environment
JOC	Joint Operations Centre
LZ	Landing Zone
MOTU	Maritime Operational Training Unit
RAFME	Royal Air Force Middle East
SOF	Show of force
VGO	Vickers Gas Operated (machine gun)
WSO/WSOp	Weapons Systems Officer/Operator

**Our Guest Speaker at the RAF Club, following the Society's
Annual General Meeting on 20 June 2012
was the Professor of History at Exeter University**

Professor Richard Overy

whose topic was:

**BOMBER COMMAND AND THE LESSONS OF THE BLITZ
1940-1941**

Almost all accounts of the RAF bomber offensive in the Second World War have taken as read the common assumption that the changeover to area bombing in February 1942 was a direct result of the report produced by the young statistician, David Bensusan Butt, on orders from Churchill's scientific adviser, Frederick Lindemann, who ran the Cabinet Statistical Section. The Butt Report was produced in August 1941 to try to demonstrate whether RAF bombing was accurate or not. The investigation resulted in what is usually seen as an authoritative scientific assessment. Butt showed that only one in five of the bombers sent out got within five miles of the target; in the Ruhr-Rhineland area the proportion was one in ten. Churchill took it seriously. The change in Bomber Command operational orders followed a few months later.

There is a great deal wrong with this historical image. The influence of the Butt Report has been prone to much exaggeration, while the report itself had a great many methodological flaws. It was based on a selection of 650 photographs taken from 100 raids between 2 June and 25 July 1941. This exercise would not have been possible even a few months earlier. Effective cameras were only introduced into bomber aircraft in the summer of 1941. There had been 13 of them available in December 1940, 75 by March 1941. The cameras were complicated to work and the release of the flash flare and the camera shutter action had to be performed manually by anxious members of the aircraft crew during the most dangerous part of their mission.¹ The photographs that Butt examined were taken by crews still trying to familiarize themselves with the procedures, with the result that a proportion would not have shown the actual bomb burst. Moreover the investigation covered only ten per cent of Bomber Command sorties, too few to be sure of statistical certainty. The Chief



Interpreting a strike photograph was often problematical.

of the Air Staff, Air Chf Mshl Charles Portal, told Churchill that the tracking of German raids on Britain had shown that the German Air Force only managed to get 24 per cent of bombs in the target area.²

Nor was the Butt Report the only investigation carried out on Bomber Command accuracy. The Air Ministry had already carried out investigations in April and in June 1941, showing how wide the margin of error was. In October 1941 the newly-created Operational Research Unit for Bomber Command completed a survey of the three months since July 1941 and found that the record was even worse than Butt had suggested, with only 15 per cent of bombs within five miles of the target point.³ Lindemann's own motives for carrying out the photographic survey are hard to gauge. He certainly used the knowledge of bombing inaccuracy to dramatise the case that he made

in a statistical memorandum in the spring of 1942 for a strategy of 'de-housing' as the best that Bomber Command could do. Churchill was impressed by the material Lindemann presented, as he was by the Butt Report, and it is partly because of the high profile both assessments achieved that historians have assumed that this was the turning point of Britain's bombing war.

The purpose of this paper is to argue that the change in strategic thinking, which saw bombing directed at large urban residential areas to destroy the morale and productivity of the German working-class, long predated the Lindemann-Butt intervention. It was based much more on lessons observed and learned from the experience of the German bombing of British cities between September 1940 and June 1941. The German offensive proved exceptionally useful to the RAF since detailed knowledge and assessment of the effects of British bombing on Germany since May 1940 were based on what Marshal of the RAF, John Slessor, later described as 'travellers' tales'.⁴ The lack of solid intelligence was compensated by a close scientific study of the direct and indirect effects of the German bombing. The first report was produced only two weeks after the first major attack on London on 7 September under the title 'Lessons to be Learned from German Mistakes'.⁵ As the Blitz intensified, the mistakes became less obvious and the devastating effect of German attacks evident for all to see. Air Ministry officials were impressed by the degree of concentration achieved in German attacks, both by day and by night, and they set out to assess more scientifically what it was that the German side got right. At a meeting on 19 September 1940 it was agreed that experts would be recruited to report on German methods 'with a view to both learning from them and defeating them'.⁶

There were a number of agencies whose task it became to assess the German bombing. At the instigation of the then Deputy Chief-of-Staff, Arthur Harris, a Directorate of Bombing Operations was established in the Air Ministry in November 1940 to oversee RAF bombing but also to gather and assess evidence from German bombing. The first Director was Air Cdre John Baker, who played an important part in pushing the RAF towards a strategy of heavy incendiary attacks on urban areas. The detailed research on the effects of bombing was carried out by the Research & Experiments Department of the Ministry of Home Security. It was run by the

director of the Building Research Station, Sir Reginald Stradling. In 1941 a division was established (RE8) under the physicist J D Bernal, whose specific brief was to undertake scientific studies of the effect of bombing on structures; the division expanded continuously to provide a stream of scientific studies for the RAF, focused on the effects of air attack on cities.⁷ Two other scientists also played an important part. Lindemann's Cabinet Statistical Section has already been discussed, and it was here that assessments of the pattern of urban damage were carried out; the other was Professor Solly Zuckerman, an Oxford anatomist noted for his work on ape behaviour, recruited to study the effects of bomb blast on bodies and buildings and to run a 'Casualty Survey' for the Ministry of Home Security. The RAF's own Air Warfare Analysis Section also carried out important assessments of bombing patterns and damage probabilities.

This impressive cluster of organisations together identified and explored a number of key issues. The starting point was to find some kind of pattern in what the German Air Force was doing after the early weeks in which it was regarded as indiscriminate terror bombing. The pattern was not difficult to discover. Air Ministry planners soon saw that the German intention was to attack ports, food and oil storage and key utility targets as part of the wider strategy of air-sea blockade of Britain. More than 80 per cent of raids were conducted against port cities, including the large port and warehousing areas of London. The rest were directed at major centres of arms production, notably Coventry, Birmingham and Sheffield. German bombing was not particularly accurate, but it was concentrated well on a particular port or urban area. The purpose, it was suggested, in a paper written in January 1941, was 'the "blitzkrieg" of fairly extensive regions' in the chosen cities.⁸ The most important lesson of all was the realization that the effect of incendiary bombing had been greatly underestimated before the war. British bombers carried 15 to 30 per cent incendiaries, diluted throughout the small force usually sent on each operation. German bombers attacked in much larger numbers and carried between 30 and 60 per cent incendiaries, mainly concentrated in the first wave to maximize, literally, the fire power of the force. After only a few weeks of German raiding, the Research & Experiments department forwarded the conclusion to the Air Ministry that 'fire will always be the optimum agent for the complete destruction of

buildings, factories, etc.’ High explosive bombs were important, so it was suggested, to create ‘draught conditions’ to increase the chance of a conflagration. Further high explosive was designed to intimidate the firefighters and overwhelm the civil defenders.⁹

Over the course of the Blitz a good deal of research was done on the effects of fire. The bombing of the City of London on 29 December 1940 was used as a model to calculate what density of incendiaries might be necessary, and what number of fires would swamp the emergency services. The 28 conflagrations, 51 serious fires and 101 medium fires caused that night were deemed to be sufficient, and Air Intelligence calculated that perhaps 30,000 4-pound incendiaries would be the necessary minimum.¹⁰ In the event this proved to be far too modest and later raids on major German targets could carry as many as 200,000 incendiaries on a major raid. The Fire Chiefs in major cities were later consulted on their estimate of the damage from fire and they were unanimous in attributing between 80 and 98 per cent of the destruction to the effects of fire.¹¹ A report sent by the Wolseley Motor Company in Birmingham to the Air Ministry in May 1941 confirmed that ‘the Incendiary, if dropped in large enough quantities, results in the position getting out of hand.’¹² The detailed studies carried out by Lindemann showed that the most effective destruction was inflicted on the most densely populated areas of the cities attacked, usually the tightly-packed residential streets around the ports, docks or major factories. The study of Birmingham showed that in the central areas of the city a ton of bombs would displace 293 people and destroy 55 homes, but in the outer zone the figures were only 72 and 21, a statistic that made it clear that bombing should focus on the most heavily populated areas.¹³

The Air Ministry, prompted by these reports, began to work out ways of ‘zoning’ German cities by population density. Zones 1 and 2(a) were the most densely-populated residential areas, down to Zone 4 for the industrial quarters on the outskirts of the city. The object was to put down as many bombs as possible in Zones 1 and 2 to start conflagrations that the German emergency services could not cope with.¹⁴ The next step was to understand more clearly how to burn down the city areas successfully. A study published in June 1941 drew unfavourable comparisons between British and German incendiary practice: ‘The success of enemy tactics is without question’. To

replicate German achievements would mean increasing concentration of effort as well as the relative accuracy necessary to make concentration possible. This would require the equivalent of the German pathfinder *Kampfgruppe 100*, trained to arrive over the target and to start fires for the rest of the force to bomb.¹⁵ In August 1941 the Research and Experiments Department completed a wide-ranging survey on 'Fire Caused by Air Raids' which examined the results of German raiding in order to discover the best way of creating a major conflagration. Wind was a major factor, but so too the accurate concentration of the incendiary load on a given urban area. A month later a new Fire Research Division was appointed under Lord Falmouth to study the vulnerability 'in the older and more congested part of towns'.¹⁶ It did not need Butt to persuade the RAF that more needed to be done to ensure that these areas could be powerfully hit. Research was already underway during the Blitz on new navigation aids (the outcome was the 'Gee' apparatus, first used in spring 1942) which were designed to enable Bomber Command to emulate the operational and tactical achievements of the enemy in burning down urban areas.

The changing view of a bombing operation, not as something aimed at a precise military or economic target, but at a cluster of targets in a designated urban area to be destroyed by fire, also required a change in the way targets were defined and their vulnerability justified. Instead of attacking a specific target, it was suggested that attacks on general urban areas would hit a large number of objectives, as German bombing did. From the perspective of economic warfare it was argued that destroying workers' housing, killing workers and undermining urban services would be far more likely to demoralize the workforce and prevent it from working productively than an attack on just one factory. As the Air Ministry director of information put it later in the war: 'It must be realized that these cities are not merely "a city that happens to contain a factory"...These cities are weapon producing areas.' The worker, he continued, 'is a production soldier manning the weapons in the production fighting machine.'¹⁷ In April 1941 a review of bombing policy recommended 'carefully planned, concentrated and continuous "BLITZ" attacks delivered on the centre of the working class area of the German cities and towns.'¹⁸ The Ministry of Economic Warfare, which had also been monitoring the

ineffective impact of Bomber Command's 'precision' raids, urged in May 1941 that the RAF should abandon individual objectives in favour of 'whole cities'. Damage to working class housing, shopping centres and amenities was, it was argued, much more likely to produce a widespread and cumulative dislocation than hitting just one plant.¹⁹

By the late stages of the Blitz, the RAF was in a position to plan a bombing strategy based on the practical assessment of German bombing practice. Large numbers of the standard incendiary bomb were to be ordered, an increase from 5 million in 1941 to 33 million for 1942 and 62 million for 1943. From dropping only 110,000 incendiaries in February 1941, Bomber Command dropped over 300,000 in July.²⁰ This explains the background to the Directive issued to Bomber Command on 9 July 1941. It was this directive rather than the directive issued on 14 February, shortly before Harris took over from Sir Richard Peirse, that laid the foundation for area bombing, and it predated the Butt Report. One of the main driving forces for the change in strategy was the Bombing Operations Directorate under John Baker. In May 1941 the directorate expressed its preference for 'continuous blitz attacks on the densely populated workers and industrial areas' instead of the oil plan still being fruitlessly pursued. When Air Intelligence suggested attacks 'on the livelihood, the homes, the cooking, heating, lighting and family life' of the German working class ('the civil garrison of Germany's economic citadel'), Baker replied that this was central to his plans for bombing policy.²¹ The Ministry of Economic Warfare suggested raids against communications in the urban areas of the Ruhr-Rhineland on nights when there was good visibility, but on the remaining three-quarters bombing could be directed against the industrial workforce. Like the German Air Force, it was suggested that targets close to water (Hamburg on the North Sea coast, or cities along the northern Rhine) would be easier to find and identify.²² In June a new directive was drafted and discussed and after the words 'the morals of the German people' had been altered to read 'morale', it came into force in July. One quarter of Bomber Command's efforts were to be concentrated on communications targets in cities, the rest of each month was to be devoted to 'heavy, concentrated and continuous attacks of working class and industrial areas'. This proved to be an enduring commitment and it was based not on the inaccuracy

demonstrated by Butt and Lindemann, but on the ability to learn from a dangerous enemy.²³

One obvious lesson from the Blitz was not learned. The nine months of bombing did not seriously damage the British economy (reducing its potential by an estimated 5 per cent); nor did the bombing produce social crisis or profound demoralization of the communities that experienced it. Indeed all the rhetoric of active and passive anti-air defence rested on the possibility of effective responses both to the bombing operations and to its effects. The first reports on 'Lessons of recent Heavy Raids' indicated that civil defence had stood up well to a severe challenge.²⁴ The Ministry of Home Security and the Air Ministry both arrived at evaluations in the summer of 1941 that suggested that morale would not be broken by bombing; surveys carried out of heavily bombed areas in Lancashire and Scotland showed that workers came back to work only days after the disaster. Social and economic policy was directed towards strategies of dispersal and protection designed to minimize the impact on production. These conclusions sat uncomfortably with the decision in the RAF, approved by the War Cabinet, to begin a sustained assault on the morale of the German workforce.

The paradox was evident to the senior commanders and officials in the Air Ministry and the RAF. The only way to get round it was to suggest that German society, ruled by a harsh dictatorship, was bound to be more brittle than Britain when exposed fully to the aerial threat. A delegation from the Air Ministry and the Ministry of Economic Warfare went out to Lisbon in July 1941 to discuss with American diplomatic personnel from Germany their view of the German workers. All but one of the Americans there agreed that bombing the workers was the best strategy on the grounds, as the Air Ministry report put it, that the average German labourer displayed the 'lack of moral fibre inherent in the German temperament'.²⁵ Casual assumptions about the German as a bully who would crumble when given a taste of his own medicine seem to have been genuinely believed and widely voiced. A study of bombing policy by Baker's Directorate in May 1941 concluded that nothing would be gained by comparing British steadfastness under bombing with the Germans, 'who will not stand up to bombing as well as our own'. When Marshal of the RAF, Lord Trenchard was invited to speak at a meeting of the

Air Staff in June 1941 his contribution was to assert that Germans were 'far more susceptible to bombing' than were the British.²⁶ The offensive against the German workforce had little or no serious intelligence evaluation behind it, and a great deal of crude stereotyping.

The decision to shift to a strategy of incendiary bombing of working-class areas to maximize the degree of productive and social dislocation was rooted in the analysis of the German bombing of Britain in 1940-41. It reflected the realization that no bombing could be entirely accurate, even German bombing with the help of electronic beams. What Bomber Command had to focus on was finding a way to locate, identify and hit a major city. Even that was beyond its capability in 1941, but the lessons learned from German practice and technology ensured that when the bombing began seriously later in 1942, the strategic commitment had already been made. As one Air Ministry report put it, the RAF would be unwise 'if we fail to pick the brains of an enemy who has had so much experience in developing the required technique.'

Notes:

¹ RAF Museum, Hendon, Bottomley papers, AC 71/2/115, 'Operational Photography in Bomber Command, September 1939 – May 1945', June 1945, pp14-29.

² Christ Church, Oxford, Portal papers, Folder 2/File 1, Portal to Churchill 'Notes on Lord Cherwell's paper', 11 Sept 1941.

³ The National Archive (TNA), AIR 41/41, RAF Bomber Command Narrative Vol III, p42; Randall Wakelam, *The Science of Bombing: Operational Research in RAF Bomber Command* (Toronto: Toronto UP, 2009), pp42-6.

⁴ University of East Anglia, Zuckerman Archive, SZ/BBSU/29, 'Comments by Sir John Slessor', 14 Jan 1947.

⁵ TNA, AIR 2/7211, 'Note on the lessons to be learned from German mistakes', 19 Sept 1940.

⁶ TNA, AIR 20/2264, minutes of meeting at Air Ministry, 19 Sept 1940, p2.

⁷ TNA, HO 191/203, A R Astbury, 'History of the Research and Experiments Department, Ministry of Home Security, 1939-1945', pp23, 46-51, 141.

⁸ TNA, AIR 9/132, minute by the Plan Dept, Air Ministry, 6 Jan 1941. See too AIR 20/2264, AWAS report 'The Bomb Censuses of Liverpool, Birmingham and London', 29 Oct 1940.

⁹ TNA, AIR 9/132, RE8 report 'Consideration of the Types of Bombs for Specific Objectives based on experience of German Bombing of this Country', 26 Sept 1940, pp2-3.

¹⁰ Churchill College Archive Centre (CCAC), Bufton papers, 3/26, Deputy Director

Bombing Ops to Director, 6 June 1941; TNA, AIR 40/1351, AI 3c (Liaison) 'Air Attacks by Fire', 17 Oct 1941.

¹¹ TNA, AIR 20/4768, note from Bufton to Baker, 6 Apr 1942, enclosing chart from Fire Chiefs.

¹² CCAC, Bufton papers, 3/48, Wolseley Motor Company to Directorate of Bombing Ops., 14 May 1941.

¹³ Nuffield College, Oxford, Cherwell papers, G192, 'City of Birmingham: effects of air raids on dwelling house property for the whole period of raiding', 12 Feb 1942, p3. The research was conducted much earlier than this, in 1941.

¹⁴ CCAC, Bufton papers, 3/50, Dickinson to Morley (BOps), 15 Dec 1941 with zone maps for Cologne, Hannover, Mannheim and Duisburg.

¹⁵ CCAC, Bufton papers, 3/26, Report from Ellwood to DBOps, 6 June 1941, pp1-2.

¹⁶ TNA, HO 196/10, R&E Dept, 'Fire Caused by Air Raids: Part I, Tactics, Targets, Weapons and Effects', 6 Aug 1941; HO 191/203, Astbury, 'History of the Research and Development Department', p141.

¹⁷ TNA. AIR 19/215, minute by Richard Peck for the Secretary of State, 15 July 1943.

¹⁸ CCAC, Bufton papers, 3/48, handwritten notes, 'The Role of the Long-Range Bomber Force', 5 Apr 1941.

¹⁹ TNA, AIR 40/1814, memorandum by O. Lawrence (MEW), 9 May 1941. See too Richard Overy, '“The Weak Link?” The Perception of the German Working Class by RAF Bomber Command, 1940-1945', *Labour History Review*, 77 (2012), pp22-7.

²⁰ CCAC, Bufton papers, 3/26, report for BOPs 1 (Morley), 16 Oct 1941; AIR 20/5813, Estimated Expenditure of Incendiary Bombs', 9 July 1941.

²¹ TNA, AIR 20/25, Baker to Deputy Chief of Staff, 13 May 1941; AI to Baker, 23 May 1941; Baker to Vice Chief of Staff, 24 May 1941.

²² University of East Anglia, Zuckerman papers, SZ/BBSU/56 'Bombing Policy' [nd, but June 1941].

²³ *Ibid*, Draft Directive 9 July 1941. See too Charles Webster and Noble Frankland, *The Strategic Air Offensive against Germany*, 4 vols. (London: HMSO, 1961), iv p135-7.

²⁴ TNA, HO 186/608, Sir John Hodsoll, 'Lessons of Recent Heavy Raiding', 4 Dec 1940; HO 186/927, Ministry of Home Security file 'Blitz Lessons Learned', August 1941.

²⁵ CCAC, Bufton papers, 3/11, Report on the interrogation of American Legation and Consular Officials in Lisbon, 24-31 July 1941', 6 Aug 1941, p5.

²⁶ TNA, AIR 20/25, DDBOps (Ellwood) paper on 'Bombing Policy', 24 Apr 1941, p2; minutes of meeting held with the Chief of the Air Staff, 2 June 1941.

DISCUSSION

Stephen Mason. Do you think that the Germans learned anything from their previous bombing campaigns in Poland and Holland? These had given them the opportunity to see what damage they had done, and may have been able to apply what they had learned to their bombing during the Battle of Britain. By contrast, of course, the RAF could only assess the effects of its bombs ‘second hand’.

Prof Richard Overy. When it came to attacking Britain, I don’t think that the Germans had actually learned very much from its earlier bombing, as it had been largely conducted in support of a military campaign – a land battle. There was some bombing of cities, but it was still essentially tactical. That happened to all air forces at some stage, of course. If the enemy was occupying a town, you were often obliged to bomb it.

I don’t think that the *Luftwaffe* had given a great deal of pre-war thought to the bombing of British cities. That said, they did accumulate a lot of very good photo-reconnaissance material before the war and they had used this to create an extensive library of target folders. They had also given some thought to analysing the distribution of British industry, but when they were confronted with the need to mount a direct air assault against the UK in 1940 they had no clear bombing policy. Many questions were unanswered. What would be the most effective means of attack? What should we attack? What are the best weapons to use? – against what?

Interestingly, there is a notable lull in activity after the famous bombing of The City at the end of December 1940. The British are trying to figure out what the Germans are going to do next, as are the Germans who are trying to digest what they have learned. There is a two or three week period while the German Air Staff and the *Luftwaffe* Commanders get together to think it through – ‘What have we got wrong? What have we got right?’ – and the subsequent campaign from late-January/February onwards is actually more effective. It was a constant learning process – for both sides.

Air Cdre Nick Randle. How ‘thoughtful’ do you think the inter-war air force was? It was all very well saying ‘the bomber will always get through’, but was anyone asking the next question – ‘will it hit the

target?’ There were two sets of people involved, of course, the Air Staff at the Ministry and the operational commanders in the field, and they were not necessarily the same chaps. Did they think differently? Was there a sufficiently systematic approach?

RO. That is quite a complex question. First, I don’t think that the men at the Ministry and the men in the field really were all that different. After all they were constantly being moved around and exchanging places. So they were actually the same people, and they certainly shared some common perceptions. I think that there can be little doubt that the air force of the 1930s saw itself as the most modern military force and that the army and navy were both outmoded and thus of only secondary significance. One consequence of this was that the RAF devoted very little effort to developing army co-operation. But, for all the modernity reflected in its aeroplanes, the thinking in the inter-war air force seemed, in some respects, to be stuck in 1918. It doesn’t really ‘project forward’. There is a certain lack of sophistication – a lack of the technical and scientific expertise that the Service needed to permit it to exploit the potential of its increasingly capable aeroplanes. That is not entirely true, of course – the priority was air defence and significant advances were made in that field in the late-1930s. But that contrasted markedly with the effort being devoted to the offensive and it would be the middle of the war before there was a satisfactory marriage between the scientists and Bomber Command.

There was another important factor that conditioned air force thinking during the inter-war years, of course. The RAF spent much of that period on colonial policing. That meant, in short, that if a tribe misbehaved, you dropped a bomb on its village and it gave up. The majority of officers experienced that at first-hand at some stage, notably Harris and Portal, and there is a very revealing letter from Portal to Churchill, from about 1942, in which he explains the nature of bombing policy. He compares Germany to a tribal village and he argues that, like any tribal village, it will contain something essential, some utility or facility that it cannot do without. The problem was to identify Germany’s Achilles’ heel. There is some truth in that but, at the same time, it does reveal a mindset conditioned by the 1920s and 1930s. I think that the air force was still looking backwards rather than forwards. But the situation is never static, of course, and pressure for

change eventually began to be exerted from the bottom up, for instance, by Group Commanders.

George Galazka. I believe that some work was done during the war to assess how rapidly production recovered after bombing raids. I understand that it concluded that German industry was remarkably resilient – which reflected our own experience. We knew, for instance, that many factories were not functioning immediately after the attack on Coventry but within three or four days they had started to recover and production soon began to get under way again. One lesson to be drawn from this was that the *Luftwaffe* should have followed through and hit the same targets repeatedly to keep them suppressed. Did that have any bearing on Bomber Command's conduct in 1941 and later?

RO. Yes, it did – but not until 1942 when serious scientific analysis began to be applied to the effects on British cities, for use when planning raids over Germany. This explains the decision to use the heavy bombers and Pathfinders to inflict widespread fire damage in order to kill, injure or 'dehouse' the workers. The object was to impose production difficulties on many factories at once through absenteeism, loss of skilled workers, and so on, rather than trying to hit just one factory and missing it. This was an important lesson from German practice, which the British realised was to concentrate a raid on an urban area with many targets, rather than just on one. As we know, this did not work effectively. Cologne, for instance, was attacked about 250 times but, until the last few months of the war, even that failed to stop production completely.

Mike Meech. There were some curious, unanticipated, side effects of bombing. I come from the port city of Southampton, which was pretty much put out of action in 1940-41, although it had recovered in time for D-Day in 1944, of course. At the time, however, many people, who had been in reserved occupations were out of work and thus permitted to join the forces. So, in one way, the bombing had acted as a recruiting campaign!

RO. Interesting. In fact most ports – London, Liverpool and others – were able to function again remarkably quickly. The usual approach was to anchor further out and offload the cargo onto smaller vessels to be ferried ashore. The fact is that bombing is not 'absolute'. In the

1930s there had been a widespread perception that, if you dropped a bomb on something, it would be completely flattened, that there would be nothing left and all activity would cease. The damage is rarely total however, and, just as with a natural disaster, once people have recovered from the shock, society adapts and people begin to rebuild. So it was with the aftermath of bombing.

Frank Haslam. I recently read Hastings' book on Churchill's wartime years¹ in which he makes the point raised by George Galazka – that Bomber Command might have been more usefully employed revisiting targets, because the initial damage was being quickly repaired. He also thinks that the RAF took its eye off the ball in allowing Berlin to become to Bomber Command what London had been to Hitler. Wrecking Berlin from end to end was extremely costly and, sadly, proved ineffective. Had they kept going at the other cities and been more 'tactical', the sacrifice that was made might, perhaps, have yielded more of a dividend.

RO. This was a problem for both the Germans and the British and the solution required an understanding of the opposition's economy – and how it worked. Neither side really got it right. There was an assumption that a certain degree of damage was bound to have a profound effect on output. This was not actually the case. If the RAF had concentrated on the cities it hit in 1942 it would have had little impact on production because many key industries began to be dispersed into remote sites in the countryside or to German-occupied Poland, where it was more or less out of Bomber Command's reach. As I suggested earlier, one of the consequences of inflicting damage on a society is that it responds by adapting – and that is exactly what Germany did.

In marked contrast to the British and Germans, the Americans adopted a far more scientific approach and sought the advice of economists and businessmen. In essence they asked them to consider the nature of an economy and then to identify two or three components that would, if crippled, have an immediate impact on its military capability. One result was the development of the concepts of

¹ Hastings, Max; *Finest Years: Churchill as Warlord 1940-45* (Harper Press, London, 2009).

‘cushion’ and ‘depth’. A ‘cushion’ is a country’s capacity to replace a loss of production of a specific item by reinstating it within a different industrial sector or other factories in the same sector. ‘Depth’ is a measure of how long it would take after an attack for the damage to have a direct effect on the military. The eventual outcome, as you will all know, was that, in the case of Germany, the answers were oil and transportation and from 1944 these became the primary targets.

With hindsight, it is clear that that had been the right answer. Since it was not possible to hit everything, what had been needed was an analytical approach – a detailed evaluation of the German economy to identify its components, how they worked and how they were integrated and, thus, where it was most vulnerable. Today, of course, smart weapons permit us to take out a specific power station or to destroy an administrative centre or a communications node. But there were no smart weapons in WW II, so they had needed to take a more measured approach, to focus operations to achieve the greatest effect. The British and the Germans never really thought about this before the war, the Americans did.

AVM Nigel Baldwin. When, as a wing commander in the 1970s, I was the only RAF officer on the staff of the USAF’s Air War College at Maxwell AFB, I had the privilege of interviewing Maj Gen Haywood Hansell. Back in 1941, as a young major, Hansell and three other staff officers of the Air War Plans Division had created AWPDP/1. It was a comprehensive global plan that envisaged the use of air power directed against specific vulnerabilities. Their approach had been inspired by two things. First, there had been a power failure during the 1930s, which had blacked out much of the east coast between Washington and Boston for two days. Secondly, in the course of their analysis, they had discovered that Chicago was not just a cattle market. It was also the hub of the transportation system and if you took Chicago out, you could disable the entire American economy. From there they drew up their plan which involved, amongst other things, a requirement for 1,000 four-engined bombers which could be directed at a critical target set – perhaps ball bearing production.

And so my question – is there any evidence to show that bright young pre-war wing commanders at the RAF Staff College were coming up with similar ideas?

RO Well, nothing as direct as that. There was little serious analysis of how an economy functioned and what were the weakest points. Everything pointed all the time to the Ruhr, which was simply assumed to be the target that would somehow unravel the whole industrial sector. British airmen did, however, share with the Americans the belief that the economic and social web was a legitimate target and was susceptible to bomb attack one way or another. The Americans stuck with this, but the RAF after some fruitless bombing of the Ruhr opted, as I said earlier, for a strategy of indiscriminate damage to industrial cities as the best way to exploit what bomber aircraft could currently do.

AVM Nigel Baldwin. Do you have anything to add, Seb?

Seb Cox. Well, we had the pre-war Western Air Plans, which amounted to an attempt to use Bomber Command to cover *all* the possible bases. But, although they were supposed to be comprehensive, none of them really were. Each plan focused on 'something', like oil, the Ruhr, coking plants and so on, but the identification of these as critical targets was rather more to do with intuition than the result of an in-depth analysis of the German economy, and that intuitive approach tended to persist until about 1943.

SUMMARY OF THE MINUTES OF THE TWENTY-SIXTH ANNUAL GENERAL MEETING HELD IN THE ROYAL AIR FORCE CLUB ON 20 JUNE 2012

Chairman's Report.

AVM Baldwin, Chairman, noted that Journal 52, published recently, recorded the minutes of the 2011 AGM, the winning 2010 Two Air Forces Award paper, and articles chosen by our Editor. The Journal also included an extended version of the lecture given by Air Chf Mshl Sir Brian Burridge on the uses of air power from his perspective as the UK Commander during the 2003 Iraq War.

The Society had held two seminars during the year; the first, in October 2011 at the RAF Museum, Hendon, addressed the RAF's early experience of the jet engine. A presentation by Dr Hermione Giffard on the development of the jet engine was followed by speakers covering the testing and early service of the jet engine. The April 2012 seminar, also at Hendon, marked the centenary of the Royal Flying Corps and described the Army Co-operation roles developed in WW I in the RFC, inter-war experiences, and the creation of jointly manned Army/RAF AOP squadrons and tactical reconnaissance in WW II. A summary of post-war developments leading to the creation of the Army Air Corps completed the day. The Autumn 2012 seminar would be on Wednesday 24 October at the RAF Museum, and would examine the experiences of RAF prisoners of war and those who had evaded capture.

The finances of the Society remained broadly stable and healthy, albeit 2011 had resulted in a loss of some £5,500, leaving the accumulated fund at around £26,000. The slow reduction in membership, allied to rapidly increasing costs had led the Committee to decide to raise the seminar attendance fee from £15 to £20, a figure which would still require some subsidy. Annual subscriptions would be maintained at £18. The Society would continue to support the study of the RAF's heritage and a grant of £500 had been made to the RAF Museum's Dornier 17 appeal. Two academic bursaries (of £1,000 each over 2 years) had been awarded.

All Society journals up to No 42 were now on-line and could be downloaded from the RAF Museum's website. Work is now in hand to improve the Society's website, perhaps by making it less reliant on

those of the MOD's Air Historical Branch and that of the RAF Museum. In essence, the website needed to make the Society more obvious and accessible on line, not least to attract new members. Concluding, the Chairman thanked the Committee for their continued hard work, and expressed his appreciation of the wise support and encouragement of the President, Sir Michael Beetham, and the Vice-President, Sir Frederick Sowrey. He also expressed thanks and appreciation of the excellent support of the staff of the RAF Club and of the RAF Museum.

Secretary's Report.

Gp Capt Dearman, Secretary, reported that since the last AGM, twenty-three new members had joined the Society, twelve had died, eight had resigned, and fourteen had lapsed, leaving total membership at about 700. Journal sales had amounted to £267.50. The Society continued to meet its aims of placing its proceedings in the public record, and supporting appropriate scholarship and projects associated with RAF history. Members were urged to do all that they could to encourage new members to join the Society.

Treasurer's Report.

Mr Boyes, Treasurer, tabled the 2011 accounts and noted that for financial year 2011, a loss of £5,473 had been incurred. However, the accumulated fund stood at a healthy £24,971. Proposed by Wg Cdr Ryan and seconded by Gp Capt Heron, a motion that the accounts be accepted and that J R G Auber Ltd be reappointed as Independent Examiner was carried.

Appointment of Executive Committee.

The Chairman noted that all the executive committee members had offered themselves for re-election. A proposal by Mr P Stewart seconded by Air Mshl Sir Reginald Harland, that all members be re-elected was carried. The Executive Committee members so elected were;

AVM N B Baldwin CB CBE	Chairman
Gp Capt J D Heron OBE	Vice-Chairman
Gp Capt K J Dearman FRAeS	Secretary
Dr J Dunham PhD CPsychol AMRAeS	Membership Secretary
Mr J Boyes TD CA	Treasurer

Wg Cdr C G Jefford MBE BA	Editor & Pubs Manager
Air Cdre G R Pitchfork MBE MA FRAeS	
Wg Cdr C J Cummings	

The *ex-officio* members of the committee were:

J S Cox BA MA	Head of AHB
AVM P Dye OBE BSc(Eng) CEng ACGI	DG RAF Museum
MRAeS	
Gp Capt P M Squires OBE MA BEng RAF	DDefS(RAF)
Wg Cdr S Hayler MA BSc(Eng) RAF	JSCSC

Discussion.

Questioned on a possible Journal Index, the Editor outlined the complexities involved, not least the fact that the titles of papers within Journals did not necessarily provide a clear indication of their content. Wg Cdr Ryan noted that, if the Journals were in a suitable format and registered with Google, they would prepare and produce a digital index which would be regularly updated. He, and others, would be willing to assist with the work on the new website. There would also be an advantage in placing published book reviews on Amazon.

AVM Dye thanked the Society for its grant to the Do 17 fund and noted that the Museum was investigating with the Egyptian authorities whether the recently discovered Kittyhawk could be recovered. He also hoped to report early progress on an audit of RAF silver and a plan for its long-term care and storage.

Two Air Forces Award.

In the absence of both the Society's President and Vice-President, the Chairman concluded the AGM by presenting the Two Air Forces Award to Wg Cdr Steve Chappell for his paper on: *Air Power in the Mau Mau Conflict in Kenya in the 1950s*.

In 1996 the Royal Air Force Historical Society established, in collaboration with its American sister organisation, the Air Force Historical Foundation, the Two Air Forces Award, which was to be presented annually on each side of the Atlantic in recognition of outstanding academic work by a serving officer or airman. It is intended to reproduce some of these papers from time to time in the Journal. This one was the winning RAF submission in 2011. Ed

AIR POWER IN THE MAU MAU CONFLICT: THE GOVERNMENT'S CHIEF WEAPON.

By Wg Cdr Steve Chappell

Introduction

In October 1952 Sir Evelyn Baring, Kenya's Governor, declared a state of emergency and requested the deployment of a battalion of British soldiers to help stop the rising tide of attacks on loyalist Kenyans and European settlers. Although more soldiers soon arrived amidst claims that the emergency would be over by Christmas,¹ it was clear that more security forces were required as the situation rapidly deteriorated into civil war. Ultimately, it took further deployments of British troops and a considerable RAF presence before the Mau Mau insurgency was militarily defeated in October 1956. However, although many accounts exist of the British Army's contribution to this counter-insurgency – the most recent claiming that a culture of barbarism was all-pervasive² – little is known of the RAF's involvement. Indeed, of the few accounts available, many contain inaccuracies; one claims that Lancasters bombed the Mau Mau³ and another that four RAF Harvards, fourteen light aircraft of the Kenya Police Reserve Air Wing (KPRAW) and a squadron of Lincolns were already in Kenya when the emergency began.⁴ However, evidence in The National Archives reveals that: Lancasters were not used in this conflict; the Harvards did not arrive until March 1953; the KPRAW had only five aircraft in late 1952; and the Lincolns did not deploy to Kenya until one year after the emergency began, flying their first mission on 18 November 1953.⁵

At the start of the emergency, the RAF presence in Kenya was one Proctor, two Ansons and a Valetta, all based at Eastleigh. The Proctor was underpowered for operations at altitude and the Ansons, old and



The first, of an eventual five, Tri-Pacers operated by the KPRAW.

(Joe Barr via Air Britain)

unreliable.⁶ The only other aircraft in Kenya at this time were five Piper Tri-Pacers of the KPRAW which were not under RAF command and, although they were later modified to carry four 20lb bombs, had no offensive capability in the early stages of the emergency. As the security situation deteriorated, it became clear that air power could make a contribution and four Harvards arrived at the end of March 1953, to be increased to eight on 1 July. By early 1955, the RAF's presence had swelled to eight Lincolns, eight Harvards, two Austers (used for sky-shouting tasks), one Sycamore helicopter and two Pembrokes. From April 1954 onwards up to six Vampires of the Aden-based No 8 Sqn were regularly detached to the Colony and from August a detachment of two Meteor PR10s from No 13 Sqn undertook photographic reconnaissance (PR).⁷

Further inaccuracies exist regarding air power's impact in Kenya; with Waters claiming that the RAF's presence alienated the local population and also had little influence on the Mau Mau.⁸ However, between June 1953 and October 1955, the RAF provided a significant contribution to the conflict and, because the Army was preoccupied with providing security in the reserves, it was the only Service capable of both psychologically influencing, and inflicting considerable casualties on, the Mau Mau in the vast, inaccessible forests around Mount Kenya and the Aberdare Mountains.⁹ This proved crucial and,



Lincolns of No 49 Sqn at Eastleigh in November 1953, shortly after arriving from Egypt where they had been on an Exercise SUNRAY.¹³

as the Government noted that ‘whilst ground forces are being primarily directed against targets in the reserves, heavy bombers and Harvards represent the chief weapon in our hands for attacking terrorists in the forest.’¹⁰ Their success was fully recognised by General Erskine,¹¹ who expressed his appreciation when he addressed a parade at RAF Eastleigh in April 1955, stating that the alternative would have been the employment of three Regiments of Artillery and another Infantry Brigade, neither of which ‘would have been a good answer and both considerably more expensive.’¹²

Through the lens of Colonel John Warden’s theory of systemic paralysis, this essay reveals the truth about how air power was employed in the Mau Mau conflict – a subject that has, until now, been shrouded in mystery and inaccurately reported. It finds that the RAF’s contribution to a conflict occurring almost sixty years ago proffers a number of lessons for air power’s employment today in counter-insurgency conflicts. Moreover, it demonstrates that, although useful in many respects, Warden’s model is somewhat limited for deciding how air power should be employed in counter-insurgencies today and consequently, a more appropriate model is offered for air power strategists to consider.

Warden’s Model

Warden’s model was used as a basis for air power’s employment in Gulf War One where it was argued that ‘leadership’ was the most important target for air power to attack. As the political decision-making group which the rest of the system was dependent on for its

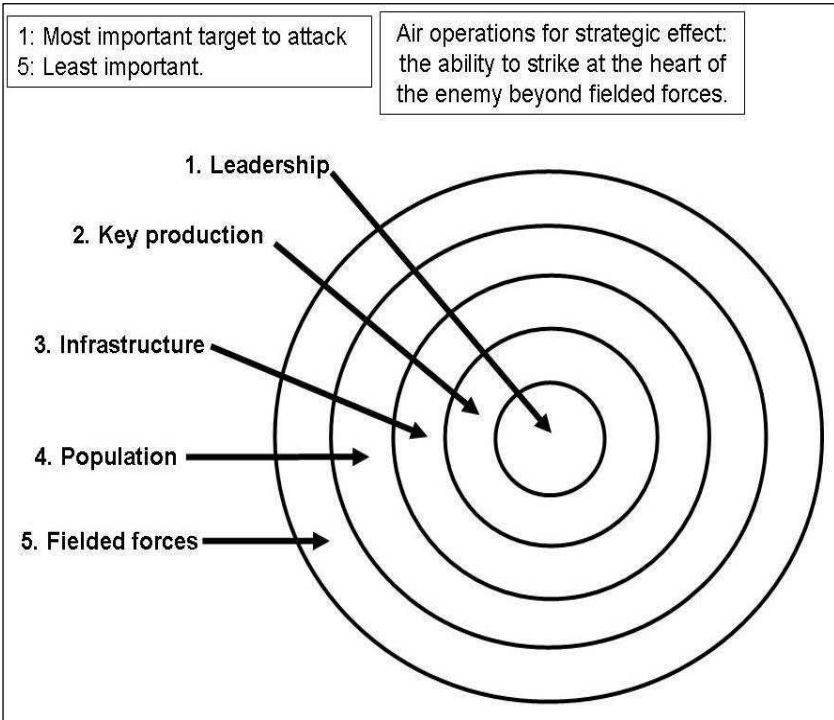


Fig 1. Col John Warden's five-ring model .

ability to command, control and communicate strategic direction (and to decide whether to continue the war effort or not), Warden advocated attacking it hard and fast from the outset. Next in importance was 'key production', then 'infrastructure', which comprised the transportation networks such as roads, railways, bridges and logistical nodes. The fourth ring was the enemy's 'population', which should only be targeted by psychological means, and the final ring was the 'fielded forces', which had the purpose of protecting all other elements of the system.¹⁴ This was the lowest priority for air because 'destruction of the enemy military is not the essence of war; [it] is convincing the enemy to accept your position, and fighting his military forces is at best a means to an end and at worst a total waste of time and energy.'¹⁵

The Iraqi target systems presented to General Schwarzkopf for

Leadership	Key Production	Infrastructure	Population	Fielded Forces
Saddam Hussein's Government National Command & Control Internal Security Forces	Electricity Retail Petroleum Weapons of Mass Destruction	Roads	Military elites Foreign workers Ba'athists Middle class	Strategic air defences Strategic offensive (air & missile)

Fig 2. Iraqi targets in Gulf War One.

Operation INSTANT THUNDER are shown in Figure 2 and Warden stressed the need to strike them all quickly in order to achieve rapid success and to stop Iraq recovering.¹⁶ Although the plan originally contained no Iraqi ground force targets, following intervention from General Horner, Republican Guard units in Kuwait were added.¹⁷

Although Warden's model was successful against Iraq, can it be used against an insurgency which, unlike an industrialised state, is an element of resistance that Clausewitz noted exists everywhere and nowhere? It is nebulous and elusive, never materialising as a concrete body, avoiding major actions and preferring to adopt a policy of scattered resistance where: 'Like smouldering embers, it consumes the basic foundations of the enemy forces [*trying not*] to pulverise the core, but nibble at the shell and around the edges.'¹⁸

Figure 3 shows the results of analysing the use of air power against the Mau Mau through the lens of Warden's model. Unlike INSTANT THUNDER, where the focus was on striking the 'leadership', the weight of effort against the Mau Mau was on the 'population' and 'fielded forces'. Less focus was placed on the inner three rings. Consequently, of the four fundamental air and space power roles, only 'Attack' (particularly counter-land and influence operations) and 'Intelligence and Situational Awareness' (more commonly known as ISTAR) were used. Elements of the 'Mobility' role were used but 'Control of the Air' was not, as the insurgents were unable to effectively challenge the RAF's air superiority.¹⁹

Leadership

The Mau Mau leadership ring comprised its political figures, the command and control (C2) elements in Nairobi and the gang leaders

Leadership	Key Production	Infrastructure	Population	Fielded Forces
Kenyatta and key political figures C2 elements in Nairobi (Op ANVIL) Gang leaders in forests	Political & financial network in Nairobi (Op ANVIL)	Stocks of fuel deep in forests Supply routes to & from forests Mau Mau supporters transporting food supplies	Kikuyu loyalists European settlers Kikuyu 'undecided'	Gangs in the forests Gangs in the reserves (after 1 June 1954; Op MUSHROOM)
Targeted by: gang leaders only by kinetic & ISTAR <u>Aircraft used:</u> Harvard, Meteor, Lincoln, Vampire, Tri-Pacer	Not targeted by air – no ISTAR used	Both targeted only indirectly by bombing gangs Some ISTAR <u>Aircraft used:</u> Harvard, Lincoln, Vampire, and Tri-Pacer	Targeted by: Leaflet drops/air presence, avoidance of Civilian Casualties <u>Aircraft used:</u> Harvard, Valetta, Lincoln	Targeted by: Kinetic: pre-planned bombing & close air support PSYOPS: Shows of force, leaflet drops, sky-shouting ISTAR in forests and the reserves to help Home Guard and Land Forces <u>Aircraft used:</u> Harvard, Meteor, Lincoln, Vampire, Auster (PSYOPS), Tri-Pacer (ISTAR)

Fig 3. Warden's model applied to air power's use in the Mau Mau conflict 1953-55.

in the forests. The political leadership was imprisoned before the RAF deployed to Kenya and, interestingly, the movement then became more radical as younger and more militant Mau Mau, whose extremist ideas had previously been suppressed by the old leadership, were now free to adopt a more revolutionary course.²⁰ This questions Warden's theory that targeting the leadership will defeat the entire system; perhaps this is not the case in an insurgency? Likewise, air played no role in targeting those leaders based in Nairobi that provided the movement's C2 and political direction as this was eliminated during Operation ANVIL in April 1954 when over 30,000 suspected Mau Mau operatives were evicted from Nairobi and moved to detention

camps. This was undertaken entirely by the Army and although the RAF could have assisted with ISTAR aspects, it was not involved.²¹

Gang leaders in the forests were the only element of this ring targeted by air and included key figures like Stanley Mathenge, Samuel Mwangi and Dedan Kimathi. Due to the thick forest canopies, it was difficult to track gangs by air and, in the 1950s, the RAF had only a limited ISTAR capability with which to find, fix, and strike²² the gang leaders. Therefore, no specific leadership strikes were mounted. Instead, pre-planned bombing missions were conducted on areas where key leaders were thought to be present.²³ This policy was successful and undoubtedly accounted for the disappearance of Stanley Mathenge in 1955.

Key Production and infrastructure

The Mau Mau's key production target was its political network in Nairobi which provided a rich source of recruits, arms, ammunition and money and this was eliminated by the Army during Operation ANVIL as previously mentioned. The Mau Mau's infrastructure targets were the fixed supply dumps of food and ammunition located deep in the forests. Insurgents obliged to leave the forests to collect food were targeted, mostly when they grouped together on the forest fringes to wait for dusk before venturing out.²⁴

Warden noted that the Mau Mau conflict was an example of where interdiction may well prove difficult to achieve against forces that do not require the same supply lines as nations, stating: 'Obviously, a force that needs little or nothing to exist or fight does not require the kind of supply lines that make interdiction worthwhile.'²⁵ However, even targeting this infrastructure ring indirectly, by bombing the area where it was believed the gangs were operating, achieved results. Interrogation reports of surrendered insurgents revealed that continuous air bombing forced them to stay on the move and severely disrupted their food supplies. Indeed, many cited hunger and the threat of being killed by bombing as the two main reasons for surrendering.²⁶

Population

Examining how air power 'targeted' the population reveals an important lesson for its use in counter-insurgencies; it can help secure the population from the insurgent's influence and thereby achieves the most important objective – winning the hearts and minds of the



Vampires of No 8 Sqn over Kenya during a deployment mounted in 1954.

indigenous people.²⁷ Air power helped to achieve this by targeting the loyalist Kikuyu, the European Settlers and those Kikuyu defined as the ‘undecided’.²⁸

Both the loyalist and the ‘undecided’ Kikuyu were targeted by direct psychological operations (PSYOPS). Leaflets depicting the Government’s victories over the Mau Mau were dropped across the reserves and this reassured the loyalists that the Government was winning, thereby emboldening their spirit. The ‘undecided’ were also influenced by leaflets showing graphic pictures of Kikuyu women and children hacked to death in incidents like the Lari massacre in March 1953, when 97 loyalists were murdered. This had a profound effect on the ‘undecided’ group, with many openly ceasing their support for the Mau Mau and some deciding to fight them by joining the Government’s loyalist Home Guard.

Equally, the presence of Lincolns, Harvards and Vampires had the psychological effect of convincing all three population groups that

they would be protected and that the Government was committed to defeating the insurgency. As the Chief Inspector of Police in Kangema stated: 'The presence of aircraft proved the power of the Government more than anything else'²⁹ and although the importance of maintaining a continuous and effective presence on the ground in counter-insurgencies is clear, a dominating aerial presence was equally effective in Kenya given that the Kikuyu were unaccustomed to seeing aircraft. Indeed, considering that the 'undecided' group will usually wait to see which side is likely to prevail before declaring its support, air power's presence arguably persuaded many in this group that the Mau Mau, armed with home-made weapons, could not win against the Government's military power.

However, the fundamental lesson arising from the use of air power in the Mau Mau conflict was how crucial it is to apply and then enforce a strict policy of avoiding civilian casualties (CIVCAS). Bennett argues that in the early stages, repression and violence were encouraged from Cabinet level down and the Army's approach was to crush the insurgency heavily. Indiscriminate targeting was commonplace and top-level Commanders exercised a loose grip on soldiers' behaviour.³⁰ Whilst this may have been true for the Army, the archival evidence reveals that senior RAF officers and members of the Cabinet were fully attuned to the need to avoid CIVCAS from air action.

This was first seen when the rules concerning the use of Harvards were issued: '[aircraft] will not take armed offensive action against any target outside the prohibited areas. It is emphasised that it is of the greatest importance that our own forces and loyal Africans should not be subjected to offensive action from the air.'³¹ Likewise, another report reveals that both Erskine and the Kenyan Government did not support indiscriminate bombing of the Kikuyu as it stated that offensive air operations would occur only in those areas prohibited to civilians, where only the Mau Mau were known to operate.³² Moreover, the Chief of the Air Staff (CAS) (Figure 4 identifies the key personalities involved in the use of air power in this conflict) also directed the CinC Middle East Air Force (MEAF) to ensure that the Senior RAF Officer (SRAFO) in Kenya was fully aware of the need to avoid CIVCAS,³³ thereby refuting claims that Erskine and others

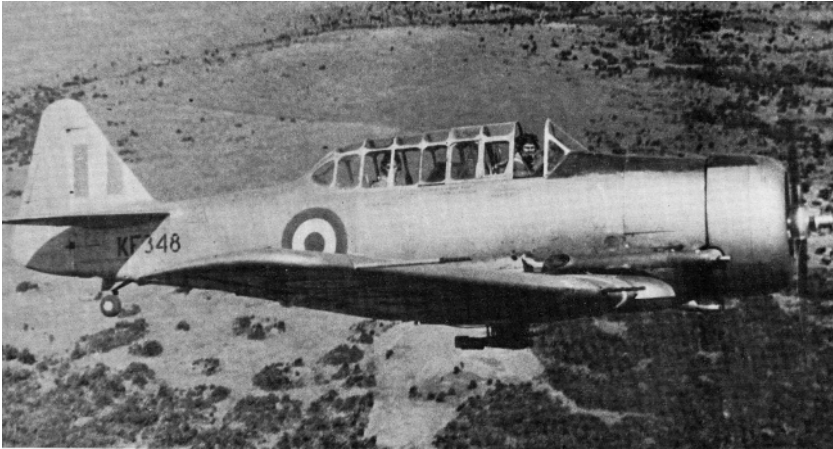
POSITION	NAME	DATES IN POST
Prime Minister	Sir Winston Churchill	26 Oct 51 – 7 Apr 55
	Sir Anthony Eden	7 Apr 55 – 10 Jan 57
The Secretary of State for the Colonies	Sir Oliver Lyttelton	28 Oct 51 – 28 Jul 54
	Sir Alan Lennox-Boyd	28 Jul 54 – 14 Oct 59
Governor of Kenya	Sir Evelyn Baring	30 Sep 52 – 10 Oct 59
General Officer Commanding (GOC) East Africa	Lt Gen Sir Alexander Cameron	7 Sep 51 – 7 Jun 53
General Officer Commanding in Chief (GOCinC) East Africa	Gen Sir George Erskine	7 Jun 53 – 2 May 55
	Lt Gen Sir Gerald Lathbury	2 May 55 – 30 Jun 57
Director of Military Operations (Kenya)	Maj Gen W R N Hinde	1 Feb 53 – 16 Aug 56
Chief of the Imperial General Staff (CIGS)	FM Sir John Harding	1 Nov 52 – 29 Sep 55
	FM Sir Gerald Templer.	29 Sep 55 – 29 Sep 58
Chief of the Air Staff (CAS)	Air Chf Mshl Sir William Dickson	1 Jan 53 – 1 Jan 56
Vice Chief of the Air Staff (VCAS)	Air Chf Mshl Sir Ronald Ivelaw-Chapman	9 Nov 53 – 16 Sep 57
Air Member for Supply & Organisation (AMSO)	Air Mshl Sir John Whitworth-Jones	1 Sep 52 – 1 May 54
Air Member for Personnel (AMP)	Air Chf Mshl Sir Francis Fogarty	1 Nov 52 – 1 Jan 57
Commander-in-Chief (CinC) Middle East Air Force (MEAF)	Air Chf Mshl Sir Arthur Sanders	19 May 52 – 25 Oct 53
	Air Mshl Sir Claude Pelly	25 Oct 53 – 10 Sep 56
Air Officer Commanding (AOC) British Forces Aden	AVM S O Bufton	12 Oct 53 – 15 Oct 55
Senior Air Staff Officer (SASO) MEAF	AVM J N T Stephenson	15 Jun 54 – 1 May 57
Assistant Chief of the Air Staff (Operations) [ACAS(Ops)]	AVM Sir Laurence Sinclair	4 Nov 53 – 15 Oct 55
Senior RAF Officer in Kenya (SRAFO)	Gp Capt D J Eayrs (Station Commander RAF Eastleigh)	20 Jun 53 – 27 May 54 (
	Air Cdre W K Beisiegel	27 May 54 – 28 Sep 55

Fig 4. Key personalities.

in authority had a policy of indiscriminately bombing civilians.³⁴

However, the RAF not only instigated a policy of avoiding CIVCAS; they rigorously enforced it. Air Operations Orders (AirOpsO) highlighted forest boundaries and the edges of the prohibited areas to ensure that no bombing occurred outside of them – some specifically stated that every effort should be made to avoid unnecessary damage.³⁵ Proposals to change aerial bombing practices were also rigorously scrutinised. In April 1954, it was proposed that RAF operations into the reserves should be extended because it was clear that the Mau Mau understood the restrictions that had been placed on aerial operations and were openly walking around in large gangs firing at passing aircraft, safe in the knowledge they could not be attacked.³⁶ The VCAS first scrutinised the request and stated that such targets should be prosecuted only if gangs could be clearly identified, if no danger of killing innocent civilians existed and that, in all cases, the principal of minimum force was to be used to achieve the effect desired. Therefore, only the Harvard's 20lb bombs were authorised and its machine gun was not. The CAS supported the proposal, but only if the Army Commander who would originate the request was in close contact with the target, to ensure that no danger to civilians existed. Lyttelton then sought Churchill's authorisation, noting that, although permitting bombing outside of the prohibited areas would undoubtedly be attacked by some in Parliament, it was known, from interrogating such key Mau Mau leaders as General China, that many insurgents knew the air restrictions and deliberately took refuge in the reserves to avoid being bombed. Following discussion by Churchill and the Cabinet on 26 May 1954 (with CAS present), permission was granted for such air strikes to occur.³⁷ Lyttelton then tasked Erskine to introduce procedures to ensure that only reliable pilots were chosen for these tasks – now to be termed 'Operation MUSHROOM'.³⁸

The RAF's determination to use air power proportionally was demonstrated by its response to the use of the Harvard's machine guns and bombs on a large gang near Mount Logonot on 11 November 1954.³⁹ The CAS asked Erskine to explain why machine guns had been used when all orders specifically forbade their use outside prohibited areas. After investigation it was decided that the Chief of Staff (COS) in the Joint Operations Centre (JOC), who had authorised



A bomb-armed Harvard of No 1340 Flt. (E W Hughes)

their use, had acted appropriately, as the area was isolated and the risk to civilians had been low. However, the CAS directed that in future, before any RAF action was undertaken which departed from existing policy, the SRAFO's authority was to be obtained.⁴⁰

In January 1955, Churchill's approval was sought to continue Operation MUSHROOM activity. The matter would be kept under constant review and such operations would '...not be permitted to continue for longer than they are really necessary.'⁴¹ This shows that the most senior members of the RAF and the Government understood that the contest for the support of the population in counter-insurgencies is based on moulding the population's perceptions;⁴² clearly something which CIVCAS would have a detrimental effect on. With evidence of a proposal to use 4,000lb bombs against the Mau Mau also being declined for 'political considerations',⁴³ it is clear that RAF commanders appeared to have had a better understanding of weapons effect and the type of war they were engaged in than did their Army counterparts – a reference to Clausewitz' warning that 'the first, the supreme, the most far-reaching act of judgement that the statesman and commander have to make is to establish [...] the kind of war on which they are embarking; neither mistaking it for, nor trying to turn it into, something that is alien to its nature.'⁴⁴ A number of atrocities such as torture, rapes and illegal killings were committed by British

troops, including an incident in which a detachment of the 7th Kings African Rifles robbed, beat and then killed four Kikuyu labourers after they ran when challenged.⁴⁵ These created a deep resentment amongst the ‘undecided’ Kikuyu population and, rightly, frustrated Erskine who made considerable attempts to rectify the situation. Not long after his arrival he ordered his officers to ‘stamp on at once any conduct which he would be ashamed to see used against his own people.’⁴⁶ However, despite this, some atrocities continued to be committed by his soldiers.

The avoidance of CIVCAS from air action is vital in ensuring that the hearts and minds of the civilian population are won in counter-insurgencies. As the Israelis discovered, killing civilians by air action immediately results in international condemnation. The events surrounding the bombing of the al-Maqqadmah Mosque, in which fifteen civilians were killed and forty injured, is one example.⁴⁷ In Afghanistan, CIVCAS from air strikes trebled between 2006 and 2007 and, although the Human Rights Watch stated that most of these occurred during rapid-response air strikes when troops were in contact,⁴⁸ incidents such as the Kunduz air strike in September 2009 (a planned strike with no ‘troops in contact’ which was requested by a German Commander against Taliban insurgents who had stolen two fuel trucks and led to 142 civilians being killed), demonstrate how quickly air action can turn the population against the authorities. Not only did this lead to Germany’s highest ranking soldier resigning over allegations that the German Defence Ministry had concealed information about civilian deaths in the incident’s aftermath, but it also caused outrage in the international community.⁴⁹ Such events have the ability to undermine the whole campaign in conflicts like Afghanistan; a fact acknowledged by General McChrystal when he stated that ‘the objective is the will of the people [...] protecting the people means shielding them from all threats’⁵⁰ adding that:

‘A focus by ISAF intelligence on kinetic targeting [*has*] hindered ISAF’s comprehension of the critical aspects of Afghan society. [...] Civilian casualties and collateral damage to homes and property resulting from an over-reliance on firepower [...] have severely damaged ISAF’s legitimacy in the eyes of the Afghan people.’⁵¹

Fielded forces

The Mau Mau gangs in the forests of Mount Kenya and the Aberdares comprised the 'fielded forces' ring in Warden's model and were predominantly targeted by kinetic action (pre-planned bombings and close air support) and PSYOPS. Consisting of shows of force (SOF), leaflet drops and sky broadcasts aimed at persuading the fighters to surrender, PSYOPS were regarded by the Colonial Office as one of the main ways of ending the emergency. The RAF played a key role in this by undertaking sky-shouting duties and by dropping propaganda leaflets designed to persuade the Mau Mau to surrender. The Lincolns dropped over 100,000 leaflets during Operation HAMMER in January 1955 and over five million in June 1955. Likewise, many pre-planned missions were coordinated with the Auster sky-shouting aircraft from the end of February 1954 and AirOpsOs show that this was usually undertaken for three days following a mission.⁵²

The Lincolns also regularly distributed leaflets whilst they were bombing the Mau Mau and, as the conflict progressed, the importance of PSYOPS increased; Pembrokes were modified to undertake sky-shouting duties and to assist the two Austers and, in June 1955, General Lathbury urgently requested two more aircraft for this role, judging them to be more useful at this time than the Lincolns.⁵³ Although SRAFO requested the transfer of two Dakotas from Malaya, the Air Ministry rejected this as they were considered 'essential to operations [...] having a large impact on facilitating surrenders.'⁵⁴ By July 1955 over 800 Mau Mau had surrendered⁵⁵ and, although many did so because of hunger and a realisation that victory could not be achieved, it is clear that the leaflet drops and sky-broadcasts had undoubtedly contributed.

The last part of the PSYOPS campaign was SOF. Undertaken from June 1953 onwards, Churchill stressed the importance of making a display of air power over the heads of the Mau Mau, stating, 'The more they saw an aircraft overhead, the more they would feel that all their movements were under observation.'⁵⁶ It was clear that SOF certainly influenced the insurgents; reports from prisoners revealed that when two Vampires flew over them, their speed terrified them so much that they decided to surrender immediately.⁵⁷

Notwithstanding this, it was still necessary to target kinetically

those who could not be reconciled. This was first conducted by the Harvards in June 1953 (although a rather rudimentary form of offensive action had been undertaken by the KPRAW pilots before this, when they had dropped home-made bombs and grenades on gangs.)⁵⁸ By October, however, it was clear that an aircraft capable of delivering more firepower was required. Consequently, the CAS offered the Lincoln to GOCinC East Africa, based on General Templer's glowing reports on their use in Malaya.⁵⁹ The CAS noted that:

'the main gangs, which are your principal tactical objective, may, like those in Malaya, be getting accustomed to the 20lb bomb and be getting trained to avoid casualties from its small blast effect in the forest. It is possible you may need a heavier bomb for occasional use so as to maintain the morale effect of air action which otherwise may decrease. [*A detachment of Lincolns could represent*] a reinforcement which may make all the difference in turning the scale in your operations and by showing the tribes the power of the Government.'⁶⁰

Churchill gave permission for the deployment on 5 November and eight Lincolns arrived six days later with twenty-four aircrew and thirty-seven ground crew from Wittering's No 49 Sqn. Based at Eastleigh and carrying a standard bomb load for each mission of nine 500lb and five 1,000lb bombs, they began operations on 18 November dropping in sticks of between 300 and 3,000 yards. They were to operate for an undefined period in order to test the psychological effect of heavy bombing on the Mau Mau.⁶¹

Although some have claimed the Lincoln's contribution to the conflict was negligible,⁶² the archival evidence reveals that almost 900 insurgents were killed or wounded as a direct result of air attacks between November 1953 and June 1954 alone.⁶³ Moreover, air power's objectives of breaking the insurgents' morale, spreading disaffection, driving insurgents out of the forests and breaking up the gangs⁶⁴ were all achieved by '...not only killing terrorists, but by imposing on them such intolerable conditions that they will elect to come out of the prohibited areas.'⁶⁵ Reports compiled from prisoner interrogations revealed that considerable success was achieved in inducing psychological terror among the insurgents. For example, a



A Lincoln of No 100 Sqn which provided the RAF's 'big stick' in Kenya between January and March 1954. The other units involved in maintaining, what had become, a permanent commitment were Nos 49, 61 and 214 Sqns. (RAF Museum P016808)

Mau Mau gang leader called Gitonga Karame surrendered in September 1954 after twenty of his gang were killed in an air strike.⁶⁶

In a report for Churchill, Erskine argued how important air power was to operations in Kenya; stating that the threat of attack had caused the gangs to disband, had lowered their morale and a pronounced move of them from the forests to the reserves was witnessed after the Lincolns arrived. Moreover, air action in general also boosted the morale of friendly forces because it took the fight to the Mau Mau in the deepest areas of the forests where Erskine's ground forces were unable to operate in strength. In some places it was virtually impossible for ground troops to surround and destroy all gang hideouts and the Lincolns proved ideal for attacking them – thereby supporting Pape's theory that air power is best used as a substitute for ground power when the latter is unable to reach the insurgent.⁶⁷ Additionally, given that in the early stages, the Army was pre-occupied with combating the unrest in the reserves and that soldiers could simply not be spared to conduct operations in the forests on a large scale, the Lincolns and Harvards represented the only way to attack the insurgents and it is clear that without their contribution, the Mau Mau would have been able to escape into the deepest areas of the

forests and live in safety. Erskine said he was ‘convinced that the air effort prepared the way for ground action in the forest – without it, the ground troops would have had a tougher and more difficult job to do.’⁶⁸

The Lincolns remained in Kenya until 28 July 1955 when Lathbury decided there was no longer a justification for keeping them in the Colony because the Mau Mau targets had reduced considerably.⁶⁹ During their deployment, they had dropped some 4,500 short tons of bombs in the course of flying over 900 sorties.⁷⁰ However, with other commitments, such as Operation ALACRITY,⁷¹ looming, it is not surprising that they were withdrawn.

The Harvards proved to be most adept at close air support, operating in all weathers and dropping bombs within 300 yards of friendly forces. They were, however, constrained by the KPRAW's Tri-Pacers which had first to mark the target with smoke before it could be attacked. This lost the element of surprise.⁷² Notwithstanding this, one incident on 6 August 1953 highlighted the need for quick communications for air operations to be effective in such fluid environments. Over 1,000 Mau Mau were seen by an Army patrol and although the information was passed to Fort Hall Army HQ at 1600 hrs, a request for air support was not received by the RAF signals unit at Mweiga until 1725 hrs, by which time, the cloud base had lowered so much that bombing could not be undertaken.⁷³ Likewise, on another occasion it was reported that the Lincolns dropped their bombs over 4,500 yards from the target⁷⁴ and on another, there was a 30-minute delay between the Tri-Pacers dropping their target markers on a gang and the Lincolns arriving, thereby allowing the gang to disperse.⁷⁵ After these initial problems, close air support procedures improved in Kenya and led to Erskine thanking the RAF for its tremendous efforts in helping to capture General China and a large number of his supporters in April 1954, adding that he was very impressed by the excellent co-operation he had witnessed between the RAF and other security forces.⁷⁶

In the early stages of the conflict the ISTAR functions of *find*, *fix*, *strike* and *exploit*, now viewed as crucial to the success of air operations, were not all satisfactorily undertaken. Whilst the RAF was able to comprehensively ‘strike’ targets, it struggled to undertake the ‘find’ and ‘fix’ functions because it lacked a timely and accurate



Between August 1954 and July 1955, the Egypt-based, No 13 Sqn maintained a permanent detachment of Meteor PR 10s at Eastleigh.

source of intelligence. Air operations were planned almost exclusively on information received from Army patrols or prisoner interrogation reports highlighting where gangs were believed to be operating in the forests. This often took eight weeks to arrive and was therefore usually inaccurate, as the gang had invariably moved from the area by the time a bombing mission occurred. Moreover, due to a lack of capability, no high quality photographs of target areas existed from which air operations could be planned.⁷⁷

To address this, CinC MEAF ordered the Lincolns to be modified for PR duties in March 1954 until a more permanent solution was found. They undertook 42 successful PR sorties providing valuable information for planning air strikes before two Meteor PR 10s from No 13 Sqn were permanently detached to Kenya in August 1954 (after demonstrating their superior capabilities on a three-week detachment in April).⁷⁸ Operating from Eastleigh, the Meteors undertook 234 sorties before leaving Kenya in July 1955. Air staffs acknowledged that they had ‘proved invaluable for planning large scale bombing operations and for passing intelligence to ground forces – without them we would have been groping in the dark.’⁷⁹

Although the intelligence system improved after the establishment of the JOC in Nairobi in January 1954, various challenges remained; there were still no dedicated RAF intelligence personnel in Kenya and the RAF was still reliant on the Army in this regard. Although the first RAF Intelligence Officer arrived in November 1954, he encountered

some prejudice from the Army intelligence community who were reluctant to share information. However, in time, the situation improved; an exploitation facility was established at Eastleigh in August 1954 which allowed the RAF to properly undertake the 'exploit' function of ISTAR and by September, this was producing interpretation reports within 48 hours of receiving photographs. Following formal coordination with ground intelligence sources, it became possible to select targets in areas with 90% certainty and, as bombing became more accurate, the results of prisoner interrogations revealed that the morale of the gangs declined.⁸⁰

Finally, in an effort to complete the intelligence picture, attempts were made to properly analyse the bombing conducted and in November 1954 a 'bomb scoring team' was established. Although this did provide some useful information for Lincoln crews on how accurate their bombing had been, it unfortunately failed to measure the damage the bombs had inflicted on the Mau Mau and did not therefore provide a true measure of effectiveness. Even if high quality photographs were taken of the bombing area, it was invariably difficult to ascertain how effective the bombing had been, because the jungle canopy often excluded the area from view. Moreover, with only two Army JNCOs and one Army officer (who was posted without a replacement in February 1955), the team was significantly understaffed and struggled to cope with the workload. Consequently, although they provided some value, a combination of climatic conditions, inadequate technology and a lack of commitment from the military hierarchy to resource the team properly, meant that it failed to deliver the effective intelligence exploitation capability required.⁸¹

These examples show that it was only after an investment had been made in all aspects of *find*, *fix*, *strike* and *exploit* that air power was able to become more effective in the Mau Mau campaign. With this in mind, the RAF's recent progress in this area is worthy of note; as the current CAS has stated, there has been a paradigm shift recently in the RAF away from pure precision attack towards the creation of a Combat-ISTAR capability where the information space can be exploited whilst kinetic activity is undertaken simultaneously. This is best demonstrated by the Tornado GR4 in Afghanistan, where it is able to data-link video imagery to troops on the ground in real time and provide comprehensive photographic and infrared images of the

whole Sangin valley in 45 minutes. It also has the capability to attack a wide range of targets, some high-speed and mobile, on the same sortie.⁸² This is crucial in counter-insurgencies and, although Ground Close Air Support missions are key, arguably the most important tasks are those aimed at reducing the IED threat by monitoring roads with the Litening 3 and RAPTOR reconnaissance pods.⁸³

A better model?

In 1944 Slessor wrote: 'The moral is that we should continue to exploit the peculiar qualities of the air as the weapon of pursuit, to give the enemy no respite or opportunity.'⁸⁴ Whilst his view still holds true, this analysis reveals that, although Warden's model has some utility in discovering how air power could be used in counter-insurgencies by targeting the insurgent, it takes no account of the support it provides to friendly forces. Therefore, the model at Figure 5 is offered as a better way of employing air power in contemporary counter-insurgencies.

Unlike Warden's model, where targeting the enemy's leadership was the top priority, air's objective here is to assist in winning the local population's hearts and minds. Thereafter, its priorities are supporting friendly forces, targeting insurgent logistics, leadership (including C2) and then the insurgents themselves. Although it is recognised that attacking insurgent leadership is important, it is not the crucial target that will defeat the entire system, as Warden advocated. Leaders, however inspirational, can always be replaced – as Israel has discovered with its policy of targeting Palestinian terrorist leaders.⁸⁵ Success lies in trying to deprive the insurgents of the essentials upon which they depend for survival, making it impossible for them to fight on.⁸⁶ This is why an insurgent's supplies, bases and the local population's support are all more important targets.

The model also recognises those air power roles which can target these five areas and, as the thickness of the arrows show, some are more important than others. Although kinetic targeting of either insurgents, their leadership or their logistics is important, in reality, ISTAR has a greater part to play as it not only ensures that kinetic action can be undertaken, but provides greater situational awareness of the insurgent's activities, thereby ensuring that air can be used to maximum effect. There is, ultimately, only so much utility that kinetic

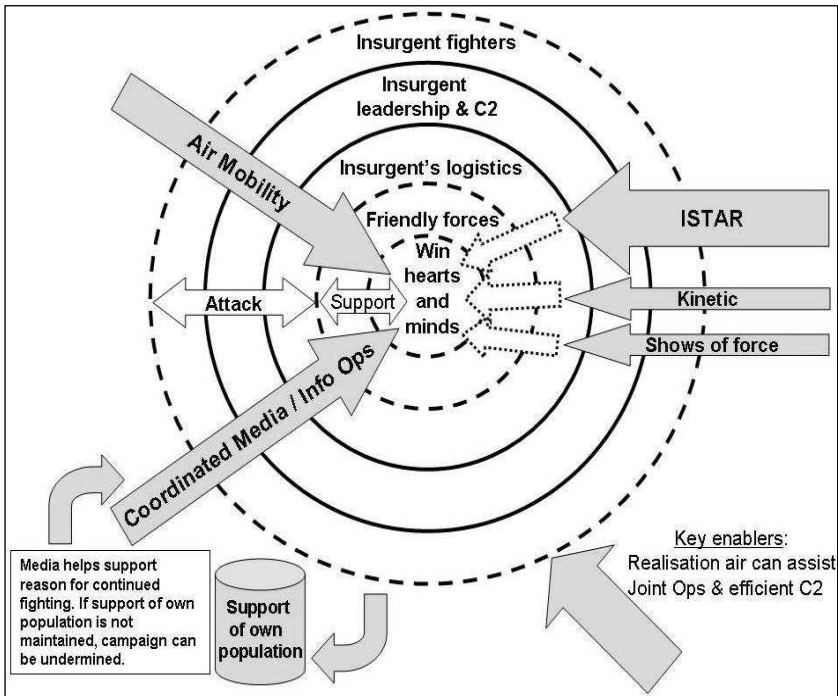


Fig 5. Proposed model for using air power in counter-insurgencies.

air power can provide. As Gray notes, if air power is used to ‘combat a highly irregular and [...] part-time enemy who hides amongst quite densely packed civilians [it] cannot be at the leading edge of effectiveness.’⁸⁷ Moreover, although today the aspiration is for surgical strikes ‘even a surgeon’s knife lets blood and creates scars.’⁸⁸ In Kenya, strict policies of avoiding CIVCAS, in conjunction with undertaking influence operations, such as leaflet drops or just providing an aerial presence to convince the indigenous population that the insurgents were not worth supporting, helped to separate the population from the Mau Mau’s influence.

The softer elements of air power are also more important in counter-insurgencies. The role that air mobility plays, for example, in directly influencing the population’s hearts and minds should not be underestimated. Such influence operations have included transporting thousands of Iraqis from Basrah to Mecca for the Hajj pilgrimage.



Seen here while on the strength of No 52 Sqn at Butterworth in 1963, this Valetta, VW814, had been based at Nairobi with the East Africa Communications Flight and the Eastleigh Station Flight throughout the period of the anti-Mau Mau campaign. (MAP)

Equally, the ability to move friendly forces rapidly into an area can deliver an immediate strategic effect. As J F C Fuller said: ‘A handful of men at a certain spot at a certain hour is frequently a far more powerful instrument of war than ten times the number on the same spot twenty-four hours later.’⁸⁹ When a battalion of the Lancashire Fusiliers was flown to Eastleigh the day after the emergency was declared, an immediate security presence on the streets of Nairobi was created and, with it, a clear strategic effect. Five months later Transport Command organised the move of 1,254 men and 54 tons of equipment from Lyneham and Stansted to Nairobi in just nine days. Codenamed Operation NICOTINE, this large-scale movement between 30 March and 7 April 1953 used a combination of RAF Hastings along with chartered Tudors and Yorks and made a significant strategic impact.⁹⁰

Air also supplied troops in the forests (planning for the 18,480lbs of supplies dropped per week in the Aberdares during Operation HAMMER began five months beforehand and the Tri-Pacers, capable of carrying enough rations to supply twenty-five men at a time, were often used to resupply two patrols on a single sortie. A large number of supply drops were also made by Valettas, capable of dropping 5,900lbs by parachute on one sortie, and even the Lincolns dropped

320 packages during December 1953 to soldiers around Mount Kenya from altitudes as high as 14,000ft.⁹¹ As Erskine said: 'The Air effort is of great importance. [...] Supply dropping and recce by the KPR Air Wing is essential and is carried out with great efficiency.'⁹²

The media also play a crucial role in the use of air power in counter-insurgencies and the military needs to ensure that it works as closely as it can with them, so that the overall mission is not undermined by the misreporting of events. When the Lincolns deployed to Kenya, the CAS anticipated a media backlash and was very keen to ensure that the deployment was not referred to as a bombing 'experiment' to which the Mau Mau were being subjected.⁹³ Despite these efforts, the press claimed that the Lincolns were undertaking 'trials of pattern bombing' on the Kikuyu.⁹⁴ Lyttelton had to refute similar accusations in Parliament and Erskine wrote to the CAS apologising for how the situation had been handled;⁹⁵ despite Erskine's comments it appears that an Army officer in Nairobi had used the phrase 'pattern bombing' rather too frequently when briefing the press.⁹⁶ Another article, claiming that air attacks on the Mau Mau were 'wasteful',⁹⁷ also caused a furore and resulted in Churchill's asking for a report from Erskine on the efficacy of air action in Kenya.⁹⁸ As the Kunduz incident in September 2009 demonstrated, the German populace placed considerable pressure on their Government to explain why it should continue its involvement in Afghanistan.⁹⁹ Clearly then, the media have the potential to influence the will of the home population to support the conflict and is therefore key in upsetting Clausewitz' remarkable trinity of the balance between the People, the Government and the Military. Maintaining 'a balance between these three tendencies, like an object suspended between three magnets',¹⁰⁰ is critical to ensuring success and careful management of the media will certainly help achieve this. Indeed, Clodfelter noted that, 'Airmen who fail to appreciate that these relationships exist – and *how* they bond together for a specific enemy or ally, as well as for his or her own nation – stand on very shaky ground.'¹⁰¹

Finally, the model at Figure 5 is underpinned by three key tenets. First, for air to be effective in counter-insurgencies, senior commanders must realise the efficacy it can provide. Equally, good C2 and joint operations must exist. In the early stages in Kenya, little

thought was given as to how air could be used, apart from discussions regarding the deployment of two Sycamore helicopters; a plan that was ultimately cancelled due to an impending overhaul programme and a lack of alternatives.¹⁰² Although Kenya was an important colony for Britain, other commitments existed – the Korean War, the requirement to increase forces in Western Europe to counter the Russian threat, and the Malayan Emergency were all more important to the British Government at the time. As a consequence, there was a lack of senior RAF representation in Kenya and the Military Command there failed to comprehend the utility that air power could provide. The Military Command consisted predominantly of Army officers who undoubtedly believed that the insurgency could be quickly resolved by ground forces alone and that there really was no need for an RAF deployment in what was a land-based operation. This was not through a lack of prescience by the Air Ministry at the time. Without prompting, on 13 February 1953, the CAS offered four Harvards, which had become available as a result of the run-down of the Rhodesian Air Training Scheme. However, following advice from Maj Gen Hinde¹⁰³ the Colonial Government declined this offer on financial grounds.¹⁰⁴ Not until the Chief of the General Staff (CIGS) visited Kenya in late February 1953, and viewed the deteriorating security situation, was it decided to detach some RAF aircraft to Kenya, along with an infantry brigade headquarters and two infantry battalions; a move which would, he argued, restore security quickly.¹⁰⁵

Churchill and the Cabinet agreed to this on 10 March and, within a week, Transport Command was arranging the movement of the Harvards and all associated munitions and support equipment to Kenya. By the end of the month, formal approval was given to establish No 1340 Flt to operate the Harvards, which all arrived on the 27th.¹⁰⁶ However, given the degree of importance that was attached to ensuring that these aircraft were hurriedly despatched to Kenya and that Churchill and the Cabinet were keen to see air power used in the conflict, the archival evidence remarkably reveals they were not used during their first two months in the colony because Hinde ‘was not convinced that offensive air operations could be effective in the heavily wooded area of operations.’¹⁰⁷ This discovery demonstrates that even the best intentions of the Cabinet can be thwarted by the decision of one local commander.

The lack of senior RAF representation undoubtedly contributed to this lack of activity. No 1340 Flt was commanded by a squadron leader, who may well have struggled to voice his opinion. Equally, the SRAFO in Kenya; Gp Capt Eayrs, the Station Commander at RAF Eastleigh, was not involved in advising Hinde and only became Erskine's advisor on 30 June 1953 on CAS' insistence.¹⁰⁸ As the operation progressed, the CAS realised that an officer of air rank was needed in Kenya to advise Erskine because, 'In operations of this kind, one error of judgement in the use of the RAF can lead to political embarrassment,'¹⁰⁹ adding that an air commodore would be better placed to improve the control and coordination of air operations with ground forces.¹¹⁰ Notwithstanding this, it still took until May 1954 for Air Cdre Beisiegel to arrive as the new SRAFO. He stayed until September 1955 and made a considerable impact; improving the coordination process between target-marking by the Tri-Pacers and the bombing of the Mau Mau by the Harvards and Lincolns. He also instigated a bombing strategy, whereby specific areas were focused on by all air assets, one stage at a time, as opposed to the previously sub-optimal policy of bombing all areas simultaneously. As an accolade, the Air Member for Personnel noted that 'The presence of an Air Commodore in Kenya has justified itself in many ways and the present S.R.A.F.O. has done admirable work in establishing a better relationship with the Kenyan Government and in planning and controlling air operations.'¹¹¹

However, whilst an air commodore in Kenya was certainly beneficial, unfortunately, an efficient, joint and coordinated system in which air operations were a fundamental part, took far too long to establish and this led to inefficiencies in the early stages. It was recognised in 1953, for example, that no unity of command existed over the KPRAW and little coordination occurred between the Army, the Police and the RAF.¹¹² To resolve this, six RAF pilots were sent to augment the KPRAW in October, as considerable issues had been encountered, with the organisation failing to provide aircraft when asked – an obstinate attitude to any tasking from the RAF also appeared all-pervasive. Indeed, the CinC MEAF called the KPRAW 'something of an embarrassment [*because,*] although the pilots are very skilful, they are under no discernible level of discipline and they tend to come and go as they please.'¹¹³ On the insistence of CAS, this

organisation was brought under RAF command in March 1954 and the situation improved dramatically.

Conclusion

Through the careful use of kinetic air power, CIVCAS were avoided in Kenya and the RAF strove to ensure that it operated within the rule of law. However, air's kinetic role must be used sparingly in counter-insurgencies if the ramifications of its failures, fuelled by media frenzies, are not to undermine the entire support for the conflict itself. As Clodfelter notes: 'In the amorphous conflicts [...] in the future, firepower, no matter how precise, is unlikely to yield the success necessary to secure the war aims sought – and in some cases it may well produce the antithesis of the desired effects.'¹¹⁴ Not forgetting that the fundamental goal in counter-insurgencies is to win the population's hearts and minds, because it is 'in men's minds that wars of subversion have to be fought and decided,'¹¹⁵ success will mainly be achieved through the 'softer' air power tasks. Air mobility will play a key role in supporting friendly forces, thereby improving morale, providing a strategic effect and positively influencing the local population through the delivery of humanitarian aid or by transporting people to religious events. Equally, ISTAR will continue to play an increasing role both by protecting friendly forces from insurgent attacks and by increasing the situational awareness of commanders. Excellent results were also obtained in Kenya by using air to influence the population through leaflet drops, sky-shouting and SOF. These, along with a policy of destroying the insurgents' food supplies and adopting an approach whereby the threat of bombing increased the psychological pressure, paved the way for military victory and ultimately helped to drive the insurgents out of the forests.

Crucially however, commanders still have to appreciate, from the outset, the positive contribution that air power can make to such conflicts – 'Air and space power isn't an optional luxury that can be added to an erstwhile military operation on the ground or at sea; rather, it provides the essential foundation for any sort of military endeavour.'¹¹⁶ Kenya shows that air operations must be brought into the conflict from the start and be properly coordinated in a joint manner to be truly effective. Perhaps, if the RAF had been deployed in greater numbers and air operations been properly integrated with all

other security forces earlier, then what the Government described as its chief weapon against the Mau Mau, could well have delivered success much sooner than 1955.

Notes:

¹ The National Archives (hereafter TNA) CAB 129/55: Memorandum, Baring to Lyttelton, 13 October 1952.

² Elkins, C; *Britain's Gulag: The Brutal end of Empire* (London: Pimlico, 2005).

³ Branch, D; *Defeating Mau Mau, creating Kenya: counter-insurgencies, civil war and decolonization*, (Cambridge University Press, 2009) p1.

⁴ Mumford, A & Kennedy-Pipe, C; 'Unnecessary or unsung? The Strategic Role of Air Power in Britain's Colonial Counter-insurgencies' in *Air Power, Insurgency and the "War on Terror."* ed. J Hayward, (Cranwell, RAF Centre for Air Power studies, 2009) p73.

⁵ TNA AIR 14/4496: Report on 49 Squadron's Mau Mau operations, 20 January 1954.

⁶ TNA AIR 20/9530: Report on RAF Operations in Kenya 1953-1955, pp3-4.

⁷ *Ibid.* Report on RAF operations in Kenya, pp4-7.

⁸ Waters, A; 'The Cost of Air Support in Counter-Insurgency Operations: The case of the Mau Mau in Kenya' *Military Affairs*, (1973) p99.

⁹ Areas, each of approximately 800 square miles,' declared 'prohibited' to all civilians in December 1952. The Mau Mau consisted mainly of Kikuyu natives and they operated almost exclusively in these two areas, although they did also venture into areas known as 'the reserves' which were where the peaceful native Kenyans resided.

¹⁰ TNA AIR 2/12668: Report on the role of Air Power in Mau Mau Operations 14/8/1954, p5.

¹¹ The GOCinC East Africa Command 7 June 1953-2 May 1955, commanding all forces in Kenya including the RAF.

¹² TNA AIR 14/4073: Weekly intelligence report, 27 April 1955.

¹³ Exercise SUNRAY was a regular training event (bombing practice), involving the deployment of Lincoln squadrons to Egypt. No 49 Sqn had just arrived at Shallufa when it was ordered to move to Eastleigh (Nairobi) to assist in the campaign against the Mau Mau on an experimental basis. This was considered to have been a success and a permanent Lincoln presence was maintained in East Africa until July 1955.

¹⁴ 'The Enemy as a System', *Air power Journal*, (Spring 1995), pp41-55.

¹⁵ Warden, J; 'Air Theory for the Twenty-first Century' in *Battlefield of the Future: 21st Century Warfare Issues*, eds B R Schneider and L E Grinter, (Maxwell University Press, 1998) p109.

¹⁶ Warden, J; 'Success in modern war: A response to Robert Pape's '*Bombing To Win*' in *Security Studies*, Vol 7, No 2 (Winter 1997-1998) p176.

¹⁷ Jordan, D; 'Air and Space Warfare' in *Understanding Modern Warfare*, eds D Jordan et al (Cambridge: University Press, 2008) p203.

¹⁸ Carl Von Clausewitz, *On War* (London: David Campbell, 1993) p580.

¹⁹ Whilst the Mau Mau lacked the capability to shoot down RAF aircraft, it did not

stop them trying (see 'population' section). At least two Lincolns were lost during the conflict, crashing in poor visibility on night bombing sorties and killing all crew members; one crashed in the Aberdares on 29 March 1954 and another near Mount Kinangop on 7 April 1954. Examination of the wreckage revealed enemy action was not responsible. See TNA AIR 20/9516.

²⁰ The Mau Mau's supposed political leader, Jomo Kenyatta, and 180 other political figures were arrested in Operation JOCK SCOTT on 21 October 1952. See Elkins, *Britain's Gulag*, pp35-36.

²¹ Over 1,400 Army personnel, including four Companies each of the Royal Northumberland Fusiliers, Royal Inniskillings, and the Black Watch, and 600 police (but no RAF) participated in Op ANVIL. See: TNA CO 822/796: Report on Operation ANVIL, 5 March 1954.

²² The functions of '*find, fix, strike and exploit*' are given in AP3000, fourth edition, p46.

²³ Examples included the pre-planned Lincoln bombings on an area where the gang leaders Kahau Karichu and Samuel Mwangi were thought to be present and the strike of 13 May 1955 when a gang of 300 Mau Mau under 'Generals' Wariungi and Kiarii Manuthia was attacked. See TNA WO 276/458: (AirOpsO 11/54, para 4 and 20/55, paras 2-3, respectively).

²⁴ TNA WO 276/458: AirOpsO 11/54.

²⁵ Warden III, J; *The Air Campaign; planning for combat*, (New York; to Excel, 1998) p80.

²⁶ TNA AIR 14/4073; RAF interrogation report of 'General' Mugo, leader of the Kibira Ngatu gang, captured 11 December 1954 in Nyeri.

²⁷ British Army, *Army Field Manual Volume 1, Part 10: Counter-ing Insurgency* (Land Warfare Centre: 2009) pp1-2.

²⁸ So called in this analysis because they were unsure as to where their allegiances lay. JDP 3-40 defines this element of the population as 'neutrals' and notes that their passive acquiescence plays a critical role in a Government's success in counter-insurgencies. See MoD, *JDP 3-40: Security and Stabilisation: The Military Contribution*. (Shrivenham, Development, Concepts and Doctrine Centre, 2009) pp5-3.

²⁹ TNA AIR 20/9530: Report on the use of air bombing as a morale weapon, p2.

³⁰ Bennett, H; 'The Other Side of the Coin: Minimum and Exemplary Force in British Army Counter-insurgency in Kenya', *Small Wars & Insurgencies*, Vol 18, No 4 (2007), pp640-657.

³¹ TNA WO 276/233: Royal Air Force bombing raids: Emergency Directive No 6, 3 May 1953, p4.

³² TNA AIR 20/9041: Note on RAF support to Mau Mau Operations by Air Commodore Graham. 20 June 1953, p4.

³³ *Ibid*. Signal CAS to C-in-C MEAF, 30 June 1953.

³⁴ Edgerton, R; *Mau Mau: An African Crucible* (London: IB Tauris, 1990) p86.

³⁵ TNA WO 276/458.

³⁶ TNA AIR 20/9041; Signal Crawford to Lyttelton, 24 April 1954.

³⁷ TNA CAB 128/27; Minutes of Cabinet meeting of 26 May 1954.

- ³⁸ TNA AIR 20/9041; Letter Lyttelton to Erskine, 28 May 1954.
- ³⁹ Approximately 20 miles outside of the Aberdares prohibited area.
- ⁴⁰ TNA AIR 8/1886; Letter SRAFO to OC Eastleigh and Tactical Air Commander in the JOC, 26 November 1954.
- ⁴¹ TNA AIR 8/1886; Letter seeking Churchill's permission to continue Op MUSHROOM activity 24 January 1955.
- ⁴² British Army; *Counter-ing Insurgency*, pp1-7.
- ⁴³ TNA AIR 8/1886; Signal CAS to CinC MEAF 12 October 1954.
- ⁴⁴ Clausewitz, *On War*, p100.
- ⁴⁵ Bennett, *The other side of the Coin*, p649.
- ⁴⁶ Bennett, H; 'The British Army and Controlling Barbarization during the Kenya Emergency' in *Warrior's dishonour: barbarity, morality and torture in modern warfare*, ed. G. Kassimeris (Aldershot: Ashgate, 2006) p61.
- ⁴⁷ Three hundred civilians were inside conducting evening prayers when the Mosque was bombed on 3 January 2009. A boy who was sitting at the entrance, had his leg blown off which was later found on the roof. The UN judged it as a direct attack on civilians, thereby contravening the 4th Geneva Convention. See Goldstone, R; *Report of the United Nations Fact Finding Mission on the Gaza Conflict conducted by the Israeli Defence Force from 27/12/2008 to 18/1/2009* (UN: 2009) pp233-237.
- ⁴⁸ One hundred and sixteen Afghan civilians were killed in 2006 by NATO airstrikes. In 2007 this increased to 321; more than the number killed by ground fire that year. See 'Troops in Contact': *Airstrikes and Civilian Deaths in Afghanistan*, (Human Rights Watch, USA: 2008). Available at: <http://www.sipri.org/blogs/Afghanistan/airstrikes-and-civilian-casualties-in-afghanistan> (accessed 4 May 2010).
- ⁴⁹ <http://www.spiegel.de/international/germany/0,1518,663582,00.html> (accessed 4 April 2010).
- ⁵⁰ McChrystal, S; *Commander's Initial Assessment*, (August 2009) p1-3. Available at: http://media.washingtonpost.com/wp-srv/politics/documents/Assessment_Redacted_092109.pdf?hpid=topnews (accessed 10 May 2010).
- ⁵¹ *Ibid*, pp2-10.
- ⁵² TNA AIR 14/4073; Intelligence reports 1954-55.
- ⁵³ TNA AIR 8/1886; Signal Lathbury to CinC MEAF, 3 June 1955.
- ⁵⁴ *Ibid*. Signal Director of Operations to Lathbury, 7 June 1955.
- ⁵⁵ TNA AIR 20/9517; Signal Eastleigh to HQBF Aden, 21 July 1955.
- ⁵⁶ TNA AIR 2/12268; Extract from minutes of the Defence Committee(53) 4th meeting, 7 March 1953.
- ⁵⁷ TNA AIR 20/9041; Brief for the War Council on the effects of bombing the Mau Mau, 5 July 1954, p2.
- ⁵⁸ TNA AIR 20/9530; Report on RAF operations in Kenya 1953-1955, p4.
- ⁵⁹ The Lincolns were requested by Templer on 9 June 1953 and, under Operation BOLD, eight were sent to Tengah and began operations with No 83 Sqn at a planned rate of effort of 35 hours per month. They remained in Malaya until April 1954. See TNA AIR 20/9271; Bombers Malaya: Air support for operations by Lincoln aircraft.
- ⁶⁰ TNA AIR 20/9041; Signal CAS to GOCCinC East Africa, 26 October 1953.
- ⁶¹ TNA AIR 14/4496; Report on No 49 Sqn in Kenya.

⁶² Waters, *The Cost of Air Support*, p98.

⁶³ TNA AIR 20/9041; Brief for the War Council on the effects of Mau Mau bombing, 5 July 1954, p2.

⁶⁴ *Ibid.*

⁶⁵ TNA WO 276/233; RAF bombing raids: Report on the use and value of heavy bombing, p1.

⁶⁶ TNA AIR 14/4073; Extracts from interrogations of Mau Mau prisoners about the effects of bombing, 15 November 1954.

⁶⁷ Pape, R; *Bombing to Win* (Cornell University Press, 1996) p79.

⁶⁸ Erskine, G; *The Mau Mau Rebellion*, A lecture by General Erskine to the Camberley Staff College (1955).

⁶⁹ TNA AIR 8/1886; Signal Lathbury to VCIGS, 19 May 1955.

⁷⁰ TNA AIR 20/9517; Operations summary reports.

⁷¹ Operation ALACRITY involved the deployment of three Lincoln, two Canberra and two Sabre squadrons to MEAF to support Operation QUICKFIRE; the codename for the contingency plan to defend Jordan in the event of an Israeli attack. See TNA AIR 20/9509; Operation QUICKFIRE: Plan for rapid reinforcement of MEAF in an emergency.

⁷² TNA AIR 2/12668; Future air staff policy: Report on Air matters, 14 August 1954.

⁷³ TNA AIR 20/9530; Report on Delay of clearance of targets by Army formations.

⁷⁴ TNA AIR 23/8615; Mau Mau operations 1953-1954. Directive from SRAFO highlighting Lincolns missing targets, 23 December 1953.

⁷⁵ *Ibid.* Report on the effectiveness of RAF bombing during Operation BLAST from OC C Company, Kenya Regiment, 25 March 1954, p1.

⁷⁶ TNA AIR 23/8615; Letter to all security forces from Erskine, 16 April 1954.

⁷⁷ TNA AIR 23/8617; Air Operations Policy: Report from Wg Cdr Newman to DirofOps(3) entitled 'Air Force operations in support of cold or limited wars', 17 May 1954.

⁷⁸ TNA AIR 20/9530; Report on RAF Operations 1953-1955, p6.

⁷⁹ TNA AIR 20/9517; Report on Photo Reconnaissance, p2.

⁸⁰ TNA AIR 20/9530; Report on planning for Air Operations.

⁸¹ *Ibid.* Photographs taken in poor light, bad weather or in low cloud invariably meant little analysis could be conducted – a significant problem during the rainy season when both Lincoln and Meteor strike photography was seldom obtained. The Lincoln's camera also regularly malfunctioned.

⁸² Dalton, Sir S; *Dominant Air power in the Information age*, (February 2010). Available at: <http://www.iiss.org/recent-key-addresses/air-chief-marshal-sir-stephen-dalton/> (accessed 10 May 2010).

⁸³ BBC news: How RAF Jets gather 3D intelligence in Afghanistan. <http://news.bbc.co.uk/1/hi/uk/8535424.stm> (accessed 7 May 2010).

⁸⁴ TNA AIR 75/69; Slessor's report on the effect of Air Power in a Land Offensive to General Arnold, Commander US Army Air Forces, 18 June 1944, p6.

⁸⁵ David, S; 'Fatal Choices: Israel's Policy of Targeted Killing' in *Democracies and Small Wars*, ed. E Inbar (London: Frank Cass, 2003) pp139-156.

- ⁸⁶ Paget, J; *Counter-insurgency campaigning* (London: Faber and Faber, 1967) pp167-168.
- ⁸⁷ Gray, C; 'Understanding Air power: Bonfire of Fallacies' in *Strategic Studies Quarterly*, (Winter 2008) p60.
- ⁸⁸ Colley, P; 'Soldiers are from Mars and Airmen from Venus: Does air power do what it says on the tin?' in *Air Power Review*, Vol 11, No 2 (Summer 2008) p111.
- ⁸⁹ Fuller, J F C; cited in *AP3002: Air and Space Warfare, 2nd Edition*, (Waddington: Air Warfare Centre, 2010), p8-1.
- ⁹⁰ TNA AIR 2/12268; Op NICOTINE: Airlift of reinforcements to Kenya: Letter DofOps(3) to SofS for Air, 10 April 1953.
- ⁹¹ TNA AIR 14/4496; Report on 49 Squadron's Mau Mau Operations in Kenya, January 1954.
- ⁹² TNA WO 216/861; Report by Erskine to Lyttelton, 3 October 1953, p4.
- ⁹³ TNA AIR 20/9041; Signal CAS to SRAFO, 27 November 1953.
- ⁹⁴ 'Kenya Pattern Bombing' in *The Daily Telegraph*, 19 November 1953, p9.
- ⁹⁵ TNA AIR 20/9041; Letter Erskine to CAS, 23 November 1953.
- ⁹⁶ *Ibid.* Signal Chief Information Officer, Eastleigh to CinC MEAF, 25 November 1953.
- ⁹⁷ Ziman, H; 'Wasteful air attacks on Mau Mau' in *The Daily Telegraph*, 21 December 1953, p6.
- ⁹⁸ TNA AIR 20/9041; Minutes of Chiefs of Staff (53)144th Committee meeting, 22 December 1953.
- ⁹⁹ 'What is this thing called War?' in *The Economist*, 24 April 2010, p35
- ¹⁰⁰ Clausewitz, *On War*, p101.
- ¹⁰¹ Clodfelter, M; 'Back from the Future: The Impact of change on Air power in the Decades Ahead' in *Strategic Studies Quarterly* (Fall 2009) p106.
- ¹⁰² TNA AIR 20/9041; Telegram, Baring to Lyttelton, 19 January 1953.
- ¹⁰³ All military operations in Kenya were commanded by Maj-Gen Hinde at this time.
- ¹⁰⁴ TNA AIR 20/9530; Report on RAF operations in Kenya 1953-1955, pp4-5.
- ¹⁰⁵ TNA AIR 2/12268; Op NICOTINE: Airlift of reinforcements to Kenya: Minutes of the Defence Committee(53) 4th meeting, 6 March 1953.
- ¹⁰⁶ TNA AIR 20/9041; Telegram ACAS(Ops) to SASO MEAF, 28 March 1953.
- ¹⁰⁷ *Ibid*; Note from DirofOps(3) to CAS, 20/6/1953, p2.
- ¹⁰⁸ *Ibid*; Signal CAS to CinC MEAF, 30 June 1953.
- ¹⁰⁹ *Ibid*; Letter CAS to Lyttelton, 28 April 1954.
- ¹¹⁰ *Ibid.*
- ¹¹¹ TNA AIR 8/1886; Letter AMP to CAS, 27 June 1955.
- ¹¹² TNA AIR 20/9041; Note from DirofOps(3) to CAS, 20 June 1953.
- ¹¹³ *Ibid*; Report from CinC MEAF to CAS, 8 January 1954
- ¹¹⁴ Clodfelter, *op cit*, p111.
- ¹¹⁵ Kitson, F; *Low Intensity Operations: Subversion, Insurgency and Peacekeeping* (London: Faber and Faber, 1971) p31.
- ¹¹⁶ Dalton, *op cit*.

WHAT'S IN A NAME? RDF, RADAR AND RADIOLOCATION

by Clive Richards

Today, the term 'radar' has gone beyond its technical definition and entered the wider popular lexicon. However, as readers of this *Journal* will be aware, in the UK the first apparatus designed specifically to use reflected radio waves in order to detect distant aerial targets carried a different designation – 'RDF'. Commenting on the derivation of RDF in his 2001 study *Britain's Shield: Radar and the Defeat of the Luftwaffe*, Canadian historian Professor David Zimmerman pointed to the fact that although 'Several of the early radar pioneers claimed to have had some role in creating the term and historians have generally accepted their accounts', the reality 'as is often the case, is much more mundane' than these accounts suggest.¹ This paper will seek to explore the origins of the terms RDF and radiolocation and the manner in which both were supplanted by the later term radar.

The name RDF would appear to date from August 1935. On 2 August the Air Ministry's Director of Scientific Research (DSR), Henry Wimperis, submitted to the Air Member for Research and Development (Air Mshl Sir Hugh Dowding) and the Deputy Chief of the Air Staff (AVM Christopher Courtney) 'a short memorandum on the practical forms which defence by radio detection is likely to take us so far as can be judged at this somewhat early stage of the investigation.' Courtney subsequently discussed this paper with the desk officer then responsible for branch FO1 in the Deputy Directorate of Operations, Directorate of Operations and Intelligence, Department of the Chief of the Air Staff, Wg Cdr John Andrews. In a minute to Wimperis dated 23 August 1935, Andrews stated that the DCAS:

'would like a name for this system of detection which does not immediately indicate its method of operation. I suggest RDF (a compression of RD [radio detection] and D/F [Direction Finding], to serve as verb, noun or adjective, as required. If you agree...we will use the initials in all future papers.'²

As a post-war monograph prepared by the Air Historical Branch noted, this new term was ‘intentionally misleading since, at the time, the problem of Direction Finding was receiving little attention.’³ Andrews’ suggestion was approved by Wimperis, on 17 September 1935, and made its first appearance in an Air Ministry technical document – a paper by Wimperis entitled ‘Notes on proposed methods of plotting information received from RDF Stations’ – a week later.⁴

Although the new system was now officially christened RDF, this would not appear to have been the only designation used by those working in this field. According to the compiler of the War Office historical monograph examining the development of Army radar, Brigadier A P Sayer RE, ‘another name will be found in early reports that might well confuse a searcher among the old records’:

‘This is ‘CUCKOO’, which was perhaps an unofficial code name or possibly even just a “pet” name, used by the small group of scientists and the equally limited number of service officers concerned in those early days. This name is really quite expressive in that it might almost be said to be onomatopoeic, or at least to represent, with its hard and short “CUC”, the powerful short pulse transmission and its gentle “KOO”, the small part reflected back from the target or other object.’⁵

In May 1937 RAF personnel assumed responsibility for the first Chain Home (CH) RDF station and by July of the following year five such stations ‘were ready for the August air defence exercises.’⁶ The construction of the CH stations, with their distinctive array of transmitter and receiver towers, did not mean that the RDF programme was now in the open. In a letter ‘To All Commands at Home and Abroad’ dated 21 April 1938, the Assistant Chief of the Air Staff (ACAS), AVM William Sholto Douglas, acknowledged that while ‘It has been the policy of the Air Ministry up to the present to maintain the highest standard of secrecy possible in regard to RDF’,

‘Once a system is developed, however, and is in general use in the Service, it is no longer possible to maintain secrecy in regard to its existence. In fact, with the erection of RDF stations along our coast line, enterprising foreigners will undoubtedly form a fairly shrewd assessment of their potentialities.’



As AVM Douglas pointed out, it was impossible to hide the aerials of a Chain Home station. This one survives at Stenigot where, now a Grade II Listed Building, it is still used for training by the RAF's Aerial Erector School. (David Wright)

Despite this, Douglas went on to emphasise that it was 'still of the highest importance that we should maintain any lead which we may possess in the development of RDF technique and its practical application to home defence.' As a consequence, 'the strictest secrecy should still be reserved' concerning 'The technical aspect of RDF and the equipment of stations'; 'The tactical employment of RDF in the detection and interception of aircraft'; and 'The organisation of

RDF in a defence system.' Air Officers Commanding were requested to 'issue such orders as you deem necessary within your Command to ensure that this object is attained. It is suggested that these orders should make particular reference to the undesirability for discussing the subject of RDF at all in public places or with anyone not essentially concerned.'⁷

The term 'RDF' remained classified until the middle of the Second World War, with 'radio' being used 'as a cover by which to designate personnel employed on these duties.'⁸ Despite this, the use of

'radiolocation' systems by the RAF was made public in 1941. Official acknowledgment of the existence of radiolocation was driven primarily by the pressing need to recruit personnel from North America who could be trained to maintain and operate RDF equipment. The first tentative steps in this direction were taken in Canada. Speaking in the Canadian House of Commons on 17 March 1941, the Minister of National Defence for Air, Major C G Power, 'revealed...that Canadian and American scientists had co-operated in the development of Britain's new secret weapon against night bombing and that Canadian radio technicians were rendering an important service in bringing it into operation.'⁹ In the same month, the Royal Canadian Air Force launched a campaign to recruit 2,500 men 'who will be given a short, intensive course in radio work in Canada and sent overseas to take their places in the ground defences.'¹⁰ During a radio address in support of this drive, broadcast on 8 April 1941, Power stated that 'Scientists of England have invented and their fellows in Canada and the United States have assisted in the development of a modern weapon against day and night attack by air':

'The details of this work are of course secret, but I can say that in general terms it means that by using a great number of small radio sets of modern design radio technicians posted at ground points all over the British Isles will be able to detect enemy planes in the air and direct anti-aircraft fire with deadly precision

The British Air Ministry expects great things of this invention, but like everything else it calls for men to make it work. For several months now we have combed Canada for amateur and professional radio men and rushed them overseas.

But that source of supply is now dried up and we are ready to take green men, men of good education who have never seen the inside of a radio.'¹¹

The statements emanating from Ottawa were reported in the British press and came to the attention of Parliament.¹² The subsequent unveiling of radiolocation would appear to have been choreographed with considerable precision. In a question to the Prime Minister on 17 June 1941 the Liberal MP for the Isle of Ely, James de Rothschild,

referred to ‘a recent speech by the Canadian Minister for National Defence in which he referred to a device for the detection of enemy aircraft’ and asked ‘whether he has any statement to make on this subject’. Responding on behalf of the Prime Minister, the Lord Privy Seal, Clement Attlee, noted that ‘Thanks to the brilliant work of our scientists, great progress has been made in devising means of helping the Fighting Services in their task of locating and destroying the enemy. This contributed in no small measure to our victory in the Battle of Britain last autumn’.¹³ At a press conference held on the same day, Air Chf Mshl Sir Philip Joubert de la Ferté – then AOCinC Coastal Command, but previously the Assistant Chief of the Air Staff (Radio) – acknowledged for the first time in public the contribution made by the ‘entirely new military art’ of ‘Radiolocation’ during the Battle of Britain:

‘Our sorely overworked fighters had no need to maintain standing patrols. They could rely on the vast Radiolocator system to tell them in plenty of time when the enemy were coming and from what direction. This was of such incalculable help to them that independent observers from the Dominions have stated categorically that the Battle of Britain was won by the Fighters of the Royal Air Force and Radiolocation.’¹⁴

The final elements of the press launch took place on 18 June. The first of these was a broadcast by Lord Beaverbrook to the United States of America in the early hours. According to a report published in *The Times* on the same day, Beaverbrook referred in his address to ‘a new science...the science of radio location’ and asked for ‘the technician’ and those with ‘experience of radio and electrical devices’ and ‘enthusiasm for wireless development’ to volunteer for service in Britain.¹⁵ This was followed by the release of a bulletin by the Air Ministry News Service entitled ‘Radiolocation and the WAAF’ and detailing how radiolocation was ‘providing the opportunity for hundreds of young women to man the outer ramparts of our defences.’¹⁶

Although ‘radiolocation’ was now in the public domain, the Air Ministry nevertheless sought to limit the amount of information on this subject that the media could divulge. The boundaries within which the press could operate were set out in a guidance note prepared

for the Chief Press Censor at the Ministry of Information, Adm George Thomson, and the head of the branch in the Air Ministry's Directorate of Public Relations responsible for liaising with the Ministry of Information (PR & AI5), Gp Capt Charles Bradley:

'A general account may be given of the principle underlying Radiolocation, ie the employment of the property of solid matter to reflect electric waves for the purpose of locating aircraft in space by means of suitable apparatus, but no particulars or speculation can be permitted in connection with any detailed application of the principle, or the apparatus involved, or the range, or the wave lengths used, or the accuracy, efficiency or limitations of the stations using such apparatus, and no indication may be given of the location of Radiolocator stations or descriptions of the exterior or interior of such stations.'¹⁷

From mid-1941, therefore, two names were employed in the British Empire for this new technology; RDF for Service use, and radiolocation for public consumption.¹⁸ However, the introduction of 'radiolocation' led in turn to a change in the way that the terms RDF and radio were used by the UK's armed forces. This change was triggered by the Wireless Telegraphy Board. On 27 October 1941 the chairman of the latter, Lt Col C V L Lycett, wrote to the Secretary of the Chiefs of Staff Committee (Brig Leslie Hollis) with regard to the 'Considerable confusion [*caused*] through the misuse of various terms connected with radio communications' following the development of RDF. 'Now that the existence of this weapon has been officially disclosed under the term, of "radiolocation"', the Wireless Telegraphy Board were keen 'to end the anomalous situation caused by the misuse of the various terms and to revert to the more generally accepted meaning.' To this end, they offered revised definitions of the words: 'radio', 'RDF' and 'wireless'. Their suggested definitions were referred by Hollis to the RDF Policy Sub-Committee of the Chiefs of Staff Committee. While accepting the principle advanced by the Wireless Telegraphy Board, the RDF Policy Sub-Committee disagreed with their definitions and instead proffered their own for the approval of the Chiefs of Staff Committee:

Radio. ‘In future the word “radio” will cease to be used by the Services as having particular reference to RDF but will normally be used in its customary broader sense as an inclusive term for all uses of wireless including RDF.’

RDF. ‘The term “RDF” will be used by the Services to cover all methods of radiolocation involving reflection or re-radiation. The term “radiolocation” may be used by the Services in matter which is communicated to the public.’

Wireless. ‘The word “wireless” (although strictly synonymous with “radio”), will be regarded by the Services as applying more particularly to communications, that is, Wireless Telegraphy and Telephony and their applications, including DF but excluding RDF and other forms of radio.’¹⁹

The Chiefs of Staff Committee approved the definitions suggested by the RDF Policy Sub-Committee during their meeting on 28 November 1941 ‘and invited the Service Departments to notify all concerned’.²⁰ The Air Ministry duly promulgated the definitions in an Air Ministry Order issued in 1941, and subsequently in an Air Ministry Office Memorandum distributed in May 1942.²¹ Within the Air Ministry, the Directorate of Radio was now renamed the Directorate of RDF, while its constituent branches, R1, R2 and R3, became RDF1, RDF2 and RDF3; Signals (Radio) Officers and Signals (Radio) Supervisory Officers became Signals Officers (RDF) and Signals Supervisory Officers (RDF); while in the RAF, the Group I Trade of Radio Mechanic was renamed RDF Mechanic and the Group II Trade of Radio Operator became RDF Operator – although the aircrew category of Observer (Radio) was unchanged. Radio Schools also became RDF Schools and ‘Non-communications equipment (where connected with RDF)’, RDF equipment.

This situation would prevail for only a year. Once again, the initial impetus for change would appear to have emanated from across the Atlantic – in this case, the USA. In November 1940, the name ‘radar’ (‘a synthetic word meaning Radio Direction And Ranging’, first coined by Lt Cdrs Samuel M Tucker and F R Furth USN) was adopted officially by the US Navy.²² In 1943 it was decided in the interests of commonality that all of the Allied Powers should use this

designation.²³ In June of that year a Confidential Admiralty Fleet Order (CAFO) was issued stipulating that radar be used in place of RDF by the Royal Navy as from 1 July.²⁴ Subsequently, an Air Ministry Order (AMO) promulgated on 2 September 1943 directed that ‘The term “Radar” will be used by the services where previously the term “RDF” was used.’ Henceforth, ‘radio’ was to ‘continue to be used as an inclusive term for all uses of wireless, including Radar’, while ‘wireless’ was to ‘be regarded by the services as applying more particularly to communications, that is, wireless telegraphy and telephony and their applications, including DF but excluding Radar and other forms of radio.’ The term ‘RDF equipment’ was replaced by ‘radar equipment’, and the trades ‘RDF operator’ and ‘RDF mechanic’ became ‘radar operator’ and ‘radar mechanic’.²⁵

Although references to the use of the term ‘radar’ in the USA appeared in the British press as early as June 1943, the Air Ministry nevertheless directed that ‘radiolocation’ should continue to be used in public.²⁶ Despite this prohibition, ‘radar’ continued to appear in UK newspapers and specialist journals during 1944.²⁷ Bowing to the inevitable, in January 1945 an AMO ruled that ‘As the term “Radar” is now commonly used by the public press, it has been decided to discontinue the official use of the term “Radiolocation” when communicating information on this subject to the general public.’²⁸

Notes:

¹ Zimmerman, Professor David; *Britain’s Shield: Radar and the Defeat of the Luftwaffe* (Sutton Publishing, Stroud, 2001) pp90-91

² TNA AIR 2/4484, Minutes 2 and 4. The copy of *The Air Ministry: List of Staff and Direction of Duties* for July 1936 held by the MOD Air Historical Branch (RAF) indicates that duties of FO1 encompassed the ‘Air Defence of Great Britain and operational questions in Europe and in connection with air raid precautions’ (page 34).

³ Air Publication AP 1063, *Signals, Volume IV: Radar in Raid Reporting* (Air Ministry (AHB), 1950) (TNA AIR 41/12), p8.

⁴ TNA AIR 2/4484, Minute 5; Zimmerman, *op cit*, p91.

⁵ Sayer, Brigadier A P CB DSO RE, *Army Radar* (War Office, 1950) (TNA WO 277/3), p2. Sayer goes on to note that ‘A number of other names or titles were suggested at times, such as “ERA” of unrecorded significance, but need not be detailed here.’

⁶ Brown, Louis, *Technical and Military Imperatives: A Radar History of World War II* (Taylor and Francis, Abingdon, 1999), p55.

⁷ TNA AIR 2/4484 Enc 119A. The continued cloak of secrecy was not without merit; for as Brown notes, ‘The characteristics of CH were so different from those of the German design that it baffled completely the first attempt at electronic espionage sent against it’ (*ibid.*, p55).

⁸ Letter from Lt Col C V L Lycett, Chairman, Wireless Telegraphy Board, to Brig L C Hollis, Secretary, Chiefs of Staff Committee, 27 October 1941; COS (41)691 War Cabinet Chiefs of Staff Committee: *Use of Terms “Radio”, “Radiolocation” and “Wireless”*: Note by Secretary, 25 November 1941. Annex I: TNA CAB 80/32.

⁹ Farquharson, R A, ‘Canadians Helped Develop Antidote to Night Bombing’, *The Globe and Mail*, 18 March 1941
(<http://collections.civilisations.ca/warclips/objects/common/webmedia.php?irn=5060296>, accessed 18 January 2013).

¹⁰ ‘Urgent Call Issued by RCAF For 2,500 Radio Technicians’, *The Globe and Mail*, 1 April 1941
(<http://collections.civilisations.ca/warclips/objects/common/webmedia.php?irn=5021134>, accessed 18 January 2013).

¹¹ ‘Calls Canadians to Operate Secret Radio Defense Weapon’, *The Globe and Mail*, 9 April 1941

(<http://collections.civilisations.ca/warclips/objects/common/webmedia.php?irn=5012939>, accessed 18 January 2013). A report published in the same newspaper two days later suggested that Power had ‘alluded to a statement made by Air Marshal Sir Hugh Dowding, former Chief of the Air Staff of the Royal Air Force [*sic*], to the effect that a radio device has been invented which, it is anticipated, will nullify night bombing. Certain equipment developed by the United Kingdom authorities is effective in overcoming this menace, but the complete success of it is dependent upon an adequate number of technicians to cover all vulnerable areas.’ ‘A Call to Special Service’, 11 April 1941

(<http://collections.civilisations.ca/warclips/objects/common/webmedia.php?irn=5095633>, accessed 18 January 2013).

¹² After some delay; for example, Power’s radio address of 8 April 1941 was reported in *The Times* some six weeks after it had been delivered in Canada (‘Detecting Night Bombers: Radio guide to AA fire’, 21 May 1941, p4).

¹³ Hansard HC Deb 17 June 1941 vol 372 cc477-8; ‘Locating Air Raiders: A British Device: 10,000 craftsmen needed’, *The Times*, 18 June 1941, p4; ‘Powerful Canadian Aid To Maintain Equipment That Destroys Raiders’, *Hamilton Spectator*, 17 June 1941

(<http://collections.civilisations.ca/warclips/objects/common/webmedia.php?irn=5087023>, accessed 18 January 2013).

¹⁴ ‘Radiolocation: Secret Device for Aircraft Detection’, *Flight*, 26 June 1941, pp403-31. A copy of the notes used by Joubert de la Ferté at the press conference – together with ‘Notes for the Press’ prepared by the Directorate of Public Relations, Air Ministry, for distribution to journalists attending the conference – can be found on TNA AIR 20/6012.

¹⁵ “‘Radio Location’: Lord Beaverbrook’s call for helpers’, *The Times*, 18 June 1941, p4. The text of Beaverbrook’s broadcast was released to the press by the Air

Ministry as AMB [Air Ministry Bulletin] No 4190 (copy on TNA AIR 20/6012). His appeal was not limited solely to those Americans who wished to join Britain's armed forces. Speaking in the House in response to a question from the MP for Cumberland Northern (Wilfrid Roberts) on 18 June, the Secretary of State for Air, Sir Archibald Sinclair, announced that:

'Skilled men overseas whose services are available, who possess the requisite qualifications and are otherwise suitable, are free to enlist in the technical branches of the fighting Services; but, in order to afford a wider opportunity for skilled technicians overseas to respond to the appeal which was broadcast last night by my noble Friend the Minister of State [Beaverbrook], His Majesty's Government have decided to establish a Civilian Technical Corps in which will be enrolled men who volunteer to come to this country for service in the repair and maintenance establishments of the Navy, Army and Air Force in a non-combatant capacity. The corps is being established by the Defence (Civilian Technical Corps) Regulations, made under the Emergency Powers (Defence) Acts, 1939-40.'

Hansard HC Deb 18 June 1941 vol 372 cc623-4.

¹⁶ Air Ministry Bulletin No 4192, 18 June 1941; on TNA AIR 20/6012.

¹⁷ TNA AIR 20/6012.

¹⁸ This did not, of course, prevent the use of unofficial designations; for example, Brown notes that 'The Australians have their own way with the language and called the new device a 'doover'' (*op cit*, p83).

¹⁹ COS (41)691 War Cabinet Chiefs of Staff Committee: *Use of Terms "Radio", "Radiolocation" and "Wireless": Note by Secretary*, 25 November 1941: TNA CAB 80/32.

²⁰ COS (41) 401st Meeting War Cabinet Chiefs of Staff Committee: *Minutes of Meeting held on Friday, 28th November, 1941 at 3.30pm*, item 6, p3; TNA CAB 79/16.

²¹ AMO A 1092/41; Air Ministry Office Memorandum 66/42, 8 May 1942. A copy of the latter is contained in TNA AIR 20/7243.

²² FTP 217 'U.S. Radar: Operational Characteristics of Radar Classified by Tactical Application' (Washington, DC: Radar Research and Development Sub-Committee of the Joint Committee on New Weapons and Equipment, 1 August 1943), p1 (accessed via the Naval History & Heritage Command Online Reading Room (<http://www.history.navy.mil/library/online/radar-intro.htm>), 16 January 2013); Buder, Robert, *The Invention that Changed the World: The Story of Radar from War to Peace* (Little, Brown and Company, London, 1996) p56. Different designations had been adopted initially by the US Army: according to Brown, 'The Signal Corps referred to it as 'RPF' for 'radio position finding', and the Air Corps, overcome by the need for secrecy, called it 'derax' (*op cit*, p83). In his monograph *Army Radar*, Sayers notes that the palindrome radar 'is not, actually, entirely satisfactory in describing the system in that it places "direction" before "range", thereby reversing the primary features, at any rate in respect of the accuracy of measurement' (*op cit*, p1).

²³ Howse, Derek, *Radar at Sea: The Royal Navy in World War 2* (Macmillan, London, 1993), page xix; Brown, *op cit*, p83.

²⁴ CAFO 2925/43, 1 July 1943; cited in Howse, *op cit*, p162 and fn1, p329.

²⁵ AMO A 863/1943 'Use of the term "Radar" to Replace "RDF"', 2 September 1943 (MOD AHB collection).

²⁶ Commenting upon the US House of Representatives Appropriations Committee report on the War Department Appropriation Bill for the 1944-45 fiscal year, *The Times* noted on 19 June 1943 that 'The Radar (wireless) detection device was praised. The witnesses said that the attack on Attu could not have been accomplished without it. The weather there was so bad that the water could not be seen from the ships' decks, and the ships were berthed and men landed by the use of Radar' ('Huge US Army Budget', p4). On 24 June 1943, *The Times* correspondent in New York reported 'The invention of a completely successful device for eliminating static interference with radio reception' that was 'expected also to improve "radar", the device for detecting enemy aircraft and ships' ('New Radio Device: Claim that interference can be eliminated', p4).

²⁷ For example, on 4 May 1944 a report in the journal *Flight* on Sir Roy Fedden's Cantor Lecture to the Royal Society of Arts examining the development of post-war civil aviation, delivered on 24 April 1944, quoted Fedden's assertion 'that all civil flying will, after the war, be fully dependent on and controlled by radar and radio services' ('Future of Civil Aviation: Second Part of Sir Roy Fedden's Cantor Lecture Read Before the Royal Society of Arts', *Flight*, 4 May 1944, p484). Recording the announcement by the Admiralty on 8 September 1944 of 'the formation of a Royal Naval Scientific Service', the naval correspondent of *The Times* pointed to the successes already achieved by the Royal Navy in improving 'its own production, the Asdic...and, in collaboration with the other services, great strides in the development of radio and radar. Of neither of these, of course, have many details yet been made public; but the former has made possible the enormous advances in tactics of the present day, and the latter has, in effect, produced a new means of seeing which is unaffected by darkness, haze, or other varieties of bad weather. The latter development has actually produced something like a revolution in both strategy and tactics at sea, on which it is, of course, not permissible to enlarge' ('Science in the Navy: New service to be formed', 9 September 1944, p2).

²⁸ AMO A 80/1945 'Discontinuance of Use of the Term "Radiolocation"', 25 January 1945 (MOD AHB collection).

JAMES TEMPLER AND THE BIRTH OF BRITISH MILITARY AVIATION

by Michael J Dunn

In 1862, the British Army began seriously to examine the potential use of balloons in modern warfare. Initially, studies sought to overcome the shortcomings that had been highlighted during conflicts such as the American Civil War. From this small beginning, British military aviation was born. Only later were efforts made to turn the balloon into a practical and reliable tool for use by army commanders.

The first serious demonstration of British air power came during the Second South African War when military balloons were deployed in 1900 against the Boers. It had taken nearly forty years for military ballooning to evolve from a virtual standing start to a point where balloon units became an accepted part of the Army's establishment, during times of peace and war. They were forty years of hard work, personal sacrifice and fighting against tight budgetary restrictions. There was a constant battle with senior officers who felt that balloons offered little to a commander that other arms, notably the cavalry, did not already provide. British military ballooning reached its zenith during the Boer War when the potential value of air power became more widely recognised. Military aviation evolved around the technology of the day. Having initially focused on balloons, in the early years of the 20th century, development began to concentrate on newer technologies: airships and aeroplanes. The pace of development was such that, in 1912, the Royal Flying Corps was formed.

The pages below explore the evolution of military ballooning within the British Army. It focuses on the prominent role of James L B Templer in establishing air power as an essential, albeit small, force component during both wartime operations and peacetime exercises. Because of the importance of the work done by Templer, he may arguably be described as the 'Father of British military aviation'.

James L B Templer

For thirty years, one man, James Lethbridge Brooke Templer, dedicated his life to the development of ballooning in the British Army. He strove continuously to solve a myriad of technical issues and battled against endless political problems, resistance to change,



Lt Col J L B Templer

hostility from within the establishment and a constant shortage of funds. He was a man of many talents; a practical man who made things happen. Templer laid down a scientific foundation for ballooning development and took the lead in the task of making balloon units an accepted part of the Army's establishment.

Templer was born on 27 May 1846, the son of John Templer, Master in HM Court of Exchequer. Educated at Harrow and Trinity College, Cambridge, he became a Clerk to the Court of Queen's Bench and later a tea broker and an inventor. Templer was an enthusiastic and skilled sports balloonist and became a respected figure within the small ballooning fraternity. He owned his own balloon, the *Crusader*. In 1870, he joined the Militia, becoming a lieutenant in what later became the 7th Battalion Kings Royal Rifle Corps. The Militia offered a route to full-time service with the Army, service for which Templer longed. In 1878, he was invited to assist in the experiments in military ballooning being carried out by the Royal Engineers (RE). He finally retired from the Army in 1908, having seen these small-scale experiments evolve into the deployment of balloon sections during the Second Boer War and the flight of the airship '*Nulli Secundus*' in 1907. Templer died on 2 January 1924 at Lewes, in Sussex.

The Evolution Of Military Ballooning Within The British Army

After nearly forty years of development, the Army successfully deployed balloons in support of military operations and demonstrated that they could favourably influence the outcome of a battle. The evolution of British military ballooning may be broken down into three phases:

1. 1862-78. The initial proposals to the War Office to evaluate the

potential value of balloons to the Army, through to the establishment of the Balloon Committee and the conduct of experiments/studies into various aspects of ballooning.

2. 1878-99. The appointment of Templer; the design and manufacture of balloons; the construction of ballooning, transport and gas production equipment; the training of RE soldiers; the establishment of the Balloon Factory and the operational deployment of balloon sections to Bechuanaland and the 'Soudan' (Sudan).

3. 1899-1906. Ballooning operations in South Africa and China; subsequent reorganisations based on the lessons learned; the emergence of the airship and Templer's final retirement.

Phase 1: 1862-1878

In 1862, papers promoting the adoption of military ballooning by the British Army¹ were read at the Royal Engineers School of Military Engineering. They were written independently by Capt F E B Beaumont RE and by Lt G E Grover RE, following their experiences during the American Civil War. Beaumont was attached to a Balloon Corps, commanded by Thaddeus Lowe, which had formed part of the Federal Army under Gen George McClellan. The corps comprised two aeronauts, fifty soldiers and two balloons. Their tethered balloons provided a stream of observation reports throughout the campaign. The value of the information in the reports was dependent on a number of factors that affected the view of the observer: the height at which the balloon was flown; the weather conditions and the distance of the balloon from the front line. In his paper, Beaumont identified problems with the supply of gas, the gas holding capabilities of the balloons and with operating them in strong winds. In cautiously advocating the use of balloon reconnaissance by the British Army, Beaumont wrote:

'...with a properly constructed apparatus, balloon reconnaissance may be made in a wind at any rate up to 20 miles per hour; the higher the wind the less would of course be the altitude attained: however, a height of even two hundred feet is more than that of the spires of most churches – points of observation eagerly sought for when on the march in an

enemy's country ...'²

Lt Grover's papers provided a detailed description of the theory of ballooning from a technical and military perspective and touched on the use of balloons in warfare by the Americans and by the French in Italy. He wrote:

'It is unsatisfactory to reflect that no definite results have yet appeared from all researches into the question of aerial reconnaissance. Balloons have been advocated by some as most suitable for the purpose; they have been condemned by others on the score of their shortcomings.

Much, therefore, remains yet to be discovered, and though no practical results seem at present likely to be produced in this country from our investigations, yet a consideration on the subject of Reconnoitring Balloons may possibly effect beneficial results eventually.'³

At this time, the War Office had little or no interest in balloons. However, Beaumont and Grover were attached to the War Office Ordnance Select Committee so that initial experiments could be carried out. Reconnaissance experiments up to a height of 1,200 feet were performed using a balloon hired from a civilian aeronaut, Henry Coxwell. The results were inconclusive and the already lukewarm official interest largely abated. There was something of a revival following the Franco-Prussian war of 1870-71. A Balloon Subcommittee, initially consisting of Beaumont, Grover and Sir Frederick Abel (the War Department Chemist), was set up to continue the experiments. Thus began a slow programme of investigation into the main issues that needed to be resolved before ballooning could become a practical and useful option for the British military: most notably how best to manufacture hydrogen gas.⁴

Phase 2: 1878-1899

In 1878, Templer was invited to utilise his ballooning experience by working full time for the British Army. He accepted. This act proved to be a catalyst for military ballooning. He agreed to construct a balloon for the Army and the War Office granted £150 for the task. The balloon, *Pioneer*, and a small hydrogen plant, also built by Templer, were reported on very favourably. The Select Committee

recommended further experimental work should be carried out:

‘Captain Templer appears thoroughly conversant with the details of manufacturing and working balloons, and he has carried out the experiments at Woolwich with untiring energy The Committee consider that it would be most desirable to retain Captain Templer’s services for the further proposed experiments The Committee consider that Captain Templer should be in-trusted with the training of the Officers and men’⁵

The recommendations were accepted and experiments performed, despite the strict limitations imposed on the Balloon Committee’s budget.

In 1879, the Balloon Equipment Store (the first unit in the British Army dedicated to any form of flying) was formed and, a year later, military balloon training led by Templer and Maj H Elsdale began at Aldershot. An *ad hoc* balloon section soon began participating in the Aldershot manoeuvres.

In 1882, the War Office (WO) ordered that a balloon detachment, commanded by Capt H P Lee and including Capt Templer should be organised for service in Egypt. Equipment to be taken included ‘automatic’ cameras attached to small captive balloons, a portable hydrogen gas plant, telephones and Edison Lamps for night signalling. Manpower was to be provided by 23 Field Company RE. The campaign ended before the detachment had left England and an opportunity to demonstrate the balloon’s potential operational capabilities under ideal conditions was lost.⁶

At this time, the Balloon Equipment Store and the School of Ballooning (together making up the Balloon Department) moved from Woolwich to Chatham. Experimental work, balloon manufacture and the *ad hoc* training of soldiers from other units of the RE continued. Progress was such that in 1884-85 balloon detachments were sent to Bechuanaland and the Sudan, with support being provided by the Balloon Equipment Store at Chatham.

In 1886, a balloon detachment was sent on the first of several visits to the siege artillery practice grounds at Lydd to study the observation of artillery fire from the air, and to try and determine how close to an enemy position a balloon could be worked. The Ordnance Select



Balloon Section on manoeuvres at Frensham Pond, Surrey, 1898.

Committee commented favourably on the observation results but inconclusively reported that the closest safe distance for a balloon was 3,100 yards (the range of the guns). In the same year, Templer leased, at his own expense, some land at Lidsing, Kent. He hired it to the WO for use during the Balloon Department's summer camps. He dug out a pit so that balloons could be hauled down into it and moored safely from strong winds. Temporary screens were erected to protect balloons at ground level. The Lidsing project was of great value to the Army, but its overall cost left Templer considerably out of pocket.

An important step forward came in 1887 when the WO accepted a report from Maj Elsdale, the Officer Commanding the Balloon Department. With input from Templer, he reported on the current status of British military ballooning. He pointed out the temporary nature of the system by which NCOs and men were detached for ballooning duties, only to be attached elsewhere 'faster than we have been able to train them'. He recommended that a permanent ballooning unit should be established with its own dedicated buildings and training grounds.⁷ The WO appointed Maj Templer as the permanent Instructor of Ballooning, at a salary of £600 a year. He was also awarded £3,500 towards previous costs such as the lease of Lidsing, his inventions, etc. Establishments were revised and increased to:

Balloon Department

- 1 officer in charge
- 1 instructor of ballooning

Balloon Detachment (later Balloon Section)

- 1 lieutenant
- 1 sergeant
- 15 rank and file

Balloon Depot

- 1 military mechanist
- 1 civilian gas maker
- 1 civilian storeman
- 1 civilian driver
- 10 balloon-making hands

The Balloon Train (with horses to be provided by a RE field company)

- 1 balloon wagon with hauling down gear
- 3 tube wagons each carrying 44 tubes (ie gas cylinders)
- 1 equipment wagon with spare balloons and stores
- 1 water cart

Following the very favourable report from Gen Sir Evelyn Wood on the Balloon Detachment's performance at the 1889 Aldershot manoeuvres, a permanent Balloon Section (replacing the Balloon Detachment), comprising three officers, three sergeants and twenty-six rank and file, was authorised as an independent unit of the RE.⁸ Shortly afterwards, the Balloon Section and Depot (increasingly now called the Balloon Factory) moved to Aldershot. St Mary's Barracks Chatham were cramped and unsuitable, training space was limited and the prevailing wind blew directly to the North Sea, thus making free runs risky for trainee balloonists. The WO granted £9,000 to build a proper factory next to the RE lines at South Camp, Aldershot.⁹

In 1897, command of the balloon establishment was split. Templer was promoted to lieutenant colonel and appointed Superintendent of the Balloon Factory, reporting to the Inspector General of Fortifications in the WO. Training became the responsibility of the Balloon Section. This operational unit was placed under command of the GOC Aldershot Army Corps. The split between the operational



A convoy of Balloon Section wagons being drawn through Aldershot prior to departure for South Africa and the Boer War. While the Sections used horses in the field, the Balloon Factory preferred to use traction engines.

and the manufacturing/experimental sides of ballooning remained until after the formation of the Air Battalion RE in 1911.

Phase 3: 1899-1906

When the Second Boer War broke out in September 1899, the Balloon Section and Balloon Factory comprised a mere four officers and forty other ranks. Qualified officers were drafted in and reservists mobilised. By March 1900, three balloon sections had been sent to South Africa. A further 'extemporised' balloon detachment was later raised locally as part of the Ladysmith relief force. Balloon depots, complete with mobile gas plants, were set up in Cape Town and Durban. The WO increased the established strength of the Balloon Detachment to six sections. In August 1900, a fourth section was dispatched to China to assist in dealing with the Boxer Rebellion and a fifth section was sent to Australia. Throughout the war, the work of the Balloon Factory doubled. Over thirty balloons, plus all associated equipment, were manufactured and sent out to South Africa alone.

Ballooning operations in South Africa were relatively limited in



Capt B R Ward in the basket with a sapper in the rigging to operate the gas valve.

scope. However, they showed that several sections could be simultaneously deployed overseas, in both mobile and siege operations. The establishment of the sections sent out to South Africa proved to be about right, in terms of both manpower and equipment. The skills of the soldiers were a credit to the training regime. Transport for balloon units proved to be something of a problem as the sections did not have their own horses. A mix of borrowed horses, mules and oxen were used. When it came to allocating animals for transport, balloon sections

were considered a low priority. Preference was given to the artillery. Post war, it was ruled that a balloon section's establishment should include both dedicated drivers and horses.

Tactically, balloons were used for observation and reconnaissance and for artillery spotting. The very threat of their presence restricted the Boers' movements and adversely affected their morale. Their value to commanders on the spot was demonstrated at battles such as Bloemfontein and Fourteen Streams. Although the balloons were of particular benefit during siege operations, they could not be used during the guerrilla warfare phase when targets were both small and fleeting.

The war demonstrated two inherent weaknesses in the use of balloons. One was that they could not operate in winds above 25 mph. In high winds, the basket would become very unstable and swing violently across the skies. Without a stable platform, observation

became very difficult and balloonists would become very sick. To partly overcome these problems, Cody's war kites, which could operate in winds up to 50 mph, were introduced in 1905. The other major weakness was a balloon's inability to manoeuvre at will. Operationally, balloons could seldom be used in free runs, when the balloon was allowed to drift freely with the wind. Instead they were attached to the balloon wagon by a wire cable and simply hoisted up and down. This limited the view available to the observer during flight. To be able to see beyond the next hill and then return with the information was the wish of every commander. In a talk to the Royal United Service Institution, Templer once described how he had criss-crossed London during a free flight. He navigated by using the separate air currents that can exist at various altitudes, each one blowing in a different direction. Templer was able to ascend or descend to find one blowing in the direction he wanted to go. This 'phenomenon' could not be relied on in a war situation, as changing altitude might only find an air current to take a balloon deeper into enemy territory. However, it was the pressure for increased manoeuvrability that partly led to the development of the airship and, ultimately, the aeroplane.¹⁰

The end of the Boer War marked a significant change in attitude towards the value of military ballooning. Senior officers increasingly began to recognise its potential. The WO increased the level of funding from the very low, pre-war levels. A WO Balloon Committee reviewed in depth the lessons learned about military ballooning. Their final report demonstrated the Army's growing confidence in balloons and recommended that there should be an established place for them in the Army's future organisation.

After the war, training moved further forward. At practice camps, particular attention was paid to artillery co-operation. Balloon sections participated in more manoeuvres and exercises. The South African war showed a need for mobility on the part of all participants so particular attention was afterwards paid to getting balloons into action and hauling them down again. To improve the control of indirect artillery fire, telephone communications between a balloon and the ground was made more reliable.

The ballooning branch reverted to a peacetime establishment, based on five balloon sections (soon re-titled balloon companies but

later renamed ‘The Balloon School’) with, theoretically, one company per Army Corps on mobilisation. A balloon company’s wartime establishment was revised in the light of recent experience and was certainly larger than that of the pre-war sections, comprising: ¹¹

- 3 officers
- 31 dismounted men
- 32 mounted men
- 54 horses
- 10 wagons

Following the Boer War, Templer was still Superintendent of the Balloon Factory (and still reporting to the Inspector General of Fortifications) and Commandant of the Balloon School (reporting to the GOC Aldershot). In 1903, Templer handed over the Balloon School to Brevet Maj J E Capper, but remained as Superintendent of the Balloon Factory until 1906. Like Templer, Capper was an energetic, enthusiastic and dynamic figure. He focused on the training and operational work of the Balloon School and also provided manpower to assist in the experimental programme run by the Balloon Factory. Command of the Balloon Factory passed to Capper when Templer was retired in 1906, at the age of 60. At Capper’s request, Templer was re-engaged to act as his part-time advisor during the development and construction of the Army’s first airship, *Nulli Secundus* and her successor *Nulli Secundus II*. Templer finally retired in April 1908.

The Development Of Military Balloons

To understand the course of ballooning development over the years, a description of some of the issues surrounding ballooning should be made. In 1878, the British Army possessed neither balloons nor the means to manufacture them. It had neither an efficient way of manufacturing gas nor a supply chain for deploying balloons, gas and other equipment in support of the most basic operational requirement.

The Objectives Of Ballooning Development

From Templer’s arrival at Chatham until he handed over command of the Balloon Factory in 1906, development of British military ballooning continued unabated. Whilst at the Balloon Factory, he focused primarily on manufacturing. But Templer was always

intimately involved in all aspects of technical development. His key objective was to make military ballooning 'fit for purpose', to transform it from a series of theoretical investigations using borrowed balloons, equipment and soldiers (with limited knowledge of the subject) into a properly equipped, professionally trained force that would become a recognised part of the order of battle. Balloon units had to be deployable overseas and operate under field conditions. Practical equipment had to be designed and built, often by the RE themselves. Processes had to be devised and practised for using the equipment. Of particular importance, drills were needed to fill balloons, winch them up to the required operating height, haul them down and deflate them. Special wagons, based on the standard General Service (GS) Wagon, for carrying gas tubes, balloons, cable and other equipment had to be built. Balloon observers needed their own drills for both tethered ascents and free flights. Experiments were carried out in aerial photography, meteorology and telephone communication between the balloon and the ground. All of this required an extensive and continuing programme of designing and building equipment, and then working out how it could be used, transported and integrated into the operational balloon sections.

By the 1870s, the basic design of military balloons was fixed although there were variations between the designs adopted by different countries, eg the way the basket was attached to the rigging. Minor improvements to the fundamental design were made continually. However, balloon performance was affected by two key factors:

1. The gas used to inflate the balloon,
2. The fabric from which a balloon's envelope was made (this affected the balloon's ability to retain gas and maintain lift).

These factors affected the amount of gas that had to be manufactured and transported, and how frequently the balloons had to be filled. In fact they affected the detailed design of the whole of the supply chain needed to support military ballooning operations.

Selecting The Most Suitable Lifting Gas

In 1878, two gases were used for inflating balloons, coal gas and hydrogen.



The Balloon Section preparing a balloon for filling from tube wagons.

Coal Gas (Town Gas): Favoured by sports balloonists, coal gas was cheaper than hydrogen, but it provided less lift, so that balloons had to be larger and more gas had to be purchased, manufactured, transported and stored. From the military perspective, its use was limited to operations being carried out in developed countries, fairly close to local gas supplies. The quality of coal gas varied considerably from source to source. For a time, British policy was based on the use of coal gas, but it soon became evident that this did not suit the type of warfare in which Britain tended to be engaged, ie relatively mobile campaigns fought in remote countries that lacked a developed infrastructure.

Reports of meteorological flights by Templer and Mr R H Curtis in the coal gas-filled *Saladin* illustrates some of the hazards faced by the balloonists. In a brief but graphic report, Curtis wrote:

'8 September 1881 – making meteorological observations using Loop Bulb on Gridiron thermometers and aneroid barometers at varying heights. Highest altitude reached 13,800 ft. Colonel Templer taken ill during flight-inhaling gas. Snow fell – clothes froze. Used up all ballast – threw out seats, wraps, boxes, etc. Hit ground very hard. Instruments all smashed. Duration approximately 2 hours. Start – Woolwich. Finish – Barnet Gate.'¹²

Hydrogen: Although Hydrogen provided greater lift than coal gas, it had its own drawbacks. Local supplies were virtually non-existent; it



Lt Col Templer (second from right) overseeing the testing of a sample of hydrogen being drawn from a gas tube.

was inherently more dangerous; it could be contaminated by acid during manufacture and its production cost was more than double that of coal gas. Hydrogen's flammable nature was never seen as a handicap when operating military balloons, but safety procedures were constantly observed. Experiments showed that balloons could not be destroyed by rifle fire; gas escaped slowly from bullet holes and patches could often be applied during a controlled descent.¹³

Around 1881, the Army selected hydrogen as its preferred lifting gas and began experiments aimed at:

- reducing the cost of manufacture,
- improving the quality of the hydrogen,
- developing mobile manufacturing plant,
- developing a practical, 'lightweight' method of storing and transporting hydrogen in support of field operations.

Manufacturing And Transporting Hydrogen

Initially, hydrogen was produced by passing steam across red-hot

iron turnings in wrought iron tubes. However, to produce just 14,000 cu ft of gas in 10 hours required 2½ tons of metal turnings, 5 tons of boiler coal and a 20-ton furnace. These experiments were soon abandoned.

Gas manufacture then centred on the zinc-acid process. However, in 1896, Templer received permission to purchase a small plant to manufacture hydrogen (and oxygen) by the electrolysis of water. This trial was highly successful, with high quality gas being produced at relatively low cost, and the zinc-acid process was phased out.¹⁴

Originally, it was planned that gas should be manufactured 'on-site', and the balloon directly inflated (as had been done during the American Civil War), only when the balloon was required for a flight. This was a slow process that impeded the tactical flexibility of the balloon unit. An important step forward came when it was decided to transport compressed hydrogen in steel tubes. Filling a balloon from the tubes was appreciably faster than the original process. Various tube designs were tried although one drawback was that the weight of gas carried was very low relative to the weight of the tubes. In 1898, a new, lighter weight tube of spun steel was introduced. These 8-foot tubes had a 5-inch internal diameter and eventually held 500 cu ft of gas at 120 atmospheres.

For the Bechuanaland and Sudan expeditions of 1884-85, gas was manufactured in Chatham and sent out in tubes with the detachments. For the Second Boer War, gas plants were set up in Cape Town and Durban.

The Introduction Of Goldbeater's Skin

Before Templer was recruited in 1878, a number of fabrics had been used to make balloon envelopes, eg varnished silk and cambric treated with varnish or linseed oil. To achieve the required inherent strength, multiple layers were used. The main limitation of these fabrics was their porous nature. Porosity increased as the fabrics were exposed to the weather. The inability to retain gas meant that envelopes had to be larger to provide sufficient lift for longer, and the balloons had to be re-filled more frequently, which required more gas to be manufactured, transported and stored. Reduced lift meant balloons had to operate at lower altitudes, which limited the visibility offered to observers. A new, more efficient balloon fabric was



*The Weinling family preparing goldbeaters skin at
the Balloon Factory.*

urgently needed.

It was Templer who came up with the solution. He had met an Alsatian family, the Weinlings, who lived in east London. They manufactured small balloons for toys and scientific experiments using a material made from the lower intestines of oxen. The material was lightweight, had great inherent strength and was almost impervious to hydrogen. As the material was used in the manufacture of gold leaf, it was called goldbeater's skin. Templer obtained approval for the Weinlings to be employed by the Army. In 1883, they worked on the production of a successful new balloon, the *Heron*, the first of many balloons and airships built for the Army over the next thirty years. Goldbeater's skin remained a secret held only by Britain and gave them a lead over their continental rivals that lasted until the advent of airships.¹⁵

Goldbeater's skin was not without its drawbacks. Its cost was very high; only the military could afford such a price. This eventually led to the development of alternatives such as rubberised cotton. An average size balloon required the intestines from 74,000 oxen which were made into multi-layered, 1-foot squares.¹⁶

Manufacturing The Army's Balloons

When Britain was considering deploying balloons with the Ashanti expedition, Henry Coxwell offered to provide two of them for the sum of £2,000. When Templer was appointed to assist the Balloon Sub-Committee, the Army still did not actually own a balloon. Initially, Templer's used his own balloon, *Crusader*, for Army work. He took *Crusader* to the 1879 Easter Volunteer Review at Dover and the 1880 review at Brighton. However, by now, the manufacture of balloons by the RE had begun. The first military balloon, built for just £71, the 10,000 cu ft *Pioneer*, was made from varnished cambric. In 1883, Templer built the 5,600 cu ft *Sapper*, using silk treated with linseed oil.¹⁷ Assisting him was the aforementioned RE subaltern, John Edward Capper.

Goldbeaters' skin was introduced in 1883. Gradually, standard classes of balloon were developed. Classes varied in size from 5,000 to 14,000 cu ft; each intended for use under different conditions, eg temperature, humidity, operating height above sea level, number of observers, etc. Balloons were manufactured at the Balloon Factory (and its predecessors) by a mix of RE tradesmen and civilian employees. The Factory was also responsible for the design and repair of balloons.

The Balloons Go To War

Bechuanaland And The Sudan (1884-85)

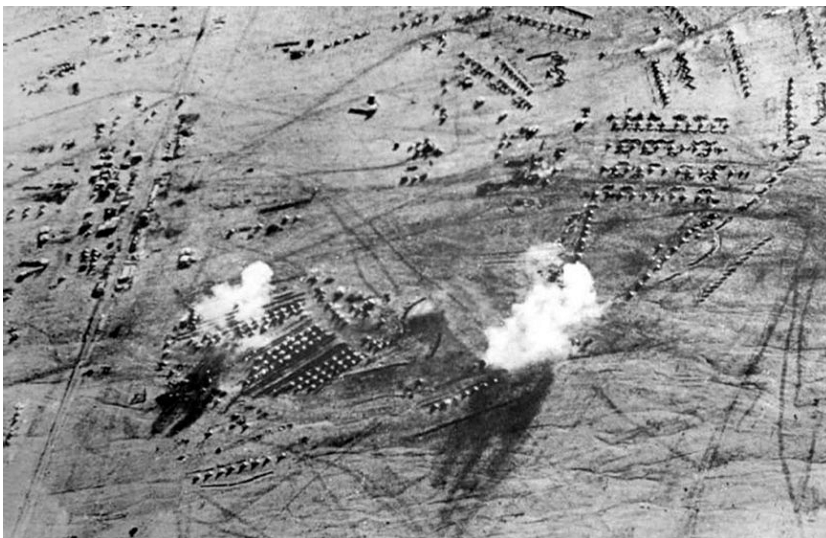
In 1884 a balloon detachment was prepared for dispatch up the Nile as part of the Sudan campaign. The best of the available balloons and equipment and the majority of trained manpower were selected for the expedition. In the event, this detachment, under Maj Elsdale, was sent instead to Bechuanaland as part of an expedition to combat the Boers in Western Transvaal. It comprised two officers and ten NCO's and sappers. Three skin-covered balloons *Heron*, *Spy* and *Feo* were despatched, along with hydrogen gas stored in steel tubes. The expedition proceeded to Mafeking and operations began in April 1885. The main problem encountered was the lack of lift due to the altitude of Mafeking (6,000 feet). Although little fighting took place, some useful ascents were made. This included one by the field force commander, Sir Charles Warren who became receptive to the idea that military ballooning offered potential benefits to the Army.

Following the fall of Khartoum in 1885, an expeditionary force, which included a balloon detachment, was sent to Suakin in eastern Sudan. Equipping the detachment was a problem as most of the available men and equipment were already in South Africa. Three smaller balloons *Sapper*, *Scout* and *Fly* were sent to Suakin, along with 22,000 cu ft of hydrogen in tubes and a small gas production plant. Only two officers, Maj Templer and Lt R J H L Mackenzie, and eight NCO's and sappers were available. Untrained soldiers were borrowed from other units to bring the detachment up to strength. A number of ascents were made. Lt Mackenzie (relieved by Sapper Wright at noon) successfully observed from a balloon towed by a wagon at a height of 200-400 ft, from the midst of a convoy moving from Suakin to Tofrek. Only three days earlier, Tofrek had been beleaguered and subject of a furious attack by hordes of Dervishes. The CRE (Commander RE) at Suakin, Colonel J Bevan Edwards, reported:

‘On 25th March, when the balloon was able to accompany the convoy, the men derived the greatest confidence from it as they knew they could not be surprised, and the convoy itself could move much faster and more freely, halting only occasionally to close up. The subject, however, is of such vast importance that it is hoped that the experience gained in this campaign may be utilized and the science still further developed, when it cannot fail to be of the greatest advantage of an army in the field, especially when operating in broken country, or when covered in thick bush like the neighbourhood of Suakin.’¹⁸

Both detachments demonstrated that they were too small to carry out their allotted tasks properly. The Suakin detachment was unable to use their portable gas plant because no trained men were available to operate it. The shortage of trained balloonists and absence of their own horses and drivers added to the problems. In his report, Col J Bevan Edwards commented:

‘The detachment employed was numerically too weak for the duty, and it is absolutely necessary that the men should be trained and drilled in handling the balloon in a moderate breeze. On the 2nd April we were obliged to supplement the detachment



A British Army camp in South Africa photographed, obviously, from a balloon.

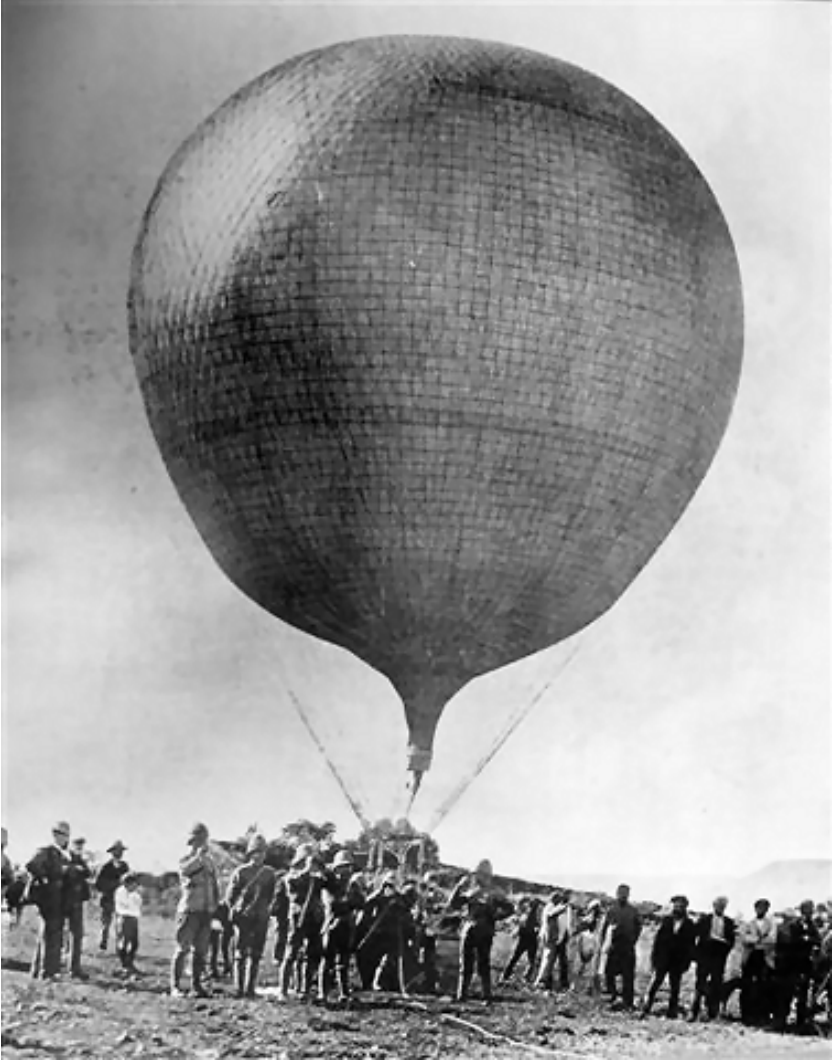
with men from the Royal Engineer companies, who had never worked a balloon before, consequently they were quite unable to keep it steady.'

South Africa (1899-1900)

During the Second Boer War, three balloon sections deployed from Aldershot to South Africa. In addition, gas production plants and balloon depots were set up in Cape Town and Durban to support operations against Transvaal and the Orange Free State.

a. 1st Balloon Section

1st Section, commanded by Capt H B Jones, departed for South Africa on 4 November 1899. They were sent to the left flank of the British advance and attached to Lord Methuen's division. Conditions for flying were often unsatisfactory but ballooning continued none the less. Successful aerial observation was carried out at the battle of Magersfontein, and during the march on Paardeberg. A successful attack was then made on Cronje's laager, when the section, using the balloon *Elsie*, began spotting for the British artillery that had been firing blind. The *Duchess of Connaught* was hit and brought down



2nd Balloon Section preparing to launch a balloon at Ladysmith.

leaking badly.¹⁹

During the advance to Bloemfontein, the section was attached to the cavalry division. As the cavalry advanced along the Modder River, a balloon spotted hidden Boer artillery. Support was then given to the Naval Brigade's guns and the way to Bloemfontein was soon cleared.

Finally 1st Balloon Section was attached to 11th Division during the advance towards Pretoria. Balloon support was provided at Vet River and Zand River. After the fall of the Boer capital, it was intended that the section should support operations in eastern Transvaal. However, a shortage of oxen (used to tow both heavy balloon wagons and artillery pieces) meant that the balloon section was without transport. It was broken up and its men transferred to other RE units.

b. 2nd Balloon Section

Commanded by Maj G M Heath, 2nd Section embarked on 30 September for Natal. They reached Ladysmith on 27 October, without all their stores. They were immediately trapped inside the besieged town. Just three days later, they were in action, during the battle of Lombards Kop. For the 27 days that hydrogen stocks lasted, the section continually observed Boer movements. The section spotted for artillery, especially the Naval Long Toms, produced sketched maps of Boer positions and located enemy artillery. The Boers concentrated artillery fire on the balloons, bringing a number down. As predicted by the experiments at Lydd, damage to the balloons by rifle fire was slight and they were soon repaired. After the hydrogen was finished, the section was employed as field engineers. Following the relief of Ladysmith on 28 February 1900, they were converted into a mounted engineer unit, 3rd Field Troop RE, and served with the cavalry.

c. 3rd Balloon Section

This section arrived in Cape Town in March 1900. It was commanded by Lt (temporary Maj) R B D Blakeney and was attached to 10th Division on Lord Roberts left flank. Initially the force was assigned to the relief of Mafeking. When the balloon *Trumpet* was emptied on 9 May, the section had been in action continually for fifteen days. Mafeking was relieved shortly afterwards. The section's most noteworthy achievement was the action at Fourteen Streams where the Boers were forced to evacuate the right bank of the Vaal. Balloon observers had located the Boers' positions and began to watch their movements. They then successfully started directing the fire of the British guns. These included a railway-mounted, 6-inch gun, sited in a specially built siding, which destroyed the enemy laager from a range of 7,000 yards. After a period spent assisting railway units, the

3rd Balloon Section was broken up.

d. Extemporized Balloon Detachment

When 2nd Balloon Section was trapped inside Ladysmith, its reserve stores were left behind at Pietermaritzburg. A balloon detachment, commanded by Capt G E Philips was extemporized from these reserves. The detachment was always handicapped by a shortage of trained men and equipment and by the cumbrous nature of its ox-drawn transport. However it was able to spot for artillery at Spion Kop, at the final crossing of the Tugela River and during the shelling of Boer trenches at Pieter's Hill. After the relief of Ladysmith, the detachment was disbanded.^{20, 21, 22}

e. British balloons from a Boer viewpoint

In March 1904, Arthur Lynch MP, a former colonel in the Boer Army gave a lecture in Paris on the role of 'English' balloons in South Africa. It would be true to say that the Boers disliked the balloons intensely. He reported that balloons were a great asset to British troops, especially at Ladysmith, Colenso, the Modder River and Fourteen Streams. He remarked:

'.... observation made by the help of a balloon often permitted the English to note exactly the position of a battery, of a laager, or of military works. Therefore, the Boers took a dislike to the balloons. The balloons were a symbol of superiority on the side of the English which seriously disquieted them. They (*the British*) were so well informed about the Boer positions that they could divine the object of a combined movement and repulsed the attack on Platrand or Cerai's Camp'

'To sum up my observations, I believe that the balloon is of the greatest value in military operations, above all in sieges, and in that instance as much to the besieged as the besieger.'²³

China

In August 1900, the 4th Balloon Section under Lt Col J R L Macdonald embarked for China. The well-equipped detachment, part of the international force, did not reach its final destination in northern China until after hostilities had ended. Problems were encountered with the dry cold weather that damaged the balloons' envelopes, and

with the heavy tube wagons that had difficulty in negotiating the rough terrain of China.²⁴ On departure from China, part of the section was sent to India where it became the nucleus of an experimental balloon section in the Bengal Sappers and Miners at Rawalpindi.

Conclusion

When Templer joined the Balloon Department in 1878, British Army ballooning was in its infancy. When he left in 1908, balloons were an accepted feature of both peacetime and wartime military deployments. Ballooning's development had overcome many and varied obstacles, technical, personal, financial and political. Resistance to change had been overcome. By 1908, ballooning was well established, yet battles were still being fought – to gain acceptance for airships and aeroplanes. The same battles that Templer had already fought.

Templer was not solely responsible for balloon development; many other officers had also participated in the work. What made Templer different from everybody else was the continuity of service that his commission as a militia officer allowed. Regular soldiers were posted away after two or three years. A few, such as Maj C M Watson, returned for a second tour with the balloons. Templer served continually for thirty years. His long service and experience were coupled with a strong and determined personality.

Obstacles did not deter Templer; he had boundless energy and knew to whom to go to get what he wanted. Professional soldiers were more deterred by the niceties of the chain of command. Templer could afford not to be. Maj Gen Capper said of him:

‘He was not always popular with his official superiors as his disregard of regulations and impatience with official delays and restrictions which stood in the way frequently led to conflicts with them, but in the end he generally managed to get his way and convince them he was right.

His wonderful enthusiasm, his kindly temperament and dogged determination to push things through in the face of every obstacle, and his refusal to be downcast over any setback, gave a great example to all those who had the good fortune to be associated with him.’²⁵



A crew preparing to launch a balloon from horse drawn wagon, circa 1903.

Templer's inventive, scientific turn of mind was ideally suited to the experimental and manufacturing environment in which he worked. He possessed a strong sense of duty that kept driving him forward. For these reasons, Templer's contribution to the development of military ballooning for the British Army sets him head and shoulders above his contemporaries. He may, therefore, justifiably be called the 'Father of British military aviation'.

Notes (WO and AIR references are to Pieces held at The National Archives).

¹ *Papers on Subjects Connected with the Duties of the Corps of Royal Engineers, New Series, Vol XII, 1863, specifically:*

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- b. Grover RE, Lt G E; Paper XI: 'On Reconnoitring Balloons'.
- c. Beaumont RE, Capt F; Paper XII: 'On Balloon Reconnaissance as Practised in the American Army'.

² *Ibid*, Paper XI, page 103.

³ *Ibid*, Paper XII, page 93.

⁴ Watson, Col C M; 'Military Ballooning in the British Army', Paper III in *Professional Papers of the Corps of Royal Engineers, Vol XXVIII, 1903.*

- ⁵ WO 32/8584. 'Employment of Major Templer as military balloonist to Royal Engineer Committee', pp11-12.
- ⁶ AIR 1/728/176/3. 'Role of English military balloons in the South African War' by Col. Lynch.
- ⁷ WO 32/6068. Report 'War Balloons', dated 10 June 1886.
- ⁸ Watson, *op cit*.
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- ¹⁰ Templer, Capt J, Royal Middlesex Rifles; 'Military Ballooning' in *RUSI Journal*, Vol 23 (1880), pp137-184.
- ¹¹ WO 32/6068. 'Final Report of the Committee on Military Ballooning', 1904.
- ¹² National Army Museum NAM-7404-59-4.
- ¹³ Jones, Lt H B, RE; 'Military Ballooning' in *RUSI Journal*, Vol 36 (1892), p261.
- ¹⁴ Watson, *op cit*.
- ¹⁵ Broke-Smith, Brigadier P W L; *The History of Early British Aeronautics* (Institution of Royal Engineers, Chatham, 1952).
- ¹⁶ *Daily Mail*, 9 March 1900.
- ¹⁷ Broke-Smith, *op cit* Note 15.
- ¹⁸ WO 32/6134. 'Report on Royal Engineers at Suakin', 1885.
- ¹⁹ RAF Museum RAFM B2136; 'No.1 Balloon Section, Royal Engineers, in the Boer War'. The 1st Balloon Section operated at least eleven balloons in South Africa: *Titania, Triton, Torpedo, Thorn, Task, Trent, Duke of Cambridge, Duchess of Connaught, Eclipse, Elsie* and *Bristol*.
- ²⁰ Broke-Smith, *op cit* Note 15.
- ²¹ *The Military Historical Society Bulletin*, Vol XXIII, No 89, August 1972, pp5-8.
- ²² Baker Brown, Brig-Gen W; *History of the Corps of Royal Engineers*, Vol IV (Institution of Royal Engineers, Chatham, 1952) pp278-280.
- ²³ AIR 1/728/176/3/8. 'History of the Royal Aircraft Establishment 1882-1905'.
- ²⁴ WO 32/6059. 'China, 1900-1901. Reports on Ballooning Operations'.
- ²⁵ *The Journal of the Royal Engineers*, Vol XXXVII, 1924, pp142-144.

THE AIR GUNNER

by Wg Cdr Jeff Jefford

Regular readers of the RAFHS Journal will find that some of the passages in this paper are similar to (even the same as) passages in a similar paper published in Journal 50 (2011) which dealt with the wireless operator. Since the wireless operator and the air gunner were often in many ways synonymous, and subject to the same influences, in order to produce a coherent stand-alone account, a degree of duplication was unavoidable. Ed

The Provision Of Aerial Gunners In The Early Peacetime Air Force.

As demobilisation got under way in the aftermath of WW I, the Air Ministry announced in May 1919 that there were ‘no vacancies for NCO Pilots, Observers and Aerial Gunners.’¹ Less than a year later it was made equally clear that there was to be no place for commissioned observers in the exclusively ‘pilots only’ club which the peacetime RAF had rapidly become. Any lingering doubts on this score were removed in January 1920 when the Air Ministry published the following statement:²

‘In view of the decision that practically all officers remaining in the Royal Air Force are to learn to fly, all pilots may in future be employed in any capacity as crew of an aircraft, ie as observers, gunners, photographers, etc. It should be noted, that as no provision has been made for observers in the permanent Air Force, all officers are to be considered available for the duties of observers, etc from the date of this Order.’

That was all very well, of course, but much of the peacetime RAF was to be employed on colonial peacekeeping or garrison duties using, initially, Bristol Fighters and DH 9As which would be progressively replaced by later aeroplanes, all of which would also be two-seaters, as were many of the bombers flown by home-based squadrons. So who was going to occupy the back seats of all of these aeroplanes? The implication of the January 1920 edict was that they would be pilots. It turned out that, not surprisingly, most pilots wanted to be the driver but, even more significantly, the RAF intended to employ enough pilots to fill only the front seats in any case.

Fortunately, the Air Ministry had already spotted the flaw in its projections. But, having already decided to do away with the professional observer, it had elected to continue to ignore the accumulated experience of 1914-18 and to misemploy ground tradesmen as part-time aircrew instead. The initial arrangements for the provision of post-war crewmen to fly as aerial gunners were announced at the end of 1919.³

To begin with, the Air Ministry restricted the internal recruiting of aerial gunners to non-technical personnel of Trade Group V, ie those required to meet only the minimum educational standard and who were on the lowest pay scale.⁴ This policy did not prevail for long, however, and the selection field was soon broadened to permit airmen of any trade to fly as a gunner.⁵

The definitive arrangements for providing aerial gunners, all of whom were to be employed on a part-time basis, were published in 1921.⁶ Any airman who had logged 50 hours of combat flying during the war was accepted without further instruction, so long as he was able to pass the specified tests. There were not nearly enough of these veterans to meet the Service's need, however, so it was necessary to start training airmen volunteering from the ranks. Successful candidates serving in the UK were to be sent to the Armament and Gunnery School at Eastchurch where they were to attend a six-week course.⁷ Thereafter they were expected to return to the school every three years to renew their qualification.

Unfortunately, there were no dedicated armament training facilities in overseas commands and in these cases training had to be carried out at squadron level. Since much of the RAF was stationed abroad during the 1920s this meant that a substantial proportion (possibly the majority) of aerial gunners⁸ was trained, somewhat informally, under local arrangements. In practical terms, regardless of whether he was or was not able to attend a course at Eastchurch, a home-based air gunner maintained his currency by completing a specified number of camera gun exercises, firing live ammunition during an annual practice camp and cleaning and maintaining his Lewis gun.

All airmen employed on flying duties were entitled to draw crew pay at a rate of two shillings per day, those additionally qualified as gunners drawing a further sixpence as duty pay. While half-a-crown a day may not seem much, it actually represented a substantial



The 'winged bullet', which was introduced in 1923. (Dennis Conroy)

supplement to an airman's pay at the time, the basic daily rate for a leading aircraftman of Trade Group V in 1921 being four shillings. On 1 February 1926 the rate of crew pay was cut by 50%, to just one shilling.⁹ In the main, this will have been a consequence of the Churchillian Treasury's deflationary policies.¹⁰ On the other hand, because corresponding cuts were not imposed on other specialist allowances, it is difficult not to see it also as a reflection of the RAF's underlying lack of regard for its

flying tradesmen.

Meanwhile, the Air Ministry had at least granted its aerial gunners a degree of distinction when, in 1923, it had introduced an appropriate badge, a gilded winged bullet, to be worn on the upper right uniform sleeve.¹¹

With the passage of time, the practical implications of trying to make do with air gunners had begun to manifest themselves with increasing clarity. As AOC Wessex Bombing Area, AVM Sir John Steel, pointed out at the end of 1926:¹²

'The decision to withdraw all officer observers from day bombing squadrons has made it necessary to teach air gunners in these units bomb aiming, air pilotage and photography in addition to their duties as gunners. To master these subjects and to carry out the necessary practices is a whole time job which cannot be undertaken by an airman who is filling a vacancy in the establishment for some other purpose.'

In other words, while the RAF had dispensed with observers, this had proved to be a false economy, because their jobs still needed to be done. Pilots were supposed to have been doing this work since January 1920 but, since there were insufficient numbers of them to man all of the crew stations in all of the RAF's aeroplanes, the *de facto* situation was that the Service had merely substituted inadequately prepared, and part-time, airmen for professionally trained full-time officers – and it was still hoping to get away with it.

Unit	Trained as Gunner	Under training as Gunner	Nominated for training as Gunner	Total
No 7 Sqn	0	0	5	5
No 9 Sqn	0	0	10	10
No 58 Sqn	5*	5	3	13*
No 99 Sqn	0	0	6	6
Totals	5*	5	24	34*

* Three due for imminent discharge.

Fig 1. Manning position with respect to wireless operators and/or wireless operator mechanics available as air gunners on twin-engined night bomber squadrons in December 1926.

In the light of Steel's observation it is of some interest to consider the trades of the men serving as gunners with his day bomber squadrons at the turn of 1926. The rules governing the provision of gunners at the time stated that those drawn from Trade Groups I to IV were 'not to exceed 25% of the authorised establishment' with the remaining vacancies, ie 75% plus, being filled by airmen from Trade Group V.¹³ There was a further constraint, to the effect that NCOs in technical trades would be considered 'only exceptionally'.

Since being a nominal gunner on day bombers actually involved discharging all of the functions of an observer, Steel expressed some reservations over the suitability of Trade Group V personnel for such demanding tasks. Indeed he appears to have been sufficiently concerned about this to have bent the rules because more than 60% (as opposed to less than 25%) of the gunners flying with his day bomber squadrons were actually skilled tradesmen.¹⁴

The situation on night bombers was slightly different, but no less acute. Figure 1 illustrates the highly unsatisfactory manning position on night bomber squadrons at the end of 1926 when only 15% of the wireless personnel nominated to fly as air gunners were actually qualified as such.¹⁵ As a result, it became necessary to grant considerable latitude in the interpretation of the regulations spelling out the qualifications demanded of gunners which had been in force

since 1921. In principle, all UK-based gunners were still supposed to spend six weeks at the Armament and Gunnery School (and to return there to be reclassified every three years) but, as the backlog reflected in Figure 1 shows, it would seem that Eastchurch simply lacked the capacity to handle this task.¹⁶

If a convenient course was not available, therefore, from 1927 it became permissible ‘as a temporary measure’ for Squadron Commanders to authorise duty pay for an airman who had already been flying as a gunner for two months. In the fullness of time such men were still supposed to go to Eastchurch where they were to be tested shortly after arrival and, if considered satisfactory, immediately returned to their units without having to complete the full six weeks.¹⁷

As a result of this concession it became increasingly common for gunners to receive practically all of their training at unit level, formal certification being endorsed by a brief visit to Eastchurch when such an excursion was mutually convenient. With the passage of time the ‘when’ began to be construed as ‘if’ and this interpretation gained a degree of legitimacy in 1929 when air gunners were added to the establishment of Special Reserve and Auxiliary Air Force squadrons. In the case of these ‘week end warriors’ it was specifically stated that their training was to be an exclusively unit responsibility. There was no requirement for these men to attend a formal course, although it was intended they should be tested on the ground by a visiting officer from Eastchurch. Practical qualification tests in air firing (and bombing) were to be completed under squadron arrangements during the annual practice camps held at one of the permanently established RAF stations.¹⁸

This relaxation of the rules relating to reservists may have appeared to have set a precedent, but the change was not really all that innovative. After all, in-house training and annual reclassification under local arrangements had been the norm in overseas commands for several years. That said, while the regulations *may* have been more relaxed overseas, it was proving to be no easier to maintain the necessary numbers there than it was at home. For example, in March 1928 Iraq Command recorded that, while more were under training, it actually had only twenty-nine qualified air gunners on strength against an establishment for forty-three.¹⁹

While juggling with the regulations may have represented a

pragmatic means of solving the problems involved in providing part-time gunners, it also represented a perceptible lowering of standards. Although the RAF would not, at the time, have admitted (or probably even have recognised) that it was starting to paper over the cracks, that is precisely what it was doing. As part of this process full-time gunners were actually established on single-engined day bomber squadrons in 1927.²⁰ What had plainly been needed to take the place of observer officers had been *several* full-time airmen gunners per *flight*. The Air Ministry had short-changed itself, however, as it had authorised only *one* full-time gunner per *squadron*, albeit in the rank of corporal. Two years later a full-time corporal gunner was added to the establishment of all twin-engined bomber squadrons.²¹ By 1933 some units had been established to have as many as three full-timers, but this still fell a long way short of what was really needed.

While a few airmen were now being employed as gunners on a full-time basis, it should be stressed that they were still not career aviators. All of them were dual-qualified, increasingly, but not exclusively, as wireless operators, and, once a gunner had completed his stint as a flyer, he was expected to revert to his original ground trade. In the meantime he was temporarily mustered as, for instance, an air gunner (fitter) to distinguish him from a part-timer who would be a fitter (air gunner). The initial introduction of full-time gunners involved only a handful of men but it represented the first indication that the Service was beginning to appreciate that total reliance on part-time aircrew might not really be a viable proposition after all.

The Air Gunner Of The Expansion Years.

In 1934 the RAF reinstated the trade of the observer, in the rank of corporal, but still on a part time basis, and it was the declared intention that all gunners would eventually be replaced by these new second-generation observers. It would be some time before that could be achieved, however, and until then it was necessary to continue to train gunners. By 1936 this was being done via a four-week course at the newly established Air Observers School at North Coates, which had assumed responsibility for all gunnery training. In practice, however, like Eastchurch (and a temporary school that had operated briefly from Leuchars) before it, North Coates simply lacked the capacity to handle anything like the numbers involved. In 1936, therefore, the Air

Ministry was obliged to acknowledge this in the following statement. 'In due course all air gunners for units at home and abroad will be trained at the Air Observers School in the first instance, but for the present . . . airmen may be selected by COs for training in units . . .'²²

Squadrons were well used to dealing with this aspect of training, of course, but their workload had been considerably increased since 1935 by the imposition of a substantial post-graduate training commitment with respect to the new observers. Furthermore, in accordance with long-standing practice, FTSs were required to teach only basic flying skills. Pilots therefore joined their first squadrons with little awareness of applied flying within an operational context and this aspect of their instruction was carried out locally during their first post-graduate year. In effect, therefore, most squadrons in the expanding RAF of the mid-1930s were functioning largely as advanced training units, which seriously degraded their operational capability.

Two and a half years after the Air Ministry had declared that it was intended that all gunners would eventually attend a formal course this goal had still not been achieved. While still holding out the prospect of such a course, a revised set of regulations governing the provision of air gunners was published in the summer of 1938.²³ It reiterated that 'in due course all air gunners for units at home and abroad will be trained at an air observers school' but went on to say that 'for the present all airmen at home will undergo training in Service units [*while*] airmen serving overseas will be trained locally under arrangements made by the command headquarters concerned.' The last part of this statement was a euphemism for 'on the squadrons, as at home.' Note, incidentally, that this order said that 'all' gunners would be trained on squadrons, not just some of them as in the past – the situation was actually getting worse.

While this change in policy was clearly unwelcome, there had been little alternative. Having been obliged to introduce large numbers of direct entrant observers, and to teach all observers to be navigators, by the summer of 1938 the non-pilot training system was running to capacity. The hard facts were that observers could not be produced without formal instruction whereas gunners could – but only up to a point. As AOCinC Bomber Command, Air Chf Mshl Sir Edgar Ludlow-Hewitt complained towards the end of the year, his: ' . . air gunners were practically completely untrained. The Command were

told to produce air gunners, and they did their best, but they had no facilities for training these important people properly . . .',²⁴

So, while North Coates had been running four-week gunnery courses since 1936, as in the past, these had never offered anything like enough places to satisfy the demands of the growing numbers of squadrons in the UK, let alone those stationed abroad. For the time being, therefore, in order to free up capacity for the training of observers, from mid-1938 all gunners were to be trained at unit level with practical experience being picked up during their squadron's one-month annual detachment to an Armament Training Station. Most of these units, of which there were eventually nine, had been set up in April 1938 by redesignating the substantially expanded network of Armament Training Camps.

This was no more than a makeshift solution to the problem, of course, and this highly unsatisfactory state of affairs could not be tolerated for long. It was brought to an end a few months later when the RAF finally abandoned its part-time air crew policy. Once it had been accepted that all air crew needed to be professionals, it followed that they would have to be properly trained. Early in 1939, therefore, two more Armament Training Stations were converted into Air Observers Schools, making a total of four. By the spring, in addition to training observers, North Coates, Acklington, West Freugh and Aldergrove were all offering four-week courses, including 12 hours of practical airborne experience, to groups of up to thirty air gunners at a time.²⁵

The Introduction Of Full Time Crewmen.

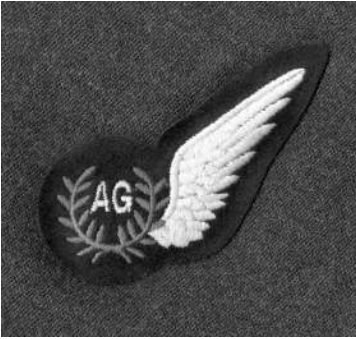
It had been the increased performance and added complexity of modern aeroplanes that had made the part-time aircrew policy untenable. By the summer of 1938, Air Chf Mshl Ludlow-Hewitt, had drafted a proposal for a dedicated aircrew trade.²⁶ By October the air staff had turned Bomber Command's idea into a practical proposition.²⁷ Still believing, or perhaps hoping, that it had time in hand, the Air Council adopted the scheme. The last major change in recruiting and training policy to be implemented in peacetime, details were announced in January 1939.²⁸

The explanatory remarks contained the crucial statement that 'employment as a member of an aircraft crew will in future be

regarded as full-time employment and airmen for such duties will be provided additionally to the tradesmen establishment of all units concerned.' Incidentally, while this was seen as a major innovation, which indeed it was, it was not really breaking new ground. Having long since seen the light, the RN had adopted this practice as early as 1935.

The new RAF scheme introduced a progressive concept which envisaged that all non-pilot air crew would begin their careers as, what were now to be known as, wireless operators (air crew). The underlying intention was to phase out the previous distinction whereby some gunners had been wireless trained but others had not. With the exception of Coastal Command, where the peculiar demands of flying boats meant that fitters and riggers would continue to be employed on flying duties, all of the new generation of gunners were to be recruited from boy entrant wireless operators.²⁹ Starting at 18 years of age, they would all fly as airmen for an initial period of three years. Most could then expect to continue to be employed as wireless operators (air crew) but about 25% were to be selected for further training. After a sixteen-week course of navigation and bombing these men would be remustered as air observers, at which point they were to become sergeants. Another innovation, was that the scheme allowed for the commissioning of a proportion of both observers and gunners, although there were no indications as to when this might occur or of the numbers that might be required.

Leaving aside the question of commissions, while the January 1939 air crew career scheme may have been sound, it represented an essentially long-term investment which would not yield any substantial dividends for several years. This would prove to be its undoing, as time was fast running out. In fact, rather than being able to indulge in the luxury of lengthy periods of training and consolidation, the demand for manpower created by the remorseless expansion of the Service was actually making it necessary to cut back on the length of time which could be devoted to instruction. As early as June 1938 the Air Ministry had been obliged to shorten the course attended by wireless operators and to warn units to expect that new arrivals would be less competent than their predecessors.³⁰ Since wireless operators were the seed corn from which the Service was expecting to grow all of its gunners, and ultimately its observers, this did little to ease the



The AG badge introduced in December 1939, the design of which was reflected in all subsequent non-pilot flying badges until 2003.

problem of providing additional air crew, or to alleviate the training task at squadron level.

Early Changes Arising From Wartime Conditions.

The declaration of war in September 1939 brought an immediate end to the scheme for the provision of air crew which had been introduced in the previous January, long before it had had time to mature. The wartime demand for observers meant that it was quite impractical to expect them to spend an initial three years as wireless operators (air crew) and, since it was clearly not essential

for all gunners to be qualified as wireless operators, direct recruiting of 'straight' air gunners was introduced. As a result, the peacetime aim of eradicating the distinction between dual-qualified wireless operator/air gunners and 'straight' air gunners had also to be abandoned.

The initial wartime policy governing the provision of air observers and airmen pilots was published in September 1939.³¹ It stated that all subsequent intakes would be directly recruited RAFVR personnel. In other words, regular airmen were no longer eligible for consideration for flying duties as pilots or observers. The new regulations were amplified in November when it was made clear that the termination of internal recruiting for flying duties had also applied to the provision of both wireless operators (air crew) and air gunners.³²

Once the shooting started there was a marked increase in respect for gunners and a distinctive badge was introduced for them in December 1939, the single-winged 'AG' that would become the template for all other aircrew badges introduced during the rest of the century.³³ The new badge was to be worn by officers on being posted to a unit as an air gunner, following a course of instruction, and by airmen who were mustered as air gunners and who had served, or were serving, as such since 3 September.



An anonymous pre-December 1939 Whitley air gunner flying on operations as an LAC with his trade still indicated by the winged bullet on his sleeve. (Air Historical Branch)

When the RAF went to war all of its airmen pilots and observers wore the three stripes of a sergeant and were paid 12/6d per day. By comparison, depending upon his performance in training, an air gunner flying on operations might be no more than an AC2 of Trade Group V, in which case he would have earned as little as two shillings per day. He still drew his shilling-a-day crew pay, of course, and his sixpence gunners pay, although both of these were forfeit if he was unavailable for flying duties for more than fourteen consecutive days. Furthermore, if he was mustered within Trade Group V solely as a gunner, ie with no basic trade (other than aircrafthand), he had no realistic career prospects beyond the classification of leading aircraftman (LAC). In short, apart from being socially segregated from

the men with whom he was supposed to fly and fight as a member of a team, a gunner was paid less than a third of what they earned.

Under the circumstances, it was hardly surprising that a detectable sense of grievance became evident within the community of gunners. While the introduction of a badge had been appreciated, it had been no more than a cosmetic gesture. In fact, it had actually managed to focus attention on gunners, without having done anything of any substance to improve their circumstances. The Service authorities were well aware that an unsatisfactory state of affairs existed (after all, they had created it) and, in his capacity as AMP, in December 1939, Air Mshl Portal convened a meeting to consider the problem. Following the inevitable ritual tussle with the Treasury, the eventual outcome was a compromise. With effect from 27 May 1940 (five months before this privilege was extended to observers³⁴) all WOp/AGs and straight air

gunners were to be automatically granted the rank of temporary sergeant on completion of their training, although they were to be paid at inclusive (ie they no longer drew separate crew and duty pay) rates of only 7/9d and 7/- per day, respectively.³⁵ In effect, therefore, while many gunners still had a basic trade to which they could revert (in their 'real' rank), so long as they remained on flying duties, they were now recognised as being fully-fledged members of the 'air crew élite'. That there had to be a pay differential between gunners and pilots/observers was unfortunate, but it was considered to be a reasonable reflection of the relative demands made by these occupations and was, in any case, the best that could be squeezed out of the Exchequer.

As they had done in 1939, when they had been obliged to give house room to hordes of young observers, the more grizzled denizens of the RAF's sergeants messes grumbled about this second influx of 'instant' NCOs. Sadly, the Order which had elevated gunners to SNCO status was not actually promulgated until 27 June. As a result, practically all of the gunners who died flying in the Battles and Blenheims of the Advanced Air Striking Force during the fall of France did so as corporals or aircraftmen. The same was true of those who lost their lives during the early operations of Bomber and Coastal Commands.³⁶

Most of the gunners serving overseas on the outbreak of war were still in-house trained part-timers. They were invited to choose between remustering as air crew or reverting to their ground trades, mostly as wireless operators or wireless operator mechanics. Like those at home, airmen who elected to become air crew would automatically have become entitled to wear the 'AG' badge from December 1939 and most should subsequently have been made up to temporary sergeant with effect from 27 May 1940.

Being a long way from London, and thus less able (or, perhaps, less inclined) to seek advice from the oracle, however, it would seem that there may have been some variations in the interpretation of the regulations in Egypt. For instance, as an armourer with three years' experience as a part-time gunner with No 208 Sqn, Cpl Dennis Conroy was made up to acting sergeant and remustered as a full-time air gunner in September 1940.³⁷ Two months later he was posted to No 70 Sqn at Kabrit, but in his original trade. Unfortunately, this

involved the forfeit of his recently acquired third stripe, although he was permitted to retain his flying badge, thus creating the rather anomalous situation of an 'AG'-badged groundcrew corporal.³⁸

While HQ RAFME may have been a trifle cavalier with the status of some of its air gunners, it did make an effort to provide them with some formal instruction. Where possible, gunners stationed in Egypt attended a locally organised 'top up' course run at Ismailia.³⁹ While these courses improved the technical knowledge of those who were already qualified as gunners, and provided some insight into the complexities of power-operated turrets for those more accustomed to a Scarff ring, the content was also deemed to be sufficient to permit additional wireless personnel to be formally remustered as WOp/AGs. Nine two-week courses were run between July and December 1940; precise details of the numbers involved are lacking but the total throughput was more than 100, including at least fifteen officers.

HQ RAFME also set up a more formal means of providing additional gunners by making suitable arrangements at No 4 FTS. The first four-week course began at Habbaniya on 23 October 1940, the last of a total of fifty-two (mostly officer) air gunners graduating in March 1941.

The Introduction Of Commissions For Air Gunners.

The question of commissions for non-pilot aircrew, which had first been publicly hinted at in January 1939, remained to be answered. The most pressing need was perceived to be for officer gunners, as it had long been clear to Bomber Command that the standard of gunnery at squadron level left much to be desired. This was hardly surprising, of course, as the vast majority of pre-war gunners had been informally trained under local arrangements. There was little in the way of doctrine and only vestigial supervisory arrangements. As a result, the AOCinC had been pressing for the establishment of a suitable unit to devise and refine techniques and tactics, to train instructors and to produce specialist officers to fill staff appointments and to act as Gunnery Leaders.⁴⁰ This demand was finally satisfied on 6 November 1939 when the Central Gunnery School (CGS) opened at Warmwell, its first course commencing on the 15th. While this unit would inevitably be commanded by a pilot, if it was to have any real credibility it would need to have at least some officer gunners on its

staff, hence the urgency attached to the granting of commissions.

Because of the significant budgetary implications, the Treasury has a role to play in determining commissioning policy and the Air Ministry had opened negotiations over the provision of officer gunners as soon as war had been declared. Sanction for gunners to be commissioned was eventually obtained from the financiers on 19 October.

The first handful of gunner officers was secured under somewhat *ad hoc* arrangements⁴¹ but these had been regularised by February 1940 when air gunners were formally introduced as a specialisation within the General Duties Branch.⁴² The Air Force List for that month, the first to feature gunners, contained the names of two flight lieutenants, one flying officer and 106 pilot officers. All of them were members of the RAFVR with the seniority of individuals being antedated by up to three months. Apart from the most senior four, all were annotated as being on probation.

There was no specific quota for officer gunners and, this initial tranche having satisfied the immediate demand, subsequent commissions were to be granted on an 'as required' basis, the aim being to create only the numbers required to fill the relatively few established officer posts. This sufficed until December 1940 when the Australians announced that they intended to commission 3% of RAAF air gunners on graduation. The problem with this proposal was that current guidance required that an officer gunner would previously have demonstrated fighting qualities and leadership in operational service and required him to be capable of instructing in gunnery and advising Squadron Commanders on equipment and tactics. Clearly, this ruled out a newly qualified gunner and, since it did not reflect RAF practice, the Air Ministry advised against this initiative. Nevertheless, the Australians persevered with and urged Canada and New Zealand to follow suit.⁴³

There followed a flurry of signals, in the course of which the Air Ministry made a further attempt to dissuade the Australians while pressing the Canadians not to conform. The outcome was that Ottawa insisted on introducing an ability to award some early commissions, but agreed to trim the quota to just 2%, while the Australians heeded the UK's advice and rescinded their original decision.⁴⁴ Since this still left the situation out of balance, and since the Canadians were now

adamant, in April 1941 the UK gave in and, for the sake of uniformity, endorsed and adopted the 2% quota.⁴⁵

This arrangement did not persist for long, however, and in July, following a reappraisal of the situation, it was agreed that up to 10% of WOp/AGs could be commissioned on graduation plus a further 10% after they had accumulated some operational experience. The proportions for straight air gunners were to be 5% and 15%.⁴⁶ The Dominions duly adopted these figures which remained in force for the rest of the war – in the RAF at least.

The Composition Of Heavy Bomber Crews Is Revised.

Following an extensive canvassing of views among senior officers in early 1942, it was decided to rationalise the constitution of the crews of heavy bombers. The most significant changes were: to dispense with co-pilots; to replace the observer with the navigator and air bomber; to reduce the current establishment of two WOp/AGs per crew by half and to man dorsal and tail turrets with straight air gunners.

These changes could not be implemented overnight, of course, but it became apparent over the next eighteen months or so that there was an increasing degree of polarisation within the joint trade of the WOp/AG. For instance, Bomber Command's turrets were being increasingly occupied by men who had little need for expertise in handling a wireless set. Conversely, the growth of Transport Command meant that the RAF was operating large numbers of aeroplanes which carried long-range communications equipment but lacked any armament at all. It was becoming clear that the traditional WOp/AGs were over-qualified so that, wherever they were employed, half of their skills tended to be superfluous.

Once this anomaly had been recognised, in December 1943 the long-standing dual-qualified trade was abolished.⁴⁷ From then on there were two distinct categories, the air gunner and the wireless operator (air) – the WOp(air).⁴⁸ It is worth noting, however, that this did not preclude a WOp(air) from being dual-qualified if that was dictated by the nature of his employment. Thus, as was so often the case, Coastal Command went its own way and continued to require the majority of its wireless operators to be additionally certified as gunners.

Interestingly, in December 1942, Bomber Command had taken the



Wg Cdr A E Lowe
(Yorkshire Air Museum)

rather surprising step of appointing an air gunner, Wg Cdr A E Lowe, to command a squadron.⁴⁹ While this was not a unique occurrence during WW II, the appointment of non-pilots, especially air gunners, to fill executive flying posts was extremely unusual.⁵⁰

Air Gunner Training During WW II.

The training of air gunners in 1939-40 was complicated by two factors – the wide range of turrets that were in, or were about to enter, service (see Figure 2)⁵¹ and the inadequacy of the available facilities. During the last weeks of 1939 seven Air Observers Schools (AOS) had been redesignated as Bombing and Gunnery Schools (B&GS). No longer involved in navigation training, the B&GSs provided instruction in armament for both gunners and observers. The majority of the available aeroplanes were Battles, armed with a hand-held Vickers Gas Operated (VGO) machine gun, and Blenheim Is with a VGO in an early Bristol turret, supplemented by a few Whitley Is and Harrows.

In December 1939 an attempt was made to impose some sort of pattern on these arrangements by concentrating types of aeroplanes in particular schools and then specifying where the output from those schools ought to be sent. For instance, No 9 B&GS at Penrhos, which still had some Demons on charge, was nominated as the primary source for Defiant gunners, while the majority of gunners destined for Whitleys were supposed to be provided by No 7 B&GS at Porthcawl because it was to have all of the available Whitley Is – but this was not an exclusive arrangement as Whitley men were also to be trained at Nos 8, 9 and 10 B&GS, none of which had any Whitleys at the time.⁵²

Thereafter, the wartime gunner training system evolved through several stages, beginning in mid-1941 when some of the B&GSs began to be converted into a second generation of, observer-only, AOSs while others became gunner-dedicated Air Gunners Schools (AGS) to which others were added to make an eventual total of ten.

Turret Type	Gun(s)	Aircraft
AW Type 11	1 × VGO	Anson (dorsal)
AW Type 15	1 × Lewis or VGO	Harrow (dorsal)
AW Type 38	1 × Browning	Whitley I, II, III & IV (tail)
BP Type A	4 × Brownings	Defiant, Roc, Albemarle (dorsal)
BP Type C	2 × Brownings	Hudson (dorsal), Halifax (nose)
BP Type E	4 × Brownings	Halifax (tail)
BP Type K	2 × Brownings	Halifax, Albemarle (both ventral)
Bristol B I	1 × VGO	Blenheim (dorsal)
Bristol B II	1 × VGO	Bombay (nose)
Bristol B III	1 × VGO	Bombay (tail)
Bristol B IV	1 × VGO	Beaufort (dorsal)
FN4	4 × Brownings	Whitley V, Stirling and first fifty Manchesters (all tail)
FN5	2 × Brownings	Manchester & Stirling (nose) and Wellington IA & II (nose & tail)
FN7	2 × Brownings	Botha (dorsal)
FN11	2 × VGO	Sunderland (nose)
FN13	4 × Brownings	Sunderland (tail)
FN14	1 × Lewis or VGO	Harrow (nose)
FN15	2 × Lewis or VGO	Harrow (tail)
FN16	1 × VGO	Whitley I, II, III, IV & V (nose)
FN17	2 × Brownings	Whitley I, II, III & IV (ventral)
FN19	2 × Brownings	Stirling (ventral)
FN20	4 × Brownings	later Manchester (tail)
FN21	2 × Brownings	Manchester (ventral)
FN25	2 × Brownings	Wellington IA & II (ventral)
Vickers + FN parts	1 × Browning	Wellington I (nose)
Vickers + FN parts	2 × Brownings	Wellington I (tail)

Fig 2 *The turrets that were in, or were expected shortly to enter, service as at December 1939; all guns were .303" calibre.*

*(AW = Armstrong Whitworth; BP = Boulton Paul;
FN = Frazer-Nash, ie Nash and Thompson by Parnall.)*



Turret training stands, a Bristol B1 at either end, but mostly Boulton Paul Type As plus at least one Type C (and, possibly, a Nash and Thompson FN64?), lined up at No 7 AGS, Stormy Down.



The Miles Martinet was the standard target-tug from 1942 until the end of the war. This one was on the strength of No 7 AGS at Stormy Down in 1943. (MAP)

By this time, a substantial degree of order had been imposed on the available equipment and each school was tending to operate one primary aircraft type supported by a fleet of target tugs, as in Defiants plus Lysanders, Blenheims plus Lysanders, or Bothas plus Battles. By 1943, most of the second-hand operational types had been replaced by the ubiquitous Anson with drogues being towed by the purpose-built Martinet. During 1944 the system began to contract with several of the AGSs disbanding while those that remained exchanged their Ansons for Wellingtons.

While the gradual provision of more appropriate aeroplanes had improved the quality of training, there had also been a 50% increase in quantity. In 1940 the Air Crew Reception Centre – Initial Training Wing (ACRC – ITW) sequence for a gunner had occupied some six weeks and he qualified for his badge after another six weeks at a B&GS. By mid-1942 the B&GSs had been superseded by AGSs which were offering a variety of courses, as summarised at Figure 3. This provided a good deal of flexibility, permitting gunnery training to be tailored to the requirements of different categories of aircrew; all

Subject	3 weeks	4 weeks	5 weeks	6 weeks
Gunnery lectures	44½	60½	77½	86½
Gunnery practical	50	63	73½	85½
Signals practice	8	11	14	17
PT, drill, parades, games, etc	11½	19½	29	35
Briefing and flying	10	15	20	25
Totals	124	169	214	249

*Fig 3. The allocation of training hours to air gunners
as at June 1942.*

straight air gunners did the full six weeks, WOp/AGs would do four or five while flight engineers and flight mechanics made do with just three.⁵³ The duration of training for a straight air gunner in 1943 typically involved two weeks at an ACRC and six weeks with Nos 14 or 15 ITWs at Bridlington followed by six weeks of preliminary ground instruction at No 1 Elementary Air Gunners School⁵⁴ at Bridgnorth and another six weeks of practical work at an Air Gunners School. Following the closure of the elementary school in 1944, the length of the AGS course was doubled to twelve weeks.

In contrast to pilot and observer/navigator training, because it was so short, the RAF never made any serious attempt to transfer gunnery training overseas and the bulk of its wartime requirement was satisfied by the home-based system which produced a total of 28,243 straight air gunners. Canada, South Africa and Southern Rhodesia also trained British air gunners, but on a relatively small scale, the Canadians contributing 1,392, South Africa 445 and Southern Rhodesia 1,591. These figures represented only a tiny proportion of the overall output of the Empire Air Training Scheme, of course; for instance, while the Canadian schools trained relatively few RAF gunners, they turned out another 12,917 for the RCAF, 244 for the RAAF, 443 for the RNZAF and another 704 for the FAA. Furthermore, many of the air gunners who were enlisted in the air forces of the various Dominions actually flew with the RAF. For example, while the home-based Australian training system produced 991 air gunners to satisfy its own demands, it trained a further 2,295 RAAF air gunners specifically for service

with the RAF.⁵⁵ In all 51,283 gunners were trained for the Commonwealth air forces, plus half as many again as WOp/AGs.

The Demise Of The Air Gunner.

With the post-war air force still flying relatively large numbers of turret-armed aircraft, the air gunner's place was secure, for a time at least. In October 1947, a final batch of newly trained gunners graduated from Jurby's No 11 AGS, at which point the unit disbanded. Despite the closure of this, the last remaining, Air Gunners School there was still a residual demand for gunners. In May 1947 AMP had indicated that he . .

‘. . . hoped to meet this requirement from existing gunners on extended service, [*others recruited internally*] and RAF Regiment gunners, and to meet any shortfall by making use of signallers and to a lesser extent engineers, both of which categories are required to be trained in gunnery.’⁵⁶

By the spring of 1949, however, shortfalls were already beginning to become apparent, not least because the extended service scheme had been terminated in April 1947.⁵⁷

Since this had cut off the supply of veteran wartime gunners, it was no longer possible to replace the outflow of three-year extended service men, the last of whom could be expected to have left the Service by mid-1950. It is true that, since 1948 it had been possible for a qualified gunner to sign on for long-term service but most of those who wished to do so had already taken advantage of that offer. The current regulations also made specific provision for direct entrants and/or serving airmen to become gunners but this was hardly a practical proposition at the time because there were no longer any *ab initio* training facilities. Furthermore, Coastal Command had a lengthening queue of signallers and engineers awaiting cross-training.

Meanwhile, the prototype Canberra had flown and it was clear that the days of the archetypal Bomber Command air gunner were numbered. As a result, the option of long-term service, ie twenty-two years, *as a gunner* was withdrawn in late 1949, although very limited numbers of five-year regular engagements continued to be available for a while and, to give gunners access to long-term service, they were offered the opportunities of cross-training as signallers or of

remustering to a ground trade.⁵⁸

At the time, the air force was still wrestling with the problems involved in providing a workable long-term career structure for its aircrew within the constraints imposed by the 1946 Aircrew Scheme.⁵⁹ This was proving to be particularly difficult in the case of signallers, engineers and air gunners, who were regarded as birds of a similar feather and referred to jointly as the SEG categories. It was considered to be essential that all SEG aircrew should have equal status, and that meant that they would need to undergo equally demanding training courses. The sequence designed for a direct entrant gunner anticipated that it would take between 90 and 96 weeks to progress from induction to joining his first squadron.⁶⁰ This was to include forty-six weeks of basic and applied technical training which would be provided by No 10 School of Technical Training at Kirkham, where the RAF trained its armament tradesmen,

In the event, this rather ambitious scheme proved to be very short-lived. Despite the laudable attempt to create a syllabus that would provide gunners with a sound basis for a long-term career, the fact was that gunners had no long-term prospects, so it simply would not have made sense to have made such a heavy investment in training them. Furthermore, it was transparently obvious that, in order to achieve the desired degree of parity with signallers and engineers, the training sequence had been extensively padded. Before training had even begun, it was being pointed out that the course would provide a gunner with 'technical knowledge, not ability, far exceeding that of the average Sergeant Fitter Armourer, and it is unlikely that he would ever be called upon in the performance of his duties to use even a fraction of the knowledge gained.'⁶¹ The upshot was that only three Air Gunner All-Through Courses (fewer than twenty men) were run at Kirkham, No 1 beginning in March 1950 and Nos 2 and 3 in May.

Nevertheless, from the viewpoint of 1949-50, while it was clear that the demand for men to handle the gun turrets in the remaining Lancasters, Lincolns and Sunderlands could be expected to fade away by the mid-1950s, something still needed to be done about the short-term manning problem, which would be prolonged by the forthcoming Washingtons and Shackletons. Thus, at much the same time as it was having to withdraw the option of long-term service as a gunner, the Service needed to find more of them.



Once the Wellington had been withdrawn, Leconfield relied on the Lincoln for practical free gunnery training. This one, RE371, with its unit code misapplied (it should read FJ-SH), flew with the CGS for much of 1951. (MAP)

Very conveniently, the answer to this conundrum presented itself in the form of National Servicemen, for whom the long-term problem did not exist, and conscripts had been eligible to volunteer for aircrew duties as a gunner since as early as May 1949.⁶² So far as regular airmen were concerned, however, when the 1946 Aircrew Scheme was abandoned in 1950, the revised regulations relating to gunners provided only for re-engagement under the terms introduced in the previous year, thus effectively marking the end of recruiting of *regular* air gunners.⁶³

The recruiting problems aside, wherever the new generation of short-term gunners was to come from, it would be necessary to find somewhere to train them. By October 1949 it was being proposed that a dedicated school should be re-established but this idea was soon abandoned in favour of exploiting the existing facilities of the Central Gunnery School (CGS) at Leconfield where No 1 Air Gunners Course eventually began on 25 April 1950. Early courses were of twelve week's duration, but this was soon reduced to just eight, with practical exercises initially being flown on Wellingtons which were soon supplanted by Lincolns.

Since the majority of gunners passing through the CGS turned out to be National Servicemen and, because they would yield little more than a year's productive service, the throughput had to be much larger than the strength of the front-line would have suggested. In 1951 the forecast intakes, for each of the next three years, amounted to 220 conscript air gunners plus, for Coastal Command, 162 air signallers

and air engineers, a substantial proportion of the latter being regulars.⁶⁴

The last National Serviceman, the 394th to be identified as a potential air gunner since 1 April 1951, was earmarked by the Aircrew Selection Centre at Hornchurch in August 1953.⁶⁵ Allowing for the time lag in the system between selection and call-up, and for the time subsequently spent, first in recruit training at Padgate followed by a stint with the Aircrew Training Unit at Drifffield (later No 2 Aircrew Grading School at Digby), and possibly 'on hold' after that, it was 11 May 1955 before the last batch of eleven *ab initio* air gunners graduated from the CGS with No 112 Course.

By the time that the supply of post-war straight air gunners finally dried up, the category had already been effectively declared redundant. The withdrawal of the Lincoln and Washington meant that within five years the manning see-saw had tipped again so that the deficit of 1949 had become a surplus. The nature of a National Service engagement meant that the conscript element of the air gunner community soon took care of itself but something needed to be done about the remaining regulars. Since there were now very few professional employment opportunities for them as gunners, in the autumn of 1954 they were again offered the options of transferring to a ground trade or of retraining as air signallers. This time, however, it was not a question of volunteering; it was to be an automatic procedure once an individual had completed his original short-term engagement, regardless of whether he had subsequently extended this to twenty-two years or accepted an offer of serving to age 55.⁶⁶

Nevertheless, the RAF still needed people to man the guns in its remaining Sunderlands, its borrowed Neptunes and the Shackletons which would eventually replace both. In order to build up a 'stock' of cross-trained men, therefore, substantial numbers of air signallers and air engineers destined for Coastal Command had continued to pass through Leconfield.⁶⁷ Indeed the final eight courses in the series were entirely made up of air signallers and air engineers, the last of them qualifying with No 120 Course on 31 August 1955.⁶⁸

Thereafter the Shackleton soldiered on until the 1970s with the twin Hispanos in the Boulton Paul Type N nose installation (the Bristol B17 mid-upper turrets were withdrawn in 1956-57) notionally manned by air signallers (some of whom may well have been

remustered air gunners), the latecomers being checked out at the OCU and/or on the squadron. In this context it is interesting to note that as late as January 1957 an air signaller under training was still 'required to pass a course in air gunnery . . .'⁶⁹ When the terms of service for air signallers were next updated in 1959 there was no reference to gunnery.⁷⁰

Notes:

¹ AIR1/1036/204/5/1455. Air Ministry letter C.85253/M4a dated 5 April 1919.

² AMWO 19 of 8 January 1920.

³ AMWO 1295 of 18 December 1919.

⁴ AMWO 109 of 9 February 1921.

⁵ AMWO 271 of 14 April 1921.

⁶ AMWO 624 of 4 August 1921.

⁷ Formed at Eastchurch in April 1920 as the School of Aerial Gunnery and Bombing, it was renamed on 1 April 1922 as the Armament and Gunnery School. It was restyled again on 1 January 1932 when it became the Air Armament School.

⁸ The post-war RAF had initially sustained the use of the WW I term 'aerial gunner', certainly until 1924, but by mid-1925 this had been superseded, apparently without any formal notification of the change, by 'air gunner'.

⁹ AMWO 59 of 28 January 1926.

¹⁰ Winston Churchill's reign as Chancellor of the Exchequer (1924-29) was notable for a drive to return to the Gold Standard and to restore the pound to its pre-war value. What this meant in real terms is open to debate but it certainly imposed considerable strain on the national economy and was, arguably, a contributory cause of the General Strike of 1926. Despite the RAF's air gunners having previously been obliged to contribute to the sinking fund at a rate of a shilling a day, it had also increased the country's vulnerability to the recession which followed the Wall Street crash of 1929.

¹¹ AMWO 204 of 12 April 1923. There was uncertainty in some quarters as to whether the new badge had any impact on the old flying 'O'. AOC India, AVM Game, for instance, sought guidance in his 1753/1/Air dated 26 June 1923. The Air Ministry's response, 442529/23/P.2 of 24 August, confirmed that an airmen gunner entitled to a flying 'O' could continue to wear it, in addition to a winged bullet (see AIR5/482).

¹² AIR8/1359. AVM Steel's observations are taken from an unreferenced and undated paper he submitted to CAS at the end of 1926. The subject was actually accident prevention but Steel considered that inadequate and/or inappropriate manning was a contributory factor at a variety of levels and his Annex D dealt with non-pilot aircrew.

¹³ Para 482 of King's Regulations and Air Council Instructions (1924 edition).

¹⁴ See Note 12. Figures from Steel's Annex D.

¹⁵ *Ibid.*

¹⁶ AMWO 581 of 28 October 1926, the latest regulation governing the selection, mustering and posting of air gunners, required names to be submitted to the Officer i/c

Records who was then to arrange a course at the Armament and Gunnery School 'when a vacancy arises'.

¹⁷ AMWO 347 of 26 May 1927 revised the terms under which a gunner was to qualify. While the regulations still appeared to be fairly rigorous, they actually contained provisions which made it relatively easy (and permissible) to short-circuit the system.

¹⁸ AMWO 147 of 7 March 1929.

¹⁹ AIR5/1291, Iraq Command Monthly Operation Summaries, Vol V, 1927-1929.

²⁰ AMWO 457 of 14 July 1927.

²¹ AMWO 63 of 24 January 1929.

²² AMO A.11/1936 of 16 January.

²³ AMO A.242/1938 of 7 July.

²⁴ AIR2/1646. Minutes of the 14th Meeting of the Air Fighting Committee held at the Air Ministry on 29 November 1938.

²⁵ A key difference between an Air Observers School and an Armament Training Station was that the former was established to have a fleet of aeroplanes in which trainees could be flown. Armament Training Stations did not hold aircraft of their own, beyond a few drogue towers, since their function was to provide facilities for squadrons (and FTSs) carrying out one-month detachments using their own aircraft. These detachments ceased on the outbreak of war, the five remaining Armament Training Stations being either converted into additional Air Observers Schools or absorbed by the four which already existed.

²⁶ AIR2/2968. Ludlow-Hewitt provided a detailed breakdown of his proposal in a letter, BC/S.21116/CinC, which he addressed to the Air Ministry on 14 July 1938. This was not the first time that he had raised the question of an aircrew trade; it had certainly been in his mind as early as 1937 because he had suggested it in his annual report on the efficiency of his Command for that year (BC/S.20711 of 10 March 1938 – AIR2/2961).

²⁷ AIR6/55. Note 156(38) dated 29 October 1938 submitted to the 141st Expansion Planning Meeting..

²⁸ AMO A.17/1939 of 19 January.

²⁹ Para 3 of AMO A.17/1939 addressed the continuing need to satisfy Coastal Command's unique requirements, these having been formally acknowledged by AMO A.235/1936 of 8 October.

³⁰ AMO A.235/1938 of 30 June announced that it had been necessary to shorten the time devoted to the training of W/T Operators at the Electrical and Wireless School at Cranwell and stressed the consequent need for additional consolidation training on squadrons.

³¹ AMO A.392/1939 of 21 September.

³² AMO A.469/1939 of 9 November. This turned out to be a relatively short-lived prohibition and a few months later internal recruiting was reinstated by AMO A.93/1940 of 15 February

³³ AMO A.547/1939 of 21 December announced the introduction of the air gunners badge, which was to become the model for all subsequent single-winged designs. In his *Customs and Traditions of the Royal Air Force* (1961), Sqn Ldr P G Hering relates

that the prototype air gunners badge had featured thirteen feathers. While vetting the badge, CAS (Newall) observed that thirteen had probably been an unfortunate choice. Wg Cdr E H Hooper (of the Directorate of Personal Services) promptly produced a pair of nail scissors and the bottom feather was deftly removed before the design was submitted for royal approval. The original badge is still preserved as an attachment to King's Order 392 which was endorsed by HM King George VI on 9 December (AIR30/271); on examination, it is just possible to convince oneself that it might indeed have been 'pruned'.

³⁴ Like a pilot, a gunner or a wireless operator, a newly graduated observer wore three stripes but as an acting, as distinct from temporary, sergeant, which had an adverse financial implication for the individual (but not the Treasury) as the rate of pay was significantly less, a differential of 3/6d per day. The war was more than a year old before the requirement for observers to complete a six-month period of probationary service as an acting sergeant was abolished by AMO A.803/1940 of 31 October.

³⁵ AMO A.416/1940 of 27 June.

³⁶ A glance through the casualty lists in W R Chorley's *Bomber Command Losses of the Second World War, Vol I* (1992), illustrates quite clearly that until mid-June 1940 practically all gunner casualties had been corporals or below. The exceptions were a handful of the first commissioned gunners and a few sergeants who will presumably have been SNCOs in their own right within their parent trade.

³⁷ HQ RAFME appears to have been playing catch-up in the summer of 1940 as the remaining pre-war gunners in another of its units, No 45 Sqn, were all given their three stripes in September – see C G Jefford's *The Flying Camels* (1995) p141.

³⁸ Conroy, Dennis; *The Best of Luck* (Victoria, Canada, 2003).

³⁹ The unit that ran the gunner's courses, the Pilot Reinforcement Pool, was formed at Ismailia on 24 June 1940, absorbing the resources of the Pilot Training Unit which had, until then, been running Blenheim conversion and navigation courses at Abu Sueir. The first air gunners course began on 1 July and ended on the 13th; it had thirteen students, eleven of whom passed. After being restyled the Training Unit and Reserve Pool on 21 September, air gunner training continued until 10 December when the unit became the Middle East Reserve Pool, the training commitment being assigned to the newly established No 70 OTU. Although the OTU continued to provide training for air gunners in, for instance the manipulation of powered turrets, it does not appear to have sustained the basic course.

⁴⁰ AIR14/57. For example, Bomber Command letter BC/S.25181/CinC dated 14 Jul 1939 to USofS in which Air Mshl Ludlow-Hewitt, refers to previous correspondence dating as far back as March, in all of which he presses for the establishment of a 'centre for the study of gunnery problems'.

⁴¹ A common (possibly the only) method was to exploit the A&SD Branch. Examples of early officer gunners commissioned via this channel include Flt Lt A H S Browne, Fg Off W H Carr-Birbeck and Plt Off W S Fielding-Johnson. The last of these, whose seniority dated from 6 November 1939, was a notable veteran of WW I. Fielding-Johnson had begun his flying career as early as 16 October 1915 when he had been attached to No 3 Sqn. Rated as a qualified observer on 15 December, he was

wounded in action a month later. After recovering, he retrained as a pilot and he was eventually to claim six aerial victories while flying SE5as with No 56 Sqn. Having been decorated with the MC twice during WW I, incidentally, he was to add a DFC during Round Two.

⁴² AMO A.62/1940 of 1 February.

⁴³ AIR2/4700. Memo S.31 of 8 January 1941 from RAAF Liaison Officer at Australia House to S.10b at the Air Ministry.

⁴⁴ *Ibid.* Memo S.31 of 12 February 1941 RAAF Liaison Officer at Australia House to AMP.

⁴⁵ *Ibid.* Air Ministry letter S.69366/S.7 of 23 April 1941 to AOC 25 (Armament) Group.

⁴⁶ *Ibid.* Air Ministry letter S.69366/S.7 of 25 July 1941 from Charles Evans (Principal Assistant Secretary to the Permanent Under-Secretary of State for Air) to AOCinCs and a similar letter of the same date to the various Dominion Liaison Officers.

⁴⁷ AMO A.1242/1943 dated 2 December, the details of which were amplified by AMO A.244/1944 dated 23 March.

⁴⁸ In 1944 the wireless operator (air) [WOp(air)] would be joined by the wireless operator mechanic (air) [WOM(air)], both of which would be subsumed into the post-war category of the air signaller.

⁴⁹ Appointed to command No 77 Sqn with effect from 10 December 1942, just as the squadron was completing its conversion from Witleys to Halifaxes, Wg Cdr A E Lowe remained in post until 12 October 1943.

⁵⁰ Another air gunner who exercised executive authority was Sqn Ldr C A Maton who commanded a flight of No 502 Sqn from September 1943 to May 1944 when he was promoted to wing commander and took over as CO, remaining in post until October when his aircraft was forced to land in Sweden. Wg Cdr L H Kay was yet another air gunner CO. Appointed to command No 149 Sqn in January 1945 he was in post only briefly, as he was killed on operations on the night of 2/3 February; evidently flying as a supernumerary eighth crew member, he was listed in the F540 as 'second pilot'..

⁵¹ AIR14/16. Air Ministry letter S.58684/DofT dated 20 December 1939.

⁵² *Ibid.*

⁵³ AIR10/2318. The June 1942, 1st Edition of AP1388D, The Standard War Syllabus for Training Air Gunners.

⁵⁴ No 1 Elementary Air Gunners School (EAGS) was set up at Bridlington in April 1943, although it had moved to Bridgnorth to operate alongside its predecessor before the end of May. A rationalisation of all initial training arrangements in the spring of 1944 involved responsibility for all preliminary air gunner training being transferred to Bridgnorth where, with effect from 21 April, Nos 14 and 15 ITWs were reorganised to become Nos 80, 81 and 82 ITWs, absorbing the resources of the collocated EAGS in the process.

⁵⁵ AIR20/5764. These figures have been derived from statistics compiled by AHB which were subsequently refined and published in AP3233, Vol 1 (AIR41/70).

⁵⁶ AIR6/94. From AMP's undated (but circa May 1947) paper SC(47)23, submitted

to the Air Council Standing Committee by Air Chf Mshl Sir John Slessor, for consideration at its meeting 6(47) held on 2 June 1947 (AIR6/90).

⁵⁷ AMO A.312/1947 of 17 April

⁵⁸ AMO A.701/1949 of 6 October.

⁵⁹ The 1946 Aircrew Scheme was an early post-war attempt to impose a revolutionary social structure on the air force, involving traditional officers and airmen but with aircrew mustered, and segregated, as a distinct, and mostly non-commissioned, third group. For an account of this experiment, which was abandoned in 1950, see *Aircrew Status In The 1940s* by Wg Cdr Jeff Jefford in RAFHS Journal 42 (2008).

⁶⁰ AIR20/9060. The projected training syllabus for gunners, along with those for engineers and signallers, was summarised for the enlightenment of the Post War Manning Committee in Air Ministry memorandum PWPP (48)12 dated 8 April 1948.

⁶¹ AIR32/323. Appendix B to TT/29437 dated 31 January 1950, Technical Training Command's Interim Report on its investigation into all-through training for SEG categories.

⁶² AMO A.335/1949 of 12 May.

⁶³ AMO A.545/1950 of 31 August, which reinstated traditional NCO ranks, laid down the conditions of aircrew service under the new scheme. So far as gunners were concerned, these were confined to the re-engagement options announced by AMO A.701/1949 (*see Note 35*).

⁶⁴ AIR20/9060. Memorandum, A953751/DDT Wps dated 22 February 1951, by Gp Capt N H Fresson.

⁶⁵ Statistics relating to aircrew selection prior to April 1951 are elusive.

⁶⁶ AMO A.285/1954 of 25 November.

⁶⁷ AIR20/9060. A document, C51948/53 dated 21 July 1953, which laid down the future task for the CGS allowed for four eight-week basic gunnery courses to be in residence at any one time with an average strength of fifteen men each, the anticipated annual intake now amounting to 300 air signallers and 80 air engineers, although the actual throughput was somewhat less than this.

⁶⁸ On 1 January 1955 the CGS became the far more sharply focused Fighter Weapons School which clearly had little use for air gunners. Since Coastal Command was now the sole employer of air gunners, on the same date it assumed responsibility for their training by taking over Leconfield's Free Gunnery Section which now became the Coastal Command Gunnery School. It remained *in situ*, operating as a lodger unit within Fighter Command, until the end of the year when, having presumably accumulated adequate numbers of qualified personnel, the closure of the school marked the end of dedicated free gunnery training within the RAF. Coastal Command's subsequent, and steadily dwindling, residual requirement for instruction in gunnery was handled by No 236 OCU, later the MOTU, at Kinloss.

⁶⁹ AMO A.2/1957 of 9 January.

⁷⁰ AMO A.88/1959 of 25 March.

THE MOSS ON THE ROLLING STONE OF HISTORY

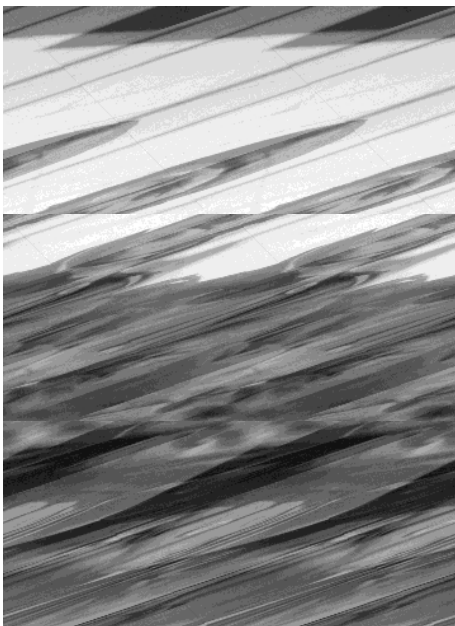
by Wg Cdr Jeff Jefford

Whether folk are wise to do so is moot, but I am occasionally asked for advice on writing air force history. My response invariably counsels against reliance on memory. Oral history is fine for recreating ‘atmosphere’ and as a source of colourful or entertaining anecdotes, but it is highly unreliable as a basis for historical fact. The same can also be true of previously published material, because once something appears in print it tends to be accepted as true and the more often it is re-cycled the deeper the patina of truth becomes. But what if the first writer got it wrong? And what if the story had tended to gain a little each time it had been retold? At the risk of being a bore, a recently published new history of No 14 Sqn provides a case in point.¹ The opening paragraph considers the knock-on effect, on the RFC, of Kitchener’s late-1914 plans for the expansion of the British Army. It says:

‘At HQ RFC the staff officers did their calculations and, with some trepidation, put forward a tentative suggestion of 50 squadrons. Their proposal was returned with a note in red ink scrawled in the margin “Double this – K”’

There is a lot wrong with this statement. Indeed it is inaccurate in practically every detail, starting with the fact that the sums were done at the War Office in London, not at HQ RFC, which was in France. One also wonders about the ‘trepidation’ and the ‘tentative’ nature of the proposal. Why the nervousness? And where is the evidence for this? What was the likely source from which this account evolved?

Almost certainly, the official history, Walter Raleigh’s Vol I of *The War In The Air* which was published in 1922. It says (on pages 432-433) that Colonel (*sic*) Brancker calculated that the requirement would be for ‘at least fifty service squadrons’. His minute was ‘circulated among the departments concerned, who promptly added to it their remarks and comments, all critical and sceptical.’ The paper eventually reached Kitchener who, ‘without an hour’s delay sent it straight back by hand to the Deputy (*sic*) Director of Military Aeronautics bearing an inscription scribbled at the foot – ‘Double this, K’.

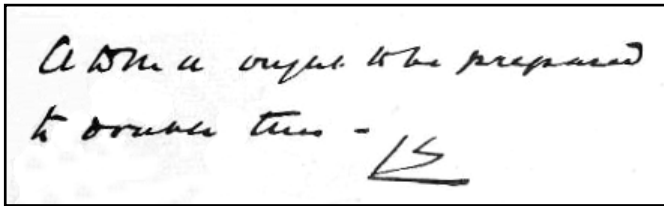



Col (later AVM Sir) Sefton Brancker.

But how accurate is that account? Surprisingly, not very. The original file is preserved at The National Archives² and it is apparent that, even in its first telling, this story had already gained a certain something. Why? Raleigh would almost certainly have had access to the file, but it is quite possible that he also interviewed Brancker. If he did, and this can only be surmise, this could explain why the facts were embellished a little. What really happened?

At the time, the overall head of the aviation community within the Army was Maj Gen Sir David Henderson, the Director General of Military Aeronautics (DGMA), a post which equated broadly to a latter day CAS. But when Great Britain declared war in August 1914, Henderson elected to go to France as GOC RFC in the Field. Although he retained his appointment as DGMA, for the next twelve months the London job was really being done, in his absence, by his *de facto* deputy, the Assistant (not Deputy) Director of Military Aeronautics (ADMA), Lt Col (not Col) Sefton Brancker.³ It was Brancker, acting on his own initiative in his capacity as the responsible airman at the War Office, who flagged up the need to create more squadrons in order to keep pace with the projected expansion of the BEF. No need to be nervous – it was his job.

He wrote a two page minute, dated 19 December 1914, which explained that when the BEF was reconstituted as 1st and 2nd Armies (which actually happened just a week later) they would need between them eight squadrons. Of these, six were already in France and two more were expected to deploy in January. What concerned Brancker



ADMA ought to be prepared
to double this - 

What Kitchener actually wrote.

was that it was now planned to create 3rd, 4th, 5th and 6th Armies and no action had yet been taken to provide the necessary air support. To conform with the current provision of four squadrons per army, it followed that four more armies would require another sixteen squadrons for a total of twenty-four, and he suggested that it would be prudent to assign six more squadrons to work directly under GHQ – so a grand total of thirty. To create and then sustain thirty service squadrons Brancker considered that he would also need five reserve (ie training) squadrons at home, three more than currently existed.

So, Brancker was proposing that the RFC should be expanded to a total of thirty service squadrons – not fifty – and his minute was not ‘circulated among the departments concerned’ it was addressed solely and directly to the Chief of the Imperial General Staff (CIGS). Far from being ‘critical and sceptical’, Sir James Wolfe-Murray forwarded the file to the Secretary of State on the 21st, noting that Brancker’s minute seemed ‘to me reasonable and based upon the experience of our wants as disclosed by the course of the campaign. What is wanted is authority to work up to this estimate . . .’

Kitchener’s response was certainly speedy; it is undated, but the next minute is also dated 21 December so the file must have been returned to CIGS (not Brancker) the same day. But Kitchener’s note was not a peremptory ‘Double this’; it was an advisory ‘ADMA ought to be prepared to double this’. And it was written in black ink – not red.

Nevertheless, Kitchener’s note was interpreted as authority to do whatever was necessary, CIGS minuting, ‘You will see from the above that the estimate of ADMA is well under the mark, and that it is by no means final – he should be authorised to go on.’

On 6 January 1915 one of Brancker’s staff officers, Maj C C Marindin, wrote to OC Administrative Wing, Lt Col E B Ashmore, at

Farnborough informing him that ‘sanction has been given for the formation of squadrons of the Royal Flying Corps up to No 30’ and authorising him to proceed with recruiting. There is nothing on the file to indicate how the next increase was calculated, but with what was evidently considered to be Kitchener’s blank cheque in hand, perhaps there was no need to make specific calculations. Whatever the rationale, on 15 January Marindin wrote to Farnborough again, this time advising that the formation of squadrons up to No 50 had been authorised.

So, while a proverbial rolling stone gathers no moss, as this tale illustrates, that is demonstrably not the case where history is concerned because that particular kind of stone does tend to pick up an accretion of factoids. So, when asked about writing air force history, my advice is that, whenever possible, one should always try to find primary sources – original contemporary policy documents, log books, diaries, photographs and so on – because accepting, without questioning, the writings of others may serve only to sustain, even embellish, a myth. ‘Back to Basics’ is not a bad slogan for a historian.

Notes:

¹ Napier, Michael; *Winged Crusaders* (Pen & Sword, Shrewsbury, 2012).

² TNA AIR1/143/15/40/316.

³ Brancker was promoted to colonel and his appointment formally raised to Deputy Director of Military Aeronautics (DDMA) in March 1915.

BOOK REVIEWS

Note that the prices given below are those quoted by the publishers. In most cases a better deal can be obtained by buying on-line.

Battle Flight by Chris Gibson. Hikoki, 2012. £29.95.

This book is a companion volume to the same author's *Vulcan's Hammer* (see Journal 51, pp157-9) which reviewed the post-war development of the RAF's actual and projected heavy bombardment weapons and delivery systems. *Battle Flight* does the same thing for its post-war air defence projects and systems.

The narrative begins with a brief account of the escalating threat as the lumbering Tu-4s of the late-1940s, delivering dumb iron bombs, eventually became Mach 2-capable bombers able to launch precision guided missiles from ranges in excess of 300 miles. This effectively meant that interceptions had to be carried out at ever increasing ranges and, with the advent of nuclear weapons, with close to a 100% success rate. As if this increasingly demanding, but relatively 'conventional' air defence challenge was not enough, it was overshadowed by the practically insoluble problem of the ballistic missile. Having set the scene, Gibson examines the various responses to these challenges, noting along the way the impact of two particularly influential documents, the Sandys Defence White Paper of 1957 and the 1965 report by R V Jones' Air Defence Committee Working Party.

The bulk of the book is broken down logically into chapters that deal with specific aspects. One is devoted to guns and gun-launched missiles (eg the GREEN LIZARD project) while another provides an account of the development of the surface-to-air missiles which replaced them, focusing on the Bloodhound programme and its projected ultimate iteration – BLUE ENVOY. Appropriate space is afforded to the evolution of the associated systems of radar surveillance, from the wartime Chain Home network via ROTOR and Linesman/Mediator to the current IUKADGE (a glossary decodes most acronyms), and to advances in successive generations of radars, providing some insight into the capabilities of, for instance, the Types 80, 82, 84 and 85, and BMEWS, taking in some blind alleys along the way – like the BLUE JOKER and ORANGE POODLE projects.

The critical contribution of air-to-air refuelling (AAR), as a

solution to the problem of long-range interception, is discussed, as is its influence on the choice of airborne early warning aircraft. The air staff evidently spent some time pondering the pros and cons of acquiring a relatively small type, perhaps the Grumman E-2 or an Andover-based system, versus something larger, like a Britannia or VC10 and it is apparent that the relative cost of the necessary AAR support was a critical consideration. The answer to that one turned out to be the ultimately disappointing Nimrod AEW 3.

Gibson goes on to describe a variety of fighter concepts and projects, including: variations on the Canberra theme; the mixed power interceptors, like the Avro 720 and SR177; the 'thin-wing Javelin' and the immense Fairey Delta III (almost as long as a Vulcan); sundry extrapolations of the Lightning and TSR2; consideration of a 'Super Mirage' and wishful thinking, in some quarters at least, over F-14s and F-15s. The answer was Tornado F.3 and, eventually, Typhoon. These aeroplanes, real or imagined, needed to be armed and, against the background of the development of Firestreak and RED TOP we are given some insight into the potential of a nuclear system, the most obvious answer being the American Genie missile, although some consideration was evidently given to tossing a RED BEARD at an incoming bomber!

There is even a chapter dedicated to the intractable problem of detecting and countering the ballistic missile or, worse still, its relatively tiny warhead(s). Much of this deals with US ABM programmes, like Nike-Zeus and Sprint, although the innovative Canadian 'Helmet' project (you will have to read the book) is also described, as is an interesting concept devised by the officers of No 1 Advanced Weapons Course at the RAF Technical College in 1959.

I could go on – and on, because this book is full of curiosities and these notes have only scratched the surface. The text is lavishly illustrated with photographs of hardware, along with informative diagrams explaining how various concepts (might have) worked, drawing of projected aircraft and of alternative weapon options fitted to in-service types and of potential advanced variants of these aeroplanes.

This well-presented, 208-page, casebound, A4-sized package is a pleasure to handle and simply full of interest. Recommended.

CGJ

Badges & Uniforms of the Royal Air Force by Malcolm C Hobart. Pen & Sword; 2012. £12.99.

Apart from Dr John Tanner's contribution to *Badges & Insignia of the British Armed Services*, a 367-page tome published by A&C Black in 1974, Malcolm Hobart is the only person to have attempted to produce a widely-available book cataloguing all the badges ever worn on RAF uniform. When his *Badges and Uniforms of the Royal Air Force* was first published in hardback in 2000, it did seem a little expensive (£19.95), but this was an inevitable consequence of his having included high-quality colour photographs of virtually every badge described in the text. Despite the title, however, there were no illustrations of uniforms. Instead, the author chose to highlight major developments in uniform policy in narrative form, thereby setting the scene for the 'meat' of his book – his detailed review of insignia.

When the original edition appeared, one might have nit-picked by highlighting, for example, that the illustrated RFC observer badge was, in fact, a WW II RAF pattern, or by suggesting that the illustrated RFC pilot badge was a recent reproduction, but that might have been a little harsh. The scope of the book was commendably wide, covering not only the RAF, but also the Auxiliary and Reserve Forces, the Civil Air Guard, the Air Transport Auxiliary, the cadet organisations (ADCC, ATC and Air Cadets) and even the Royal Observer Corps. It was thus a valuable aid to anyone collecting RAF badges – and a useful reminder to those of us who would otherwise have forgotten some of the less common badges and accoutrements that have adorned RAF uniform over the years.

The recently-released, 144-page, A5-ish softback version has a very striking cover, which will certainly attract the attention of air-minded people browsing in bookshops. But it is a great pity that the opportunity was not seized to correct errors found in the first edition (eg: the 'AT' badge did not appear briefly in the 1960s, as stated in the book, but was first awarded in 1990 and is still being worn today by Airborne Technicians flying in Sentry aircraft) and to update the text (eg by including the WSO/WSOp badge controversially introduced in 2003).

Whilst such deficiencies cannot be overlooked, one has to acknowledge the book's virtues. Where else could one see a high-grade colour photograph of the WRAF Chief Section Leader's or

Section Leader's badge, worn briefly in the early days of the Service? Or of the various badges, obsolete and current, worn by members of the Air Cadet organisation? It is this breadth, rather than depth, which will continue to attract those who collect, or have an interest in, RAF badges. Whilst one hesitates to draw a parallel with the sadly defunct range of 'Observer's Books', published by Frederick Warne between 1937 and 2003, such a comparison is apt and by no means uncomplimentary. For those of us who are not collectors, this might be a good book to buy now and put away for grandsons to explore in years to come.

Gp Capt Chris Morris

Winged Crusaders by Michael Napier. (Pen & Sword, 2012). £25.0.

In terms of raw statistics, *Winged Crusaders* is a 324-page hardback, illustrated by a selection of sketch maps, about ninety well-reproduced photographs, all set within the text, and sixteen colour profile paintings of representative aeroplanes ranging from the Bristol Fighter to the Marauder – but I found it particularly difficult to review.

The good news is that it is a well-written and, within the constraints imposed by its page count, comprehensive narrative account of the history of No 14 Sqn. Well a third of it anyway. Like its predecessor, *Winged Promises*¹ (on which it is a considerable improvement, incidentally), it comes to an abrupt stop in May 1945. There is a passing reference to recording the 'first hundred years' in the Introduction, so perhaps the remaining seventy are already in the mill. While the narrative is sound, it is conventional for a squadron history to be underpinned by a few annexes which present the key facts and provide the reader with a convenient cross-reference. *Winged Crusaders* offers only one of these. The most notable gaps are the absence of a list of COs and the lack of a record of movements, the latter being a particularly significant omission in the case of No 14 Sqn, which was unusually prone to mounting and maintaining detachments. The one important annex that is provided records all of the aeroplanes used by the squadron between 1915 and 1945. It is

¹ *Winged Promises*, (RAF Benevolent Fund Enterprises, 1996) was compiled by four contributing authors: Vincent Orange, The Lord Deramore, AVM D C Stapleton and Wg Cdr E Donovan.

admirably detailed, providing serial number, individual (where known) code, and, in most cases, dates of acquisition and disposal (although one or two of these look a little suspect), with a note to amplify the latter where appropriate. Where casualties were involved these are named, which serves to record the squadron's losses, although it is a bit cumbersome to use, compared to a dedicated Roll of Honour.

And now the bad news. While I have no issues with the telling of the squadron's story, there are some inaccuracies that suggest that the writer is rather less familiar with the history of the wider RAF. For instance, No 14 Sqn's aeroplanes could not have followed the oil pipeline while flying from Amman to Hinaidi in 1926 because it was not built until 1935, and when the squadron was reinforced in 1929 it was by Bristol Fighters of No 208 Sqn and DH 9As (later replaced by Fairey IIIFs) of No 45 Sqn – not the other way round. No 6 Sqn was flying the Hart, not the Hardy, in 1935-36; the Blenheim IVF's gun pack held four .303" machine guns, not four 20 mm cannon; there was no flying training school at Shaibah in 1941. There are a few more of these, and there are some classic misspellings, eg when it comes to signal lamps and pyrotechnics, there is only one 's' in Aldis and one 'e' in Very.²

The occasional factual error aside, the book is let down by a lack of attention to detail in its presentation. For instance, in his Introduction, the author outlines the problems involved in presenting place names rendered in Arabic, explains his approach to the problem and states that the 'sketch maps [. . .] reflect the spelling which I have used in this book.' But there are numerous inconsistencies between the maps and the text, eg Zerka/Zerqa, Dhalak/Dahlak, Takestan/Takistan, Kasr/Qasr and so on. A reader wishing to follow the action in detail will, incidentally, need to have an atlas to hand, as many names crop up that do not feature on the sketch maps.

Perhaps the most unsettling feature of the book is the inadequacy of the proof reading (a service that Pen & Sword are notorious for not providing). I came across more than sixty instances of omitted definite or indefinite articles, letters missing from within words and

² The Aldis lamp was named after its inventor, Arthur Cyril Webb Aldis, and the Very pistol, and its associated flares, for Lt Edward W Very, USN.

incomplete editing (where a phrase has been altered but bits of the original expression have been left embedded within the text). All of these provoke double-takes, which, when added to the occasional need to check a suspect fact, makes for an uncomfortable read at times.

But, back to the good news. No 14 Sqn spent almost the entire period covered by the book in or near the Middle East and, as a result, its history is full of incident. Of particular interest is the squadron's contribution to the campaigns in Egypt and Palestine in 1915-18. This is described in considerable detail by reproducing an eighty-page account (co-authored with the late Mike O'Connor whose fingerprints are, I fancy, all over this section), which was originally published as a three-part series in the *Cross and Cockade Journal* during 2011. The story goes on to cover the colonial policing of Transjordan during the inter-war years, wartime bomber operations with Wellesleys and Blenheims followed by a unique period operating the Marauder over the Mediterranean in a maritime role before spending the last few months of WW II at Chivenor flying anti-submarine patrols in Wellingtons.

As I have explained before in this Journal, if a book has shortcomings, I believe that a reviewer has an obligation to point this out. The problem with that approach is that it can create an unfortunate impression and I fear that that may have been the case here. While *Winged Crusaders* does have its flaws, and the potential purchaser should be aware of this, that does not necessarily make the book a bad buy. In this instance, despite my observations, if I had not been fortunate enough to have acquired the review copy, I would most certainly have bought one myself, and it is that comment that reflects my recommendation.

CGJ

Borneo Boys by Roger Annett. Pen & Sword; 2013. £25.00.

Roger Annett's *Borneo Boys* brings together an impressive collection of 'I was there' stories from young helicopter pilots and others involved in the Brunei Rebellion and the Confrontation with Indonesia in the 1960s. The stories are set against a comprehensive operational and political background and also cover the routes into the RAF taken by the Borneo Boys and their subsequent careers; as a result, the narrative is not always as smooth as it might be.

Nevertheless, the author is to be congratulated for recording these very readable personal accounts before they are lost and for setting them in context.

There is much hard data embedded within and between these tales and the reader will be able to derive a great deal of information relating to the Army and RN, as well as the RAF, units involved. It is apparent that helicopter squadrons and/or their various detached elements moved frequently and those on unaccompanied tours were shifted around remorselessly. That said, most of the young bachelors involved were only too happy to remain in the wilds of Borneo, with as many miles as possible between them and the command hierarchy. Their first-hand accounts will provide the reader with considerable insight into the way in which the Sycamore, the Belvedere and, the star of the book, the Whirlwind were flown – and fixed. The lessons learned in this campaign had a major influence on the procedures and practices involved in the subsequent evolution of Support Helicopter operations in the RAF.

For this reviewer it was the personal accounts that brought the book to life. Each contribution would make a good ‘Boy’s Own Story’ in its own right but being brought together, and supported by an excellent selection of well-reproduced photographs, they illustrate a story that could be bettered only by an action movie. Such a movie would have to be in 3D in order to capture the often hair-raising close-ups of 200ft trees, the stomach churning drops into hastily prepared LZs and the aerobic manoeuvres required to get into and out of some sites, often a dozen times a day, lifting supplies from DZs to camps, or construction materials to hill-top forts and relay stations together with the regular redeployment of Army units and their howitzers. This could involve logging an impressive 37 hours in a two-week detachment – and that was just the routine flying! Add to this the rapid-reaction insertion of troops to counter incursions and many service and civilian casevac and one has the flavour of the task facing the Borneo Boys.

In 1964, to counter Indonesian incursions, cross-border operations were authorised. At the time, Operation CLARET was highly classified and even the pilots who were actually inserting and recovering the SAS and Ghurkha patrols knew little of the detail. Roger Annett provides a useful summary of the rules governing, and

the secrecy surrounding, these clandestine activities.

What characterises the first-hand accounts is the freedom associated with the nature of the flying in Borneo. This would frequently involve a pilot operating alone, from a remote site, without any form of direct supervision for days at a time, and often out of radio contact. Couple that with their youth, few hours on type, minimal in-theatre training and the challenges of jungle flying in a relatively basic helicopter (with limited reserves of power and fuel, and little in the way of back-up systems) and many would say that this was a recipe for disaster. However, to their great credit and perhaps, as the author quotes, because ‘nobody told them that it was difficult’, these young men provided the essential mobility that permitted the few troops on the ground to cover a vast area and take the fight to the Indonesians.

The inclusion of groundcrew stories makes it clear that it was largely through their efforts that the pilots were able to achieve what they did. It took a great deal of ingenuity and perseverance to keep helicopters intended for fixed bases in temperate climates serviceable at remote sites in tropical heat and humidity with torrential rain. This while being plagued by bugs, beetles, bears and the odd snake and hindered by long supply lines, few spares and centralised servicing, as well as the corrosive contribution of a very frightened pig and the panel-popping effect of wet rice grains, is well told by the author, who has included contributions from other enablers, like Supply Officers and Mobile Air Movements Teams.

Pen & Sword are to be congratulated on publishing this well-presented, well-illustrated 304-page hardback, as is the author on his easy to read style. I recommend this title to the membership, and especially to anyone who was involved in ‘Confrontation’ or who may be studying the application of Air Power.

Air Cdre John Lumsden

Air Battle For Arnhem by Alan W Cooper. Pen and Sword; 2012. £19.99

Had I ever entertained the idea of applying for a place on Mastermind, my specialist subject would have been the airborne attack on Holland in September 1944. It is probable that more column inches have already been expended on almost every aspect of

MARKET-GARDEN than on any other comparably sized operation, nevertheless, a new book on the topic never ceases to attract my attention.

Air Battle for Arnhem sets out to cover the actions of the aircrews involved and of the air dispatchers of the Royal Army Service Corps who supported them, particularly during the hazardous and costly resupply sorties, which followed the initial deployments. The author sets the scene by summarising the military situation and providing some details of planned, but never executed, airborne operations, before discussing the available air transport forces and the plan for Operation MARKET-GARDEN itself (the former codeword being the airborne element and the latter the ground operation).

The book deals with the action chronologically, the description of each day's events being supported by a selection of vignettes and, generally short, comments. Whilst these are interesting and informative, it is difficult to know if they originate from personal recollections or are taken from such documents as the RAF Form 540s (the Operations Record Books) maintained by the units involved, because no primary sources are cited, nor are there any acknowledgements and there is no bibliography. The book concludes with reviews of the aftermath and a series of annexes listing awards, casualties, etc.

Unfortunately, the errors which characterise every facet of this book, start on the first page of the Introduction, with the identification of the *wrong* British airborne division! Throughout the book, use is made of ranks which simply do not exist in the British armed forces (other than some exclusive female titles). We are, for example, treated to Flight and Wing Officers, an Air Group Captain and a Lieutenant Air Commander – presumably a reference to a Leading Aircraftman. On the Army side, the air dispatchers have a sprinkling of Lieutenant Corporals and so it goes on with the Flight Commander of one Dakota squadron apparently being a Second Lieutenant. There are some factual errors and there are inaccuracies in the casualty index. For instance, one man, recorded as having been killed, is said, only two lines later, to have survived – but again with the wrong rank.

This book, the subject matter of which should have been interesting, and which would have been but for the myriad of errors, is truly awful. It is hard to believe that such an experienced author could

have written this account and I can only assume that the gremlin, or more likely the squadron of gremlins, responsible for the many inaccuracies managed to evade detection during the proof reading (were the proofs ever actually read?).

On my bookshelf are copies of *Green On* and *Tugs and Gliders to Arnhem*, both by Arie-Jan van Hees and both covering much the same ground as that attempted by *Air Battle for Arnhem* but doing so comprehensively and with far greater accuracy.

I found this 201-page hardback so disappointing that I felt obliged to draw its many shortcomings to the publisher formally, in writing, and I certainly cannot recommend it to this society's membership.

Wg Cdr Colin Cummings

British Experimental Combat Aircraft of World War II by Tony Buttler. Hikoki; 2012. £34.95.

Over the last ten years or so Tony Buttler has established a sound reputation as an authoritative writer on the design and development of British (and foreign) military aircraft, with a particular focus on unbuilt projects. This one is sub-titled *Prototypes, Research and Failed Production Designs*, which admirably sums up the content. It is a hefty, 268-page, A4, casebound volume, produced to Hikoki's customary high standard. The text is easy to read, although I did find myself skipping over the lengthier descriptions of the handling characteristics of some of these pretty obscure aeroplanes.

I doubt that there is much that is really new in this book. Much of the ground has already been covered by the author himself in his three earlier, and equally well-produced and received, 'British' volumes in the ever-lengthening 'Secret Projects' series. That aside, one can find quite detailed essays devoted to most, if not all, of these aeroplanes elsewhere, in the Putnam series of books dedicated to the products of individual aircraft manufacturing companies, for instance, and in articles in magazines such as *Air Pictorial* (in its heyday) and *The Aeroplane*. What this book does is to bring all of this information together and present it between one set of covers, and in the process it provides quite unmatched photographic coverage. Many of the pictures will inevitably be familiar because, while most of these aeroplanes will have had their 'studio portraits' taken, being experimental and subject to wartime security constraints, there will

have been few opportunities for taking informal ‘happy snaps’. That said, the reproduction of the available pictures, and there are a lot of them, well over 200, 250 if you include photographs of models of projects, is excellent, many of them being printed full-page width, and these are supplemented by a dozen profile paintings in colour.

I came across only a couple of double-takes, the use of ASI, where it should surely have been IAS (*pp 210 and 218*) and I think that the caption to the picture of the Martin-Baker MB 5 on page 147 actually shows the early MB 3-style fin and rudder configuration, rather than the ‘enlarged tailplane fitted to counter the aircraft’s directional instability’ – which doesn’t actually sound right either. But these are mere pinpricks in what is a handsome volume. So, if you want to know about the Boulton Paul P.92, the Folland Fo 108, the Vickers 432, the Martin-Baker MB 2, 3 and/or 5, the Supermarine 322, the Hillson Bi-Mono, the Blackburn B.20 or any one of a couple of dozen other non-starters or types that fell by the wayside, this book is a ‘must have’.

CGJ

ROYAL AIR FORCE HISTORICAL SOCIETY

The Royal Air Force has been in existence for more than ninety years; the study of its history is deepening, and continues to be the subject of published works of consequence. Fresh attention is being given to the strategic assumptions under which military air power was first created and which largely determined policy and operations in both World Wars, the inter-war period, and in the era of Cold War tension. Material dealing with post-war history is now becoming available under the 30-year rule. These studies are important to academic historians and to the present and future members of the RAF.

The RAF Historical Society was formed in 1986 to provide a focus for interest in the history of the RAF. It does so by providing a setting for lectures and seminars in which those interested in the history of the Service have the opportunity to meet those who participated in the evolution and implementation of policy. The Society believes that these events make an important contribution to the permanent record.

The Society normally holds three lectures or seminars a year in London, with occasional events in other parts of the country. Transcripts of lectures and seminars are published in the *Journal of the RAF Historical Society*, which is distributed free of charge to members. Individual membership is open to all with an interest in RAF history, whether or not they were in the Service. Although the Society has the approval of the Air Force Board, it is entirely self-financing.

Membership of the Society costs £18 per annum and further details may be obtained from the Membership Secretary, Dr Jack Dunham, Silverhill House, Coombe, Wotton-under-Edge, Gloucestershire. GL12 7ND. (Tel 01453-843362)

THE TWO AIR FORCES AWARD

In 1996 the Royal Air Force Historical Society established, in collaboration with its American sister organisation, the Air Force Historical Foundation, the *Two Air Forces Award*, which was to be presented annually on each side of the Atlantic in recognition of outstanding academic work by a serving officer or airman. The British winners have been:

1996	Sqn Ldr P C Emmett PhD MSc BSc CEng MIEE
1997	Wg Cdr M P Brzezicki MPhil MIL
1998	Wg Cdr P J Daybell MBE MA BA
1999	Sqn Ldr S P Harpum MSc BSc MILT
2000	Sqn Ldr A W Riches MA
2001	Sqn Ldr C H Goss MA
2002	Sqn Ldr S I Richards BSc
2003	Wg Cdr T M Webster MB BS MRCGP MRaES
2004	Sqn Ldr S Gardner MA MPhil
2005	Wg Cdr S D Ellard MSc BSc CEng MRaES MBCS
2007	Wg Cdr H Smyth DFC
2008	Wg Cdr B J Hunt MSc MBIFM MinstAM
2009	Gp Capt A J Byford MA MA
2010	Lt Col A M Roe YORKS
2011	Wg Cdr S J Chappell BSc

THE AIR LEAGUE GOLD MEDAL

On 11 February 1998 the Air League presented the Royal Air Force Historical Society with a Gold Medal in recognition of the Society's achievements in recording aspects of the evolution of British air power and thus realising one of the aims of the League. The Executive Committee decided that the medal should be awarded periodically to a nominal holder (it actually resides at the Royal Air Force Club, where it is on display) who was to be an individual who had made a particularly significant contribution to the conduct of the Society's affairs. Holders to date have been:

Air Marshal Sir Frederick Sowrey KCB CBE AFC
Air Commodore H A Probert MBE MA

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