# ROYAL AIR FORCE

# HISTORICAL SOCIETY


# JOURNAL

# 63

First published in the UK in 2016 by the Royal Air Force Historical Society



ISSN 1361 4231

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

## ROYAL AIR FORCE HISTORICAL SOCIETY

| | |
|---|---|
| President | *Vacant* |
| Vice-President | Air Marshal Sir Frederick Sowrey KCB CBE AFC |

### Committee

| | |
|---|---|
| Chairman | Air Vice-Marshal N B Baldwin CB CBE |
| Vice-Chairman | Group Captain J D Heron OBE |
| Secretary | Group Captain K J Dearman FRAeS |
| Membership Secretary | Wing Commander C Cummings |
| Treasurer | J Boyes TD CA |
| Editor & Publications Manager | Wing Commander C G Jefford MBE BA |
| Members | Air Commodore G R Pitchfork MBE BA FRAes |
| | Wing Commander S Chappell MA MSc |
| | Peter Elliott |
| | *J S Cox Esq BA MA |
| | *Maggie Appleton MBE |
| | *Dr Ross Mahoney BA PGCE MPhil |
| | *Group Captain P Wilkins MA RAF |
| | *Wing Commander J P Grindlay RAF |

**Ex Officio*

## CONTENTS

# SELECTED GLOSSARY

| | |
|---|---|
| ACM | Air Combat Manoeuvring |
| ADGB | Air Defence of Great Britain |
| AEW | Airborne Early Warning |
| AFBSC | Air Force Board Standing Committee |
| AHB | Air Historical Branch |
| ALM | Air Loadmaster |
| AMP | Air Member for Personnel |
| AQM | Air Quartermaster |
| ARL | see Note 16 on page 23 |
| AUS(G) | Assistant Under-Secretary of State for Air (General) |
| AUS(P) | Assistant Under-Secretary of State for Air (Personnel) |
| AMSO | Air Member for Supply and Organisation |
| AWRE | Atomic Weapons Research Establishment |
| BAWA | Bristol Aerospace Welfare Association |
| BCAS | Bomber Command Armament School |
| CINCENT | Commander-in-Chief Allied Forces Central Region |
| COMAAFCE | Commander Allied Air Forces Central Europe |
| DASB | Director of Air Staff Briefing |
| DCA | Deputy Controller Aircraft |
| DCINCENT | Deputy Commander-in-Chief Allied Forces Central Region |
| DGPS | Director-General of Personal Services (at the War Office) |
| DGT | Director-General of Training |
| DGW | Directorate-General of Works |
| DPA | Director Personnel Administration |
| DSD | Director Staff Duties (at the War Office) |
| DUS | Deputy Under-Secretary of State |
| FIDO | Fog Investigation Dispersal Operation |
| FOI | Freedom of Information Act |
| LCT | Landing Craft Tank |
| MAP | Ministry of Aircraft Production |
| ORB | Operations Record Book (the RAF Form 540) |
| ORS | Operational Research Section |
| PUS | Permanent Under-Secretary of State for Air |
| PWD | Petroleum Warfare Department |
| SAO | Strategic Air Offensive |
| SBA | Standard Beam Approach |
| SDA | Sex Discrimination Act |
| SDSR | Strategic Defence and Security Review |
| SHAPE | Supreme Headquarters Allied Powers in Europe |
| TNA | The National Archives |
| TSD | Top Secret Document |
| UAS | University Air Squadron |
| WMD | Weapons of Mass Destruction |
| WME | Weapons of Mass Effect |

**Our Guest Speaker, following the Society's Annual General Meeting at the RAF Club on 1 July 2015, was**

**Jonathan Aylen,**

**Senior Lecturer in the University of Manchester's Institute of Innovation Research whose topic was:**

## BUILDING AND DEPLOYING BLUE DANUBE – BRITAIN'S FIRST NUCLEAR WEAPON

> 'Although we had eventually won the Cold War […] there had been scant recognition of the efforts of those who had made it possible.' *Sir Freddie Sowrey*[1]

Nuclear weapons were a radical innovation in warfare. But, with a couple of exceptions, there has been little analysis of how Britain developed and adopted nuclear weapons.[2] An obituary of Air Marshal Sir John Rowlands alludes to his involvement in nuclear weapons, but does not focus on his leadership role in developing routines for the safe handling, storage, loading and maintenance of the first atomic bombs to enter RAF service.[3] Documents on the development of early atomic bombs have evaded the National Archive or, in some cases, been withdrawn. Key items of equipment have disappeared from history – the 'fish fryer', for testing bomb bay circuitry is only to be glimpsed in photos.[4]

BLUE DANUBE was the first atomic bomb delivered to the RAF. The first weapon arrived at the Bomber Command Armament School at RAF Wittering on Saturday, 7 November 1953, with the radioactive cores for the initial weapons delivered a week later – a year ahead of the aircraft which was to carry it into service.[5] The first V-bomber, a Valiant, WP206, was delivered to the RAF at Gaydon on 8 February 1955.[6] The first live drop, from a Valiant of 49 Squadron at 30,000 feet, took place at the BUFFALO series of tests at Maralinga in Australia on 11 October 1956, three years after the weapon's arrival in the RAF.[7] The Air Ministry recognised that 'for political reasons, BLUE DANUBE was introduced into the service at a fairly early development stage, which would normally be regarded as premature'.[8]

A deterrent is only credible if it is translated into a practical technology which can be delivered reliably and with force in all circumstances. As John Walker has said:

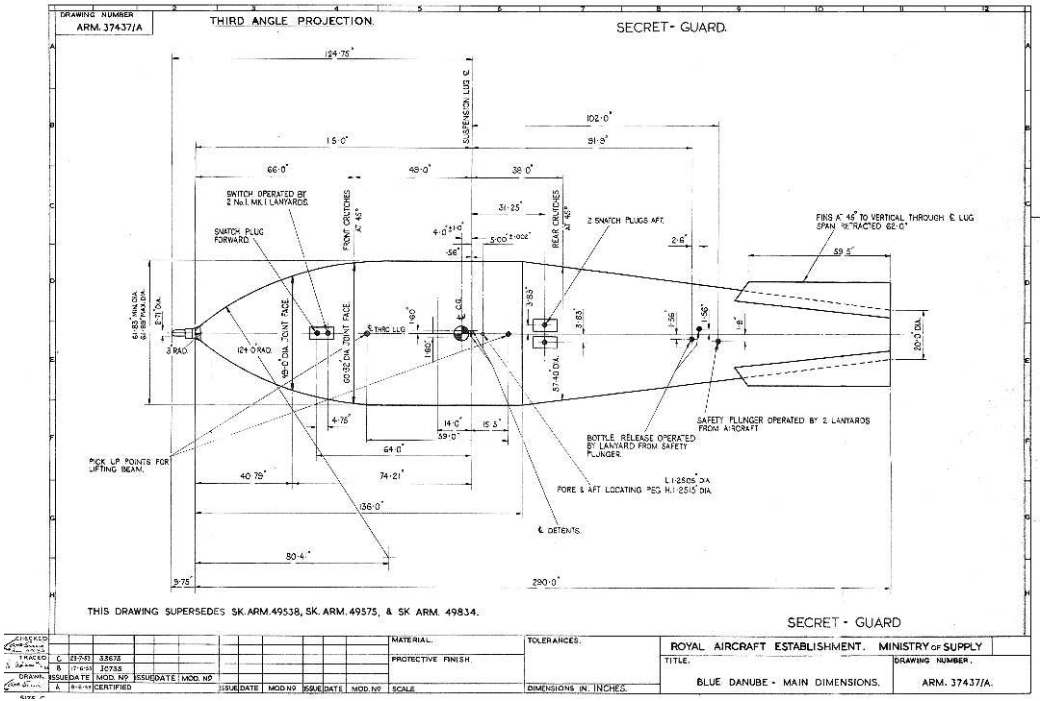
> ‘Becoming a nuclear weapon state and sustaining a militarily credible nuclear weapons capability is far from trivial, especially for medium powers. Such a capability is demonstrated by much more than firing a first test or acquiring significant quantities of fissile material; capability is indicated by factors including weaponization, delivery of weapons, reliability and effectiveness of weapons and their delivery systems, fissile material availability, and nuclear and non-nuclear testing. […] Sustaining a nuclear capability requires a wide range of capacities built over a protracted period of time.’[9]

So, it is a giant step from demonstrating that a weapon might work to development of a complete system for delivery by the Royal Air Force. The United Kingdom moved from go-ahead in January 1947, through to the first British-made nuclear explosion at the HURRICANE Trial at the Monte Bello Islands off Western Australia on 3 October 1952, to having a force of Valiant aircraft capable of delivering an atomic bomb by July 1955.[10] The RAF played a key role in supporting this nine-year transition from an initial idea to a fully functioning nuclear weapons capability.

To assemble the jigsaw of history, testimony was contributed by a number of individuals who had been involved in the development of, or who had actually handled, BLUE DANUBE and its successor, RED BEARD, the latter remaining in service until 1972.[11] Those involved with nuclear material were only given details on a ‘need to know’ basis.[12] Classification of material as ‘Top Secret – Atomic’ meant respondents were only aware of their particular contribution to the weapon. The RAF armourer who loaded BLUE DANUBE into a Valiant bomb bay, had no idea what the ‘secret squirrels’ got up to in their Supplementary Storage Area (SSA) where the bomb was held and serviced on their own base.[13] Participants give a practical – and more realistic – technology-based focus to what has hitherto been seen as a polite story of early nuclear science.[14]

**BLUE DANUBE – A Weapon on a Shoestring**

BLUE DANUBE was developed on a shoestring. A secret organisation led by Sid Hunwicks called ARL, based at the Royal Aircraft Establishment, Farnborough, was responsible for practical weapon design, ballistics testing and fitting the bomb onto the




*BLUE DANUBE: General arrangement drawing prepared by Miss Brenda Adams at ARL, Farnborough showing Modifications up to summer 1953 for Vickers at Weybridge to help Valiant design.* (RAFM AC74/27/2/11/5)

aircraft.[15 & 16] One of the lead designers Peter Barker said:

> 'We joked that somewhere there must be a large, brilliant team – with boundless resources – doing the 'real job', and that we were just a decoy […] it was inconceivable that ARL's small scale activity could possibly be a major part of the development of the British Nuclear Deterrent.'[17]

At first sight, Britain's first atomic bomb owes as much to the Reverend Awdry, creator of Thomas the Tank Engine, and the cartoon devices of Heath Robinson as to the sinister world of Doctor Strangelove and the Cold War. The Government turned to a maker of tank engines in Leeds for key components.[18] Vital parts of the bomb depended on a hot water bottle manufacturer in Barnsley.[19] The bomb was put together using traditional production methods, relied on fabrication, handling and storage practices developed during the Second World War and was based around a supply chain located in factories in northern industrial towns and southern ring roads, as well as the sites usually associated with atomic weapons development such as Fort Halstead, Aldermaston and Burghfield.[20]

BLUE DANUBE's design used pragmatic solutions to solve novel technical problems. Some of the biggest difficulties arose not from the fissile nuclear components, but from everyday practical concerns such as shaping the high explosive lenses needed for implosion, the fuze design, the trigger mechanism, and getting the free-fall bomb to leave the bomb bay of the delivery aircraft. One key obstacle was development of reliable electronics. These had to be 'potted' to protect circuits from extremes of temperature and humidity.[21] An RAF Progress Report says: 'delivery of electronic weapon components continue to lag behind schedule. This is attributed to the inability of manufacturers to keep pace with planned production rates, and to technical problems during current development trials.'[22]

When first deployed, the atom bomb was a craft-built prototype which was continually modified in service in a search for greater reliability. In many respects, the technology was deployed first and developed afterwards. The provisional status of the weapon is reflected in the ORB of the Bomber Command Armament School which laments in December 1953:

> ‘The training is somewhat impromptu, because there are component design changes, or rumours of such changes, almost daily. These reach the unit by devious means, but there is, as yet, no official channel for the communication of information. This facility has been requested.’[23]

**Conception of the British Atomic Bomb**

The decision to proceed with a UK atomic bomb was taken by a small cabinet committee ‘GEN 163’ on 8 January 1947, although plans to make plutonium were already underway.[24] Despite helping develop the first two atomic bomb designs as part of the Manhattan project and playing a part in the post-war tests at Bikini Atoll in July 1946, the British were cut off from American help by the terms of the USA’s McMahon Act which became law in August 1946.[25] The UK Government decided they had to develop their own ‘special weapon’. The aim was to build a version of ‘Fat Man’, the plutonium-based bomb dropped at Nagasaki, using knowledge acquired by British scientists working on the Manhattan project.[26]

A development laboratory called Basic High Explosive Research was established in June 1947 under the leadership of William Penney who had worked at Los Alamos from June 1944 and had witnessed the Nagasaki explosion. Penney had both the formal knowledge and the tacit know-how to transfer the essentials of bomb design to his new team and he had been appointed Chief Superintendent, Armaments Research as early as January 1946.[27] The project name was soon shortened to ‘High Explosives Research’ and the design team was given headquarters at Fort Halstead near Sevenoaks.[28] The team had access to production facilities at Woolwich and testing facilities, initially at Foulness in Essex and later at Orford Ness in Suffolk. In due course, High Explosives Research moved to a new site of its own at Aldermaston, a former airfield in Berkshire, which became part factory and part R&D laboratory.[29]

Both the Royal Air Force and the Royal Aircraft Establishment were involved in the development programme almost from the outset.[30] RAF personnel were attached to both Fort Halstead and ARL at Farnborough. Sqn Ldr J S Rowlands was selected to lead the RAF team during the summer of 1947. John Rowlands was to play the lead role in the RAF’s adoption of nuclear weapons. A Hollerith Punch

*A Valiant engaged in BLUE DANUBE loading trials being marshalled into the fenced ARL compound. The polished metal finish suggests that this is the second prototype, WB215.* (RAE)

Card machine was used to search RAF records to select the best qualified personnel to assist him. The nine men chosen to join Fort Halstead were Sqn Ldrs J H Hunter-Tod and J P Prior and Flt Lts C S Betts, A H Bullock, D W Densham, H Durkin, D Mercer, P E Mitchell and M E Pulvermacher. By then Sqn Ldr, Mitchell went on to accompany, now Wg Cdr, Rowlands to the Monte Bello test and to help set up the Bomber Command Armament School at Wittering.

A succession of RAF personnel was attached to ARL at Farnborough to 'learn the job'. These are known to have included a Flt Lt 'Nobby' Gilbert.[31] ARL was a secure compound for atomic bomb development work located at the remote southern end of Farnborough airfield. This ARL compound had aircraft access for loading trials and was occupied around 1950. Protected by an armed special police unit, ARL had a staff of at least 22 engineers, including RAF personnel, and 10 support staff working on BLUE DANUBE in 1953.

**Development of New Routines**

New technologies require new operating practices. The Royal Air Force had to adopt new jet bombers, new strategic doctrines and new concepts of operation. These innovations included a new bombing strategy: no bomber stream or pathfinders; one pre-planned target per aircraft; prior recruitment and training; a war of limited duration; blind

*The senior staff of BCAS as at 27 January 1954. Rear row: WO T G James; WO R Humphrey; WO S J Sparrow; Fg Off B I Sheppard; Flt Lt J G Whitaker. Front row: Flt Lt G Clubley; Sqn Ldr P E Mitchell; Sqn Ldr R Brown; Wg Cdr J S Rowlands; Sqn Ldr J A Blythe; Sqn Ldr C F Whitehouse and Sqn Ldr A D Button.*

bombing by radar and electronic warfare.[32] They also had to identify and develop the appropriate procedures for the handling and storage of nuclear weapons. These included armed convoys to move bombs around the country and 'special storage' facilities at depots and airfields.[33] New procedures were also required for the loading, arming and release of the weapon.

These routines were developed under the leadership of the Herod Committee ('High Explosives Research Operational Distribution') which first met in November 1948 and the related Salome Committee.[34]A special training school was set up at RAF Wittering called the Bomber Command Armament School (BCAS), formed on 1 August 1953 under Wg Cdr Rowlands to train aircrew and engineers in the use and servicing of nuclear weapons.[35] The first of many training courses began with the Technical Officers Course from 24 November 1953 to 10 February 1954 and was completed by three officers, all with an A2 grade pass. The numbers soon grew. For reasons of secrecy the school was 'located at the western end of the airfield, some three miles from the main technical and domestic site.'[36]

Accommodation was a set of leaking pre-fabricated Seco huts.[37] The unit badge had the apt motto *E Parvis Maxima* – 'From little things to big things'.

Apart from training aircrew and maintenance personnel many other tasks were foisted upon BCAS, including holding all weapons until the storage units at RAF Barnham in Suffolk and RAF Faldingworth in Lincolnshire were completed. The school was also required to write the servicing manuals and Air Publications, and became involved in specified test programmes, for instance conducting temperature trials on a live centre section for the Air Ministry at the request of the Atomic Weapons Research Establishment (AWRE).[38] The school's ORB notes that by June 1954 the unit was under strength and under immense pressure. Aside from its primary role and the random allocation of supplementary tasks it was experiencing difficulty in obtaining up-to-date information on the weapon and having to cope with large number of visitors to the site: 'As you would expect, we were deluged with visitors – the Royal Family, the Prime Minister, members of Service Boards and so on. In fact, everybody who was anybody paid us a visit.'[39]

**Design of BLUE DANUBE**

Supply of fissile material helped determine the design of the British atomic bomb. Plutonium was manufactured in two air-cooled graphite piles at Windscale in Cumberland.[40] The alternative approach, uranium enrichment, would have required elaborate facilities and, more to the point, huge electric power consumption at a time of post-war shortages.

A key feature of BLUE DANUBE was a sphere of explosives that triggered the implosion of the inner plutonium core with a powerful spherical pressure wave. The BLUE DANUBE bomb weighed four and half tonnes, but this included two and a half tonnes of high explosive. The 57½ inch diameter implosion sphere determined the overall size of the weapon.[41] So BLUE DANUBE was big. Peter Sharp, a former armourer, said after joining 138 Squadron at RAF Wittering in 1961:

> 'I saw my first BLUE DANUBE – I would never forget it, the Valiant to me was a big aeroplane. As aeroplanes go it was pretty damn big in those days. The bomb bay was enormous.

When this bomb came along – I couldn't believe it when it first arrived'.[42]

Shorter, fatter and lighter than a second world war Grand Slam, BLUE DANUBE's length at 24 feet, 10,000 lb weight and 62-inch girth determined the overall size and bomb bay capacity of the four medium bombers: the prototype Sperrin, the Valiant, the Victor and the Vulcan. All had been designed around the requirement to carry BLUE DANUBE. The size and design of the weapon also dominated RAF transport, storage and handling procedures.

The BLUE DANUBE design did not replicate the US 'Fat Man'. The British store had a light, internally braced ballistic casing, whereas the American case had been heavily armoured. BLUE DANUBE's explosive sphere was redesigned from first principles using a combination of 12 pentagonal and 20 hexagonal shapes which tessellated to form a globe – not unlike the outer pattern of a modern soccer ball. The first version of the British bomb was primed in flight through In Flight Loading of the core.[43] The UK bomb worked at higher altitudes and lower temperatures than its US equivalent.

Farnborough was responsible for the design and ballistics of the complete casing and for elements of the implosion sphere such as the support structure and the In Flight Loading mechanism. The bomb casing had a flush-riveted stressed skin over an inner airframe. The glass fibre nose formed a radome for the ground proximity fuzes. A programme of wind tunnel testing, trials of rocket propelled models and scale models, followed by full-scale trials at Orford Ness were used to confirm the shape.[44]

Wind tunnel testing at Farnborough confirmed the predicament that the bomb was reluctant to leave the aircraft due to the flow of air into the bomb bay when the doors were opened. Airflow generated local lift at the nose and downward flow at the tail driving the weapon back up into the bomb bay. From this point of view, the large BLUE DANUBE bomb suffered design problems. The bomb was very light for its volume. It had low density and a high surface area relative to its weight and so was more inclined to fly than fall. All the weight was in the middle, so it was easy for the bomb to pitch nose up, swivelling around the moment of inertia. John Allen was given the task of resolving the problem.[45] A bomb 'flying' in the bomb bay would

cause considerable embarrassment to the aircrew if a tug on the bomb bay lanyard caused the time delay fuze to kick in, or if violent movement in the bomb bay smashed the glass dome covering the contact fuzes on the nose of the weapon.[46]

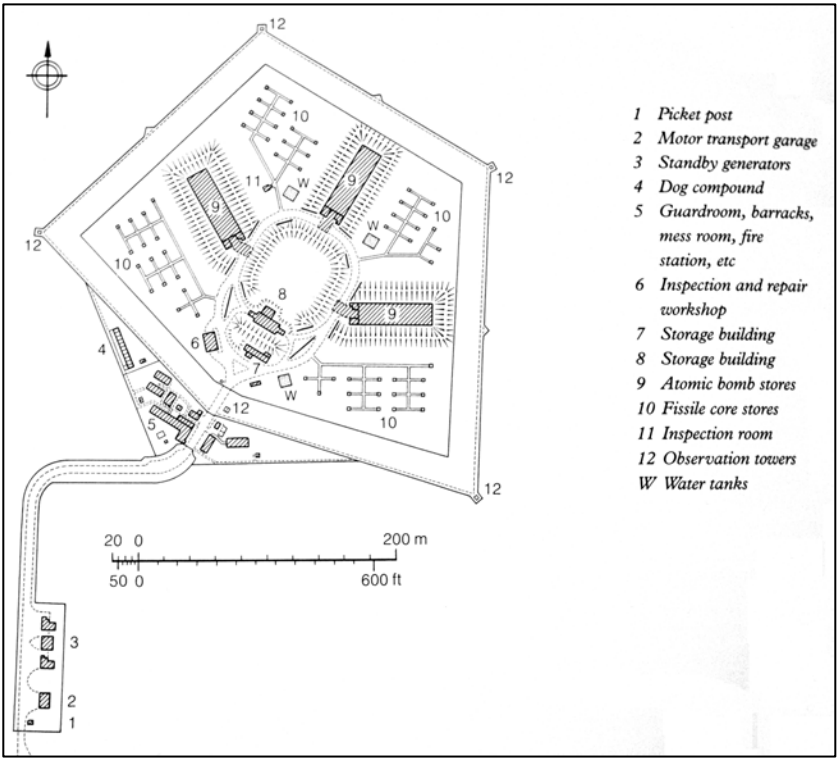
Two measures were taken to make sure the bomb *did* fall away from the aircraft. BLUE DANUBE had four fixed fin stubs which were limited in span by the diagonal size of the bomb bay. Extendable flip out fins were fitted to lengthen the span of these stubs. The flip-out fins were captured inside the fin stubs while the weapon was stowed in the aircraft. The fins were deployed as soon as the bomb left the aircraft. This was achieved using compressed nitrogen to drive a piston and four connecting rods, all activated by a lanyard. The Valiant was also fitted with half-a-dozen retractable dragons-teeth 'fingers' at the leading edge of the bomb bay to disturb the airflow to avoid the nose-up effect which generated lift.

**Storage and Handling – New Routines**

New routines were developed for handling the new type of weapon. The 'two man principle' was central to all handling and delivery systems.[47] So, there were always two RAF personnel in charge of handling or releasing a nuclear core on the ground. To release a core from storage needed an 'Equipper' with the combination of the storage igloo and an 'Engineer' with the key to the padlock of the stainless steel safe inside.[48] They would then walk together with the core to the load carrier.[49] Casings were always transported separately from cores. 'It was doctrinal that we never moved a complete weapon (ie one with its nuclear core fitted). There were always separate convoys for weapons and cores.'[50]

Again, the two man principle was always used on the aircraft: the Nav Radar would release the bomb, but the Captain controlled the Bomb Release Safety Lock on the final pin preventing the bomb dropping.[51] 'The two man principle was always applied to atomic weapons. There were *two* switches, one for the Nav Radar and one for the pilot.'[52]

The paramount need for security determined the layout of the two special storage sites built at RAF Barnham in Suffolk and RAF Faldingworth in Lincolnshire to hold and carry out simple mainten




*RAF Barnham 'Top Site'. The inner compound was laid out around a circular road with clutches of 'igloos' for plutonium core storage at safe intervals around the outside.* (Cocroft, Wayne et al *Cold War: Building for Nuclear Confrontation 1946-1989* [English Heritage, Swindon, 2003])

ance on BLUE DANUBE.[53] The 'Top Site' store at Barnham, south of Thetford, was operational for just ten years between 1953 and 1963.[54] The outer perimeter is a chain link fence a kilometre long with watch towers at each of the five corners. The fence was fronted and topped by barbed wire. The inner secure area is surrounded by a concrete panel security fence some six feet high and dug into the ground. The 'free fire' zone between fences was fitted with trip wires and patrolled by RAF armed guards with dogs. There were regular tests of the integrity of the defences as RAF personnel were deputed to penetrate

*The plutonium cores were stored in containers in locked floor safes with hinged lids sunk into the floor of the rectangular igloos at storage sites and SSAs (Author)*

the base – without success.[55]

Access to the inner compound was regulated by a sliding gate and clearance was needed to reach particular parts of this danger area. Even then: 'You only had access to certain areas within Top Site. You never went into other buildings unless specifically invited and unnecessary questions were discouraged. It didn't do to be curious.'[56]

BLUE DANUBE comprised a small fissile core and a large high explosive sphere and this combination of radioactive and explosive materials dictated the layout of the inner compound at Barnham. The site was built around a circular inner road. There were three high explosive storage sheds for the casings and explosives known as DD Buildings. There were also four sets of individual 'igloos' for storage of the plutonium cores distributed around the site, totalling 57 in all – each at a safe distance apart. Trial assembly of complete weapons took place in the CD Inspection and Maintenance Building inside the inner perimeter. There was another much smaller building for maintaining the cores which required 'urchin' replacement at regular intervals due to the short half-life of polonium (an intense source of alpha particles used as an initiator).[57]

The core storage igloos were rectangular concrete shelters, about 6 feet 6 inches high fitted with wooden doors, remote alarms, secure door locking and a circular locked safe fitted into the floor. The cores were relatively light and compact and amenable to manual handling in their carrying cases, so the storage huts were spread around the site and interconnected by narrow concrete paths.

In contrast, the heavy bomb carcase required road access, travelling cranes and mechanical handling devices. The bomb casings contained high explosive, lined with their uranium tampers. So the

three large concrete framed DD sheds had side walls that were not bonded into the pillars or the roof. In turn, these sheds were surrounded by earth banks to help contain and deflect any explosion upwards, thereby protecting the igloos nearby. The sheds were air conditioned. Typically the bombs were stored in a fishbone pattern on their trailers, facilitating their swift removal in the event of fire.

**Preparation**

The atom bomb was a set of technologies. It brought together pioneering electronics with novel fissile materials and conventional, heavy weight explosives. BLUE DANUBE was built up from five packages of components. These modules were:

a. the outer ballistic casing, which came in three parts – nose, body and tail;
b. the suspension system for the central physics package;
c. the various fuzes;
d. the firing mechanism and detonators; and
e. the physics package combining a high explosive outer shell and the tamper.

Finally, the core and urchin were loaded via a separate gauntlet, which also contained explosives once assembled. Assembly of the weapon required a combination of skills in handling explosives, fissile material and complex electronic circuitry. The BCAS developed the servicing manual for BLUE DANUBE which laid down the maintenance checks and assembly procedures, including the precise layout of the D1 Assembly Buildings at the Special Storage Areas (SSA) that were being built at selected airfields. These even included dusting instructions for the physics package as in: 'Exploder pockets (ii) Remove dust with clean dry cloth'.[58]

**Loading Live Weapons**

Loading also followed a strict routine developed by the BCAS. These procedures illustrate another feature of nuclear weapons handling, which applied to armourers and aircrew alike.

> 'If a team was detailed for a job, that's it. You went the whole nine yards together. You became a 'constituted team'. You trained together; you did the live loads together; you did everything together.'[59]

*Loading BLUE DANUBE into a Valiant required an oblique approach angle to allow it to fit under the aircraft. It was then hoisted up into the bomb bay from the Standard Airfield Bomb Transporter using a lifting rod inserted down through the fuselage from the Niels gantry in the background.*

The armourers would collect the weapon from the SSA. This would involve four or five personnel, the only exception being if a trainee was under instruction, in which case it was never a live weapon. The team had a very strict routine to follow when loading the weapon. The bomb would only fit into a Valiant on a particular diagonal from either the port or starboard side, and even then there would be only an inch or so clearance. Given the size and weight of the weapon, it was difficult to manoeuvre the trolley under the aircraft, even though the tyres were at 90 psi. There was still roll resistance.[60]

When a live weapon was delivered to the aircraft it would be accompanied by two policemen in a Land Rover at the front and two more in a Land Rover behind. 'Both policemen were armed.' The trailer with the bomb would be behind a towing tractor. 'That was pretty well it. They were very relaxed. The whole system was in its infancy.'[61]

Before a bomb could be loaded, the circuitry had to be tested.

> 'After you had put all this gear up it would have to be – we used to call it 'fish fried' – before it would be approved, before it could take a weapon. Officially we called it an electrical check. But once the fish fryer came along everybody knew what you meant.'[62]

The bomb was lifted from above the aircraft via the roof of the bomb bay using either a Niels gantry or a later Simon bomb hoist, with a 'top man' operating the hydraulic system at the top of the

aircraft and an operator/driver on the hoist. The two armourers below had to be particularly fit and agile, swinging around in the bomb bay connecting the various snatch cables. But the fuze lanyards were left to the Chief of the armourers' team:

> 'The Chief would tell you what to do. You would do it. There would be two of you in the bomb bay doing it. He would watch you do it, and then make sure that you had done it. He would inspect it when you finished. He always seemed – at least in my experience, it always seemed – to be the team leader that actually did the lanyards as well, all on his own. I don't recollect seeing anybody else ever do that; he'd still have to squeeze up round the weapon.'[63]

The lead armourer would then go up into the cockpit to work alongside the flight crew to make sure all was working. The final stage, the insertion of the gauntlet, was carried out by the aircrew. That made the weapon 'live', but they were never flown in that condition. 'Practice scrambles were frequently held, but although nuclear weapon-carrying aircraft often taxied to the end of the runway they were never allowed to become airborne.'[64]

**Overall Evaluation and Conclusion**

Air Vice-Marshal Stewart Menaul had a clear view of both the V-bomber programme and the arrival of BLUE DANUBE having commanded the Bomber Command Bombing School at Lindholme. He concluded confidently:

> 'By 1954, the many and varied components of the nuclear deterrent force were in production, including aircraft, weapons, a wide range of complicated radio and radar equipment, bombing and navigation aids and electronic counter-measures devices. Progress was not spectacular, but the superior quality was already apparent, and there were solid grounds for optimism that the future of Bomber Command as Britain's independent nuclear deterrent was assured'[65]

The RAF played a key role in development of the weapon from inception through to delivery and maintenance in service. RAF staff were attached to High Explosives Research at Fort Halstead and to the ARL design and development team at Farnborough. The Bomber

Command Armament School at Wittering played a crucial role in developing routines for handling and maintaining the weapon as well as training personnel under the leadership of John Rowlands.

The BLUE DANUBE weapon itself followed the imperative of 'build first – test later'. BLUE DANUBE was a provisional deterrent – frequently modified as problems cropped up. BLUE DANUBE and the associated RAF training and test procedures continued to evolve after it was designed. While the ballistic trials were thorough, many components were only tested and reliably manufactured after the weapon had been delivered. The operational weapon was modified, as if it were a prototype. There were two different priming systems and two main casings during the bomb's brief history. The tail was modified after an accident during trials in Australia. BLUE DANUBE was more a process of going nuclear than a finished product.

The weapon was developed and deployed with awesome professionalism, and with emphasis on the credibility of the threat it posed. Cheap but practical development of the atomic bomb saved deploying resources elsewhere. It kept the UK in the great power game and encouraged the Americans to renew cooperation over nuclear devices. But, the triumph of the technology was as much prosaic as scientific – a combination of leadership, hard work and strict adherence to new routines.

**Acknowledgements**

A wide range of participants have kindly helped with time and advice. In addition to those cited, the assistance is acknowledged at least half a dozen sources who chose not to be named. The Ministry of Defence and AWE supplied material very efficiently under the Freedom of Information process.

**Notes**

1 Sir Freddie Sowrey in response to Peter Hennessy in discussing the latter's presentation 'The Secret State: Old and New', RAF Historical Society Journal, No 34, 2005, p20.

2 Wynn, Humphrey; *The RAF Strategic Nuclear Deterrent Forces: their origins, roles and deployment 1946-1969, a documentary history* ( HMSO, London, 1994); Cocroft, Wayne, D and Thomas, Roger J C edited by Barnwell, P S; *Cold War: Building for Nuclear Confrontation 1946-1989* (English Heritage, Swindon, 2003); Pyne, Katherine; 'The nuclear dimension – the development of warheads for the Royal Air Force 'Special Weapons'' in *RAF Historical Society Journal No 62*, 2016, pp9-30; Brian Cathcart; *Test of Greatness: Britain's Struggle for the Atom Bomb* (John Murray, London, 1994).

[3] To be fair, there was much else to occupy the obituarist when discussing John Rowlands remarkable life; *The Telegraph*, 7 June 2006. See also his own understated account in Rowlands, J; 'The development of the atomic bomb' in *Proceedings of the Royal Air Force Historical Association 7*, 1990, pp13-18.

[4] The fish fryer was a piece of electrical test equipment on wheels. 'The fish fryer was connected to the bomb bay circuits'. The electrician outside was 'connected by intercom to the Nav Radar'. The electrician relayed the responses indicated on the fish fryer back to the cockpit as he tested the circuits. No weapon was loaded until testing was completed. (Interview with Sqn Ldr Bill Tivenan, Monday, 17 February 2014 who suggested he was using this about 1957. It looked like an item from a fish and chip shop, hence the name. It was about 3-4 feet wide and about the same height.). Peter Sharp said the fish fryer replaced the ML Wagon filled with 'relays and lights, telephone keys, and light panels – it might have been twenty in a row across ten rows. The ML wagon was driven up and plugged in to the plane.' (Interview with former armourer Peter Sharp, West Midlands, 16 April 2015).

[5] TNA AIR 29/4106 Air Ministry and Ministry of Defence: Operations Record Books, Miscellaneous Units, Bomber Command Armament School Wittering 1953 August to 1954 September, entry for November 1953, Para 1.

[6] Wynn, *op cit*, p116.

[7] Wynn, *op cit*, pp97-98 and 170-173.

[8] TNA AVIA 65/1114, 'Serviceability of BLUE DANUBE Mark I and Mark II, Note by the Air Ministry'. 29 November 1956.

[9] Walker, John R; 'Potential proliferation pointers from the past: lessons from the British nuclear weapons program, 1952–69' in *The Non-proliferation Review, Vol 19, No 1*, 2012, pp109-123.

[10] There is some ambiguity over this date. Wynn *op cit*, p117 suggests the first flight of Valiants of No 138 Sqn moved to RAF Wittering on 6 July 1955.

[11] Pyne, *op cit*, p21.

[12] Dissembling was also widely employed: As Air Cdre Mike Allissstone remarked, the RAF Barnham storage site was 'Locally rumoured to be breeding chimpanzees for a non-existent but convenient UK Space Programme', p55. Allisstone, Mike; 'Nuclear weapons and No 94 MU, RAF Barnham' in *Royal Air Force Historical Society Journal 35*, 2005, pp54-61.

[13] Interview with former armourer Peter Sharp *op cit*. At RAF Akrotiri the SSA was known euphemistically as the 'Tropical Trials Unit' to conceal its true purpose. (Interview with former Canberra pilot Gp Capt K J Dearman, London, 28 July 2015.) Also see: Moore, Richard, 'Where Her Majesty's weapons were' in *Bulletin of the Atomic Scientists Vol 57, No 1*, 2001, pp58-64.

[14] For science-focused accounts see Gowing, Margaret, *Britain and Atomic Energy 1939-1945* (Macmillan, London 1964) and Gowing, Margaret with Arnold, Lorna; *Independence and Deterrence: Britain and Atomic Energy, 1945-1952, Volume 2, Policy Execution* (Macmillan, London, 1974). Conventional accounts also overlook the considerable role of women in atomic bomb production.

[15] Hugh Francis was in charge of the overall Bomb Group at RAE, Farnborough. This information is due to Doug Bateman, who researched the early history of ARL

(interview 30 May 2013, Farnborough); Reg Milne, Farnborough (interviews 6 August, 2013 and 8 May 2014); John Allen (interview 5 September 2013) and Mike Igglesden (interview 1 October 2013); also see Hicks, George edited by Dommett, Roy; 'History of RAE and nuclear weapons' in *Prospero No 2*, Spring 2005, pp155-178.

[16] The ARL acronym was meant to conceal the true purpose of the organisation located on a remote part of the airfield at Farnborough, protected by armed guards. Sqn Ldr Clive Ellam, author of 'When engineering was fun: an apprentice's eye view of the Royal Aircraft Establishment, 1948-53' in *The Newcomen Society Transactions, Vol 71, No 2*, 1999-2000, pp165-181. He spent five years at RAE as an apprentice from 1948, aged 16, until 1953. Clive said that 'apprentices knew everything that was going on at the site'. But he did *not* know what went on at ARL until 2014. They thought ARL stood for 'Airfield Radio Laboratory', so they would have thought nothing about a Valiant going into the compound as they would have assumed it was just going in for radio development work. (Comment and interview Clive Ellam, London, 8 January 2014 and 12 November 2014). In their *Atomic Weapons Research Establishment, Orford Ness, Suffolk Cold War Research & Development Site Survey*, Research Department Report Series No 10-2009, (English Heritage, Portsmouth, 2009) p15, Wayne Cocroft and Magnus Alexander note that the ARL was 'variously referred to as the 'Airfield Radio Laboratory' or 'Airfield Research Laboratory' and that its personnel 'took the lead in designing the casing'.

[17] Peter Barker, initially a draughtsman at ARL and then engineer with AWRE (correspondence, 11 August 2014).

[18] The main casing of the bomb was fabricated by Hudswell Clarke at Leeds. The firm is best known for design and manufacture of industrial steam locomotives. (Interview with Brian Burnell, former keeper of drawings, Hudswell Clarke Aircraft Section, London, 9 January 2014).

[19] William Freeman & Company Ltd, of Peel Street, Barnsley made the 32 individual airbags which cushioned the outer layer of explosives beneath their aluminium cover plates. They were each fitted with a Schrader valve and pressurised to 55 psi. The firm was known for the manufacture of Subaseal hot-water bottles (Reg Milne, Farnborough *op cit*).

[20] For a detailed account of BLUE DANUBE's design and manufacture see: Aylen, Jonathan; 'First Waltz: Development and Deployment of Blue Danube, Britain's Post-War Atomic Bomb' in *The International Journal for the History of Engineering & Technology Vol 85, No 1*, January 2015, pp31-59.

[21] On the difficulties faced by Whiteley Electrical Radio Company of Mansfield, Nottinghamshire in manufacturing firing circuits see Aylen, *op cit.*

[22] TNA AIR 29/4106, BCAS ORB Aug 53-Sep 54, Appx 22 'Progress Report No 6.'

[23] *Ibid*; entry for December 1953, Para 6.

[24] Hennessy, Peter; *Cabinets and the Bomb*, British Academy Occasional Paper 11, (Oxford University Press, 2007) pp49-59.

[25] Szasz, Ferenc; *British Scientists and the Manhattan Project: The Los Alamos Years* (St.Martin's Press, New York, 1992).

[26] On the design of 'Fat Man' see Hansen, Chuck; *U.S. Nuclear Weapons: The*

*Secret History* (Aerofax, Arlington, Texas, 1988).

[27] *RARDE: the first fifty years* (Ministry of Defence, Royal Armament Research and Development Establishment, Fort Halstead, Kent, 1987).

[28] Cocroft, Wayne D; *Fort Halstead, Dunton Green, Sevenoaks, Kent: A Brief Assessment of The Role of Fort Halstead In Britain's Early Rocket Programmes and The Atomic Bomb Project*, Research Department Report Series No 49-2010, (English Heritage, Portsmouth, 2010).

[29] Hawkings, David J; *Keeping the peace: the Aldermaston story: a brief account of the first fifty years of the home of Britain's nuclear deterrent, the Atomic Weapons Establishment, Aldermaston* (Leo Cooper, South Yorkshire in association with AWE plc, Aldermaston, 2000).

[30] See Wynn *op cit*, chapter II.

[31] Correspondence from Reg Milne, 25 April 2014.

[32] 'Bombing On The Tin Triangle'; lecture by former Nav Radar Dave Lingard at Newark Air Museum, 20 October 2012.

[33] Allisstone, Air Cdre Mike; 'Nuclear weapons and No 94 MU, RAF Barnham' in *Royal Air Force Historical Society Journal 35*, 2005 pp54-61.

[34] See Wynn, *op cit*, chapter VI.

[35] Later known as Strike Command Armament School (STCAS) and then The Royal Air Force Armament Support Unit (RAFASUPU) within Logistics Command (interview with Sqn Ldr Bill Tivenan, 17 February 2014). Also see: Michael Hely, 'Nuclear Weapons Training – Groundcrew' in *RAF Historical Society Journal 26*, 2001, pp 74-80.

[36] *RAF Wittering: Information Handbook*; RAF: Wittering,1995, p11.

[37] TNA AIR 29/4106, eg Para 12, February 1954.

[38] *Ibid*. Orford Ness was not yet available for this sort of research, although chambers were built there for temperature, vibration and drop testing of BLUE DANUBE. See also Cocroft, Wayne and Alexander, Magnus *op cit*.

[39] *Ibid*. Appx 42 and quote from Rowlands *op cit*, p17.

[40] Lord Hinton; 'Atomic energy' in Williams, Trevor I (Ed); *A History of Technology, Volume VI, the Twentieth Century c.1900 to c.1950, Part I* (Oxford: Clarendon Press, Oxford, 1978) Chap 10, pp223-267.

[41] 'The problem is to enclose a sphere 57½" diameter and two cylinders, each about 3' diameter and 1' length, in a casing giving good ballistic performance.' Dr W G Penney in 'Ballistic Casing: Notes of Meeting', 11 May 1948 (private source, Surrey). These large cylinders were the firing units which were duplicated and contained the electronic circuitry needed to initiate simultaneous detonation at 32 points around the physics sphere.

[42] Interview with Peter Sharp *op cit.*

[43] On In-Flight Loading see Aylen *op cit*, pp47-48 and Pyne *op cit*, pp13-15.

[44] Heazell, Paddy; *Most Secret: The Hidden History of Orford Ness* (History Press, Stroud, 2010).

[45] Professor John Allen, former Senior Scientific Officer at ARL (Interview 5 September 2013, Suffolk and follow-up discussion 9 September 2015) and TNA AVIA 6/19446, Royal Aircraft Establishment; *The Effect of High Release Speed on*

*the Design of Blue Danube* by R I Vaughan and J E Allen, (RAE, Farnborough, Technical Note No Arm 502, December 1952).

[46] On the multiple fuzes fitted to BLUE DANUBE see Aylen *op cit*, pp41-43.

[47] Sources on the two man principle include John Weller, former Nav Radar (Interview Salford, 3 February 2014); Norman Bonnor, former Nav Radar (Presentation 24 March 2013, South Yorkshire Aircraft Museum, Doncaster); Gp Capt K J Dearman, *op cit*

[48] The first design of 'RAF safe' was unsatisfactory due to water ingress, causing much disagreement between the AWRE 'Works and Bricks' advisors and their RAF opposite numbers. The second, successful design was due to Tom Wilkinson of AWRE and was coated in white epoxy. (Communication from Peter Barker, 14 March 2015).

[49] Air Cdre Mike Allisstone, former Convoy Commander and later Stock Control Officer, No 94 Maintenance Unit, RAF Barnham (Interview 26 February 2014, Sussex).

[50] *Ibid*.

[51] Dearman, 28 July 2015 *op cit.*

[52] Tivenan, 17 February 2014 *op cit.*

[53] On Barnham see Cocroft *et al*; Cold War, pp29-34. Also see TNA AIR 29/4157, ORB of No 94 MU, RAF Barnham, 1 Oct 57-30 Jun 59.

[54] RAF Barnham 'Top Site' is being conserved under the care of a conscientious owner with the support of judicious grants from Historic England. See http://rafbarnham-nss.weebly.com/. The hospitality and help of Keith Eldred is warmly acknowledged,

[55] 'There was a security test at 19.15 on 18 December by an outside team. The NCO climbed the outer fence but triggered an alarm and was arrested and the officer surrendered without further attempt at entry.' TNA AIR 29/4157 *op cit* is one example.

[56] Allisstone, 26 February 2014 *op cit.*

[57] AWRE were insistent that radioactive components should not be broken down in Service'. TNA AVIA65/1255, M.S. 1749/55/4/Arm.Eng.5. The ORB for RAF Barnham, TNA AIR 29/4157, records regular visits of AWRE personnel.

[58] TNA AIR 29/4106, Part 1, Section 10 of Appendix 51, July, 1954. Also, see, at same reference, 'TSD 730, Bomb Aircraft, HE 10,000 lb, MC Mk 1, Vol 5A, Basic Servicing Schedules' and 'Vol 4, Missile Preparation Schedule'.

[59] Sharp, interview 16 April 2015.

[60] Sharp, telephone interview 1 April 2015.

[61] Sharp, interview 16 April 2015.

[62] *Ibid*.

[63] *Ibid*.

[64] Hamlin, John F; *'For faith and freedom': Royal Air Force Waddington: the first eighty years* (GMS Enterprises, Peterborough, 1996) p114.

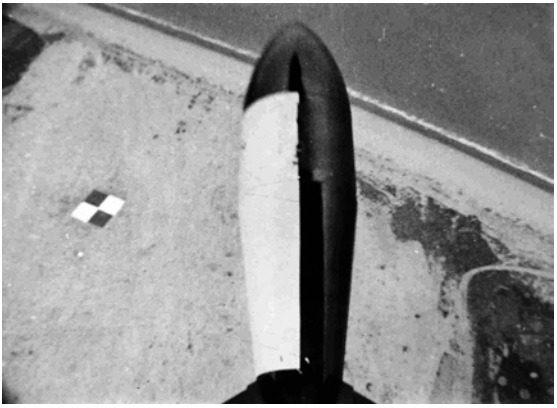
[65] Menaul, Stewart, *Countdown: Britain's strategic nuclear forces* (Hale, London, 1980) p51.

## DISCUSSION

**Air Cdre Graham Pitchfork.** You said there were three years between availability of the weapon and the trials. Without a trial, in the absence of any data, what could actually be done to improve the weapon? What filled those three years?

**Aylen.** When I said 'a trial', I meant a test of the whole weapon system. In the meantime there had been extensive testing of components, and, in particular, the bomb 'shape', initially using Lincolns and the Sperrin and finally early Valiants. The drops were carried out at Orford Ness where they could be monitored by telemetry to check that the internal circuits were working properly – that was the greatest concern – the establishment of confidence in the very advanced, for the time, electronic circuits. And, of course, the trajectory of the bomb could be tracked by kinetheodolites to determine its ballistic characteristics. Almost inevitably, there were incidents along the way – like a bomb being released into the bomb bay. I can't recall off-hand exactly how many were dropped but it would been of the order of 50 – many with concrete cores. But it wasn't until Maralinga that the whole system was tested.

Needless to say, the RAF was pressing for this work to be completed. After all, it needed to be reassured that the thing actually worked. There are numerous memos on file at The National Archives saying 'A test is long overdue. We need to prove that this is a functioning weapon.'



*A BLUE DANUBE casing being dropped at Orford Ness.*

**Richard Bateson**. You mentioned documents being withdrawn from The National Archives. Could you expand on that? And do you know whether the Operations Record Books for No 1321


*A BLUE DANUBE leaving a Valiant of No 90 Sqn when the redundant casings were being disposed of following the weapon's withdrawal from service.*

Flt and Nos 92 and 94 MUs have been released?

**Aylen.** Yes, they have, and the ORBs of the MUs are quite entertaining. The MUs were at Barnham and Faldingworth and were responsible for all of the weapons taken on charge by the RAF. Air Cdre Mike Allisstone describes it as like running both a wholesale and a retail service. Wholesale, in that they took delivery of all weapons and components from Aldermaston and Burghfield, and retail, in that, after any necessary preparation, they then issued them to operational units. The records are quite interesting, in places even mildly amusing. They describe, for instance, the problems involved in keeping the guards alert and they record the various simulated 'attacks' on the units and at least one instance of a policeman falling asleep on duty. There are issues to do with the Alsatian police dogs and they scrupulously record visitors to the sites. The visitors are not named, but one can see, for instance, a regular series of teams from AWRE at Aldermaston who would have been maintaining the initiators inside the plutonium cores – that isn't actually stated, but it can, I think, be inferred with some confidence. So – yes, the ORBs are available, and they make interesting reading, especially if you can talk to folk who were there at the time and who can expand on some of the more interesting incidents. Mike Allisstone has a particularly good story

about a RED BEARD finishing up in a lady's front room in Reading![1]

As to material being withdrawn from Kew, perhaps surprisingly, I have some sympathy with that policy. The fact is that BLUE DANUBE was a viable weapon and a rogue state could build one with relatively little effort. The problems that had to be overcome in the 1950s were less to do with nuclear physics than with the electronics. Today, you would not need to resort to the sort of devices that had to be developed at that time. Using current solid-state electronic technology, it would be easy to design the necessary circuits – you might even be able to buy some components off the shelf! So I have some sympathy with this kind of material being redacted. If the Iranians had gone down this route, it might have saved them fifteen years.

**Jefford.** Assuming, of course, that the Iranian hot-water bottle industry would have been up to the task. (*Laughter*)

**Aylen.** I just couldn't believe the hot water bottle story when I first heard it. But when it is being told by someone who was clearly involved in the design process, and who can draw sketches of the components and describe their function, you simply have to accept that it isn't a wind-up and you have to suspend your disbelief. Indeed my informant had actually specified the particular type of rubber – the elastomer – that would be needed and he identified the two individuals who handled the contract. Neither of them were at all fazed by being asked to produce oddly shaped – hexagonal – 'hot water bottles' in a peculiar material – indeed, they were extremely co-operative.

One way to track down the suppliers involved in the project is to examine the Honours Lists for the 1950s. (*Laughter*) If you can spot a manufacturer of hot water bottles who got an MBE out of the blue – he's your man. But he would not have been alone; there were others who contributed from obscure outlaying sectors of industry.

**Jefford.** In-flight loading is a topic that you and I have discussed before. I hadn't previously registered the three-year interval between delivery and a realistic capability. Do we know whether in-flight loading was ever an in-service procedure, or had it been abandoned before the weapon became fully operational?

**Aylen.** We know that it was used at Maralinga. We don't really know

why the procedure was dropped. We do know that the facility was not designed into the Vulcan or the Victor, but such correspondence as is available on the topic at Kew is so curt as to be cryptic. I believe that, while the mechanism worked to insert the gauntlet containing the core, there may have been a problem retracting it, which could have involved the aeroplane having to return to land with an armed weapon on board.

**Jefford.** Might there have been a problem with flexing of the airframe during flight causing difficulties with alignment with the bomb?

**Aylen.** No. I have discussed this with several people who were involved in the design of the mechanism and they assured me that the problem had been anticipated and, with the bomb very securely crutched, the system had been provided with sufficient tolerance to allow for any drift in alignment.

**AVM Nigel Baldwin.** Have you any idea of the cost of the weapon, in 1950s terms, compared to the cost of the aeroplanes?

**Aylen.** Sadly no. Despite my economics training, I have been unable to unravel that. It would make an interesting, if challenging, project, but the costs were hidden under a variety of budget heads and would be very difficult to isolate in any case. And you would have to include, for instance, the cost of key peripherals, like building, maintaining and manning Barnham and Faldingworth.

**Baldwin.** Numbers? Do we know how many were made?

**Aylen.** The numbers do not seem to have been recorded in any of the available documents, but we can estimate, with some confidence, perhaps 350 bomb cases, including practice rounds and those dropped in trials and, I believe fifty-eight live cores, of which one was used at Maralinga. Certainly fewer weapons than aircraft.

**Baldwin.** Jumping ahead to YELLOW SUN and WE177. Do we know, for instance – Jeff might – how many WE177s we had?

**Jefford.** I spent five years in the ‘Strike Shop’ at High Wycombe, when I knew precisely how many there were, and where they were – but I can’t remember now . . . (*Laughter*)

*The interior of one of the three Explosive Stores at Barnham, where the bomb casings were stored without their fissile cores, which were held separately in individual 'igloos'. Demilitarised, these cavernous buildings were ideal for growing mushrooms, until the business had to be terminated following an outbreak of disease.*

**Tony Bateman.** I wish I had spoken to you before I published *Valiant Boys* because there was a lot more that I could have included. The most surprising thing, to my mind, was that the Australians ever gave permission for the thing to be dropped at Maralinga!

**Aylen.** You may be gratified to know that when the Newcomen Society paid a recent visit to Top Site at Barnham, we presented the owner, Keith Eldred, with a copy of *Valiant Boys* as a token of our gratitude.

Eldred is a remarkable character. Barnham only operated for about eight years and when the MOD eventually decided to dispose of the site, it failed to sell at auction. Eldred subsequently submitted a ridiculously low bid – £20,000 – and, much to his surprise, it was accepted. Since then it has operated, first as a mushroom farm, and latterly as a light industrial estate but more recently English Heritage has taken an interest in it and some of the old nuclear facilities are

now Grade II Listed Buildings. Some restoration work has been carried out and more is underway – all of which is quite admirable, since nuclear issues are hardly fashionable these days.

**Tony Ball.** Despite such matters being unfashionable, with the imminent closure of Fort Halstead, would you know whether any effort is being made to record the nuclear heritage issues associated with that site?

**Aylen.** Yes. It has been very well recorded. There is an English Heritage report, which is available on the web, documenting Fort Halstead in some detail, and I believe that a number of buildings have already been listed, or scheduled, and they know what each building was used for. I think that Kate (Pyne) had been very helpful in that respect.

**Wg Cdr Colin Cummings.** Wg Cdr Geoffrey Dhenin, a particularly distinguished RAF doctor, flew a Canberra through a nuclear cloud. Would that have been BLUE DANUBE?

**Aylen.** I don't know specifically, because Canberras were also involved in the later H-bomb tests at Christmas Island. I do know that some of the Canberras used at Maralinga were said to be too 'hot' to handle.[2]

**Cummings.** Sir Geoffrey said that after landing he was required to jettison the starboard drop tank, which had been modified to incorporate filters to trap radioactive particles from within the cloud. Unfortunately, it bounced and rolled in front of the aircraft. Someone ran forward and kicked it out of the way to permit the aircraft to taxi to its parking area for decontamination. Sadly, not long afterwards, that man died from radioactive poisoning.

**Notes:**

[1] See Journal 26, pp117-121 for Air Cdre Allisstone's description of the activities of No 94 MU – including the Reading incident.

[2] For the record, the live BLUE DANUBE drop at Maralinga took place on 11 October 1956. Wg Cdr Dhenin's sortie had been flown over Emu Field three years earlier, on 14 October 1953. Remarkably, Geoffrey Dhenin, later Air Marshal Sir, would repeat his exploit, at Christmas Island in May 1957. See Journal 43, pp109-113.

## SUMMARY OF MINUTES OF THE TWENTY-NINTH ANNUAL GENERAL MEETING HELD IN THE ROYAL AIR FORCE CLUB ON 1 JULY 2015

**Chairman's Report.**

AVM Baldwin noted that a special effort would be needed to mark the Centenary of the RAF which was now less than three years ahead. This highlighted the relatively elderly composition of the committee, many of whom, by then, might have outstayed their welcome. The introduction of some new blood, especially from those recently retired from the Service would be most welcome.

There had been two seminars since the last AGM, both at the RAF Museum, Hendon. The first, in October, had looked at aspects of the RAF in the Far East after WW II, while the second, on the RAF's birthday, had examined Guided Weapons. Both were well attended and broadly covered their costs. Noting our continued appreciation of the support and the facilities afforded by the RAF Museum, the Chairman gave a special welcome to the newly appointed Chief Executive Officer, Maggie Appleton. The next seminar, on Wednesday 21 October 2015 at the RAF Museum, would cover post-WW II maritime air operations, while the Spring 2016 meeting, on 23 March, was planned for RAF Halton where we would examine Trenchard's Three Pillars' – the Apprentice Scheme, The RAF College at Cranwell, and the RAF Staff College. A planned seminar at the BAWA, Bristol on Thursday 20 October 2016 would deal with procurement issues over the years.

Despite falling subscriptions and increasing costs, the Society's finances had broken even in 2014 and there was a healthy balance of some £26,000. Accordingly, annual subscriptions would remain at £18 and seminar fees at £20 per head.

Concluding, the Chairman thanked the committee for their continued hard work, and expressed his appreciation of the support and encouragement of the President, Sir Michael Beetham, and the Vice-President, Sir Frederick Sowrey.

**Secretary's Report.**

Gp Capt Dearman reported that, since the last AGM, membership had reduced to 660. Efforts to increase membership, not least by word of mouth recommendation, would therefore be welcome.

**Treasurer's Report.**

Mr Boyes reported on the 2014 accounts. Despite the fall in membership numbers, the year had seen a break-even with a loss of only £1. Income of £19,431 was down on the 2013 figure of £22,006, but expenses had also been reduced from £21,370 in 2013 to £19,482. The nett cost of seminars had been reduced as a result of revised catering arrangements, and advantage had been taken of the fact that, with a turnover of less than £25,000, the Society had been able to reduce the independent examiner's fee. Total funds at 31 December 2014 stood at £25,789 which the committee considered was more than adequate for the Society's immediate needs.

A proposal by Gp Capt Heron, seconded by Mr S Cox, that the accounts be accepted and that Mr Bryan Rogers be re-appointed independent examiner was carried.

**Appointment of Executive Committee.**

The Chairman noted that, following the death of Dr Jack Dunham, Wg Cdr Colin Cummings had taken over the role of Membership Secretary. The remaining Executive Committee members had offered themselves for re-election. Mr S Cox, Head of the MoD Air Historical Branch, and Gp Capt Paul Wilkins, Director of Defence Studies(RAF) had agreed to continue as *ex-officio* members, while Wg Cdr Jamie Grindlay, of the Joint Services Staff College and Maggie Appleton, Chief Executive Officer, RAF Museum, had kindly agreed to become *ex-officio* members. A proposal by Air Cdre Tyack, seconded by AVM Johnson, that the Executive Committee be so 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 |
| Wg Cdr C J Cummings | 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 S Chappell MA MSc RAF | |

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

| | |
|---|---|
| J S Cox BA MA | Head of AHB |
| Maggie Appleton MBE | CEO RAF Museum |
| Gp Capt P Wilkins MA RAF | DDefS(RAF) |
| Wg Cdr J P Grindlay RAF | JSCSC |

**Discussion.**

Mr R Bateson noted that October 2016 would mark the anniversary of the first meeting of the Society and enquire whether there were plans to mark the event. The Chairman replied that the committee would consider this. Mr C Pocock offered microfilm equipment for disposal to anyone who might need it.

**Two Air Forces Award.**

The winner of the Two Air Forces Award for 2014 was Gp Capt Martin Johnson for his paper on The V-Weapons Offensive in 1944-45. (He had been unable to attend the AGM so the presentation was actually made at the Society's next seminar which was held at Hendon on 21 October 2015.)

**75th Anniversary of the Battle of Britain**

As a small gesture, to mark the 75th Anniversary of the Battle of Britain, Sir Freddie Sowrey recited a poem written by Lord Balfour of Inchrye.[1]

**Biggin Hill, July, 1947**

On Weald of Kent I watched once more.
Again I heard that grumbling roar
Of fighter planes; yet none were near
And all around the sky was clear.

Borne on the wind a whisper came,
'Though men grow old, they stay the same.'
And then I knew, unseen to eye,
The ageless Few were sweeping by.

[1] *Capt Harold Balfour MC* MP, Parliamentary Under-Secretary of State for Air, May 38-Nov 44, had been credited with nine victories while flying with No 43 Sqn in 1917-18. He was ennobled as the 1st Baron Balfour of Inchrye in July 1945*. ***Ed***

## OBITUARY: MARSHAL OF THE ROYAL AIR FORCE SIR MICHAEL BEETHAM GCB GBE DFC AFC

Sir Michael Beetham who has died aged 92, was, with the exception of the RAF's founder, MRAF Lord Trenchard, the longest serving Chief of the Air Staff.

Aged eighteen, he trained as a pilot in the USA under the US/UK bi-lateral 'Arnold' Scheme. He completed a full tour of operations, flying Lancasters of No 50 Sqn, including no less than ten visits to the 'Big City' and the disastrous Nuremberg raid, culminating in the award of a DFC.

In the years following the war he was very much a bomber man and commanded No 82 Sqn flying Lancasters on photographic survey and aerial mapping tasks for the Colonial Office in East and West Africa. In 1953 he was at the Air Ministry where the issues of bringing the three V-bombers into service took up much of his time. Five years later he joined the force when he commanded the Valiant-equipped No 214 Sqn.

His squadron pioneered air-to-air refuelling and in July 1959, the

*Left, Flt Lt MJ Beetham while serving with No 50 Sqn in 1944 and, right, Air Chf Mshl Sir Michael Beetham as CAS.*

then, Wg Cdr Beetham made a non-stop flight to Cape Town before returning a few days later. His two flights, of almost 12 hours duration, broke the speed records for the distance and provided a convincing demonstration of the feasibility and potential of air-to-air refuelling. For this work, he was awarded an AFC.

After a further tour at Bomber Command, he commanded RAF Khormaksar, his arrival coinciding with the start of a major terrorist campaign against British forces. After two years as the Director of Strike Operations in MOD, he took command of the RAF's Staff College at Bracknell. In August 1972, he became Assistant Chief of Staff (Plans and Policy) at SHAPE and worked under the charismatic and bullish American General Al Haig. His work was at the heart of NATO policy making, in particular the nuclear planning aspects.

After a period as the Deputy CinC at HQ Strike Command, he left in January 1976 on appointment as CinC RAF Germany and Commander Second Allied Tactical Air Force. His RAF squadrons were in the midst of a major aircraft re-equipment programme and there was great emphasis on the ability of his air bases to survive any pre-emptive attack.

Sir Michael became CAS on 1 August 1977, inheriting the appointment at a difficult time and at a relatively young age. He and his fellow Chiefs took a strong stance on the vexed issue of pay and conditions and eventually won the day. In 1979 he faced further serious challenges when it was decided to carry out a major defence review. With the support of a strong air staff, he fought the RAF's corner with considerable skill, tenacity and resolve, during what became known as the 'Nott Review'.

By 1982 he was nearing retirement when the Argentineans invaded the Falkland Islands on 2 April. He was determined that the RAF should make a direct operational contribution and he put the whole of the RAF's transport fleet on standby, despatched Nimrods to Ascension Island and pressed successfully for the employment of RAF Harriers from the Navy's aircraft carriers.

With his great knowledge of strategic bombing and his expertise on air-to-air refuelling, he instructed his staffs to assess if a bombing attack against Port Stanley airfield was feasible. He appreciated that there was little prospect of inflicting lasting, or major, damage but he believed such an attack, mounted at extreme range (the longest

bombing operation in history at the time), would send a clear message to the Argentineans that air power based on Ascension Island could pose a major threat to mainland Argentina, in addition to boosting the morale of the islanders.

Beetham saw the operation as a potent illustration of the case for the strategic impact and flexibility of air power, which he had argued for during the previous year's defence review. A few months after the end of the Falkland's conflict, he handed over the reins to his successor and retired from the Service.

Sir Michael retained a deep interest in RAF affairs. He was a founder member, and long-standing President, of the RAF Historical Society and, until his final days, he continued to maintain a keen interest in its activities. For many years he was President of the Bomber Command Association and fought tenaciously to gain the recognition he believed his colleagues deserved. Despite failing health, he was determined to see the culmination of his efforts and he was able to attend the dedication of the Bomber Command Memorial by HM the Queen in Green Park in July 2012.

He died on 25 October 2015.

**GRP**

*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 2014.* ***Ed***

# THE V-WEAPONS OFFENSIVE: ITS IMPACT UPON THE ALLIED WAR EFFORT AND SOME REFLECTIONS UPON THE CONTEMPORARY IMPLICATIONS OF WEAPONS OF MASS EFFECT

**by Gp Capt M R Johnson**

> *'Who can think without horror of what another widespread war would mean, waged as it would be with all the new weapons of mass destruction.'*[1]
>
> *The Times*, 28 December 1937

## Introduction

Between June 1944 and March 1945, Germany launched 15,500 V-1 'flying bombs' and V-2 rockets at targets in England and Europe.[2] While the V-weapons offensive did not succeed in meeting Hitler's aspiration of altering the course of the war by attacking the morale of the population,[3] this belies their broader effectiveness as weapons that delivered significant strategic influence. The Germans' overall strategy for the use of the weapons was incoherent and included disagreement as to whether they should be used against the civilian population or as weapons to strike at military targets.[4] Nonetheless, the indiscriminate nature of the weapons resulted in an impact that outweighed their capabilities as military weapons. This effect was magnified by the threat that they might be used to deliver chemical and biological agents.

The broader impact and influence of the V-weapons has endured beyond WW II. As the forerunners to cruise and ballistic missiles, the V-1 and V-2 marked the introduction of the use of missiles and rockets to deliver strategic influence and as such have provided a template for the contemporary implications of weapons of mass effect (WME). British Doctrine defines WME as 'weapons capable of a high

order of effect […] beyond the traditional lethal domain.'[5] By definition therefore, WME include all previous weapons that could be categorised as weapons of mass destruction (WMD), such as nuclear, chemical, biological and radiological. A key area of difference, however, is the emphasis on the ability of WME to deliver psychological effect and therefore their ability to influence the cognitive domain as well as the lethal. In assessing the implications of modern WME, this paper will consider cruise and ballistic missiles with the potential to deliver traditional WMD warheads. As observed by former US Secretary of Defense William Perry, such weapons in the hands of rogue or third world states could 'constitute the greatest single danger to […] world security.'[6] While recognising their overall importance in the debate, the paper does not specifically consider implications of the threat posed by nuclear weapons, or the unique nature of the evolving implications posed by cyber warfare as a potential WME.

By examining historical analysis of the V-weapon offensive, the paper shows that the psychological impact of the threat posed by the weapons had a major influence on strategic thinking and had a tangible impact through the diversion of resources to counter the threat. It will conclude, however, that this did not have a decisive effect on the outcome of the war. Extrapolation from more recent campaigns highlights many parallels between the impact caused by the V-weapons and the implications of modern WME, particularly in terms of strategic considerations. Finally, the paper will argue that the implications associated with allocating assets to counter today's threat is likely to be more complex and challenging than at any previous time due to pressures and imperatives caused by resource and fiscal constraints.

**Psychological Impact**

Although Hitler did not succeed in his objective of destroying the will and undermining the support of the English population, the fear caused by his 'Vengeance' weapons undoubtedly affected morale and had a psychological effect that impacted allied considerations for the remainder of the war. The first V-1 landed in London on 13 June 1944; this was followed by the first V-2 on 8 September 1944. Between June 1944 and April 1945, more than 8,600 V-1 and V-2

weapons attacked England;[7] nearly 1·5 million people had evacuated London by September 1944, and by the end of the war 24,165 had been killed or seriously injured by the V-weapons.[8] Although the V-1 and V-2 both brought terror and fear, they did so in different ways. The V-1 was an inherently inaccurate weapon which was used indiscriminately by the Germans. The fear this engendered was enhanced by the fact that its distinctive droning noise became silent once the engine cut, giving a terrifying notice of the destruction that was to follow. Although more accurate, the V-2 was silent and therefore gave no notice prior to impact. While this may have engendered a 'fatalistic attitude',[9] the V-2 also marked a shift in the way civilians could be targeted; Coblentz describes this effect as 'the introduction of chaos […] into human affairs.'[10]

There was strong concern that the psychological impact of prolonged exposure to the V-weapon attacks would lead to a loss of public support with calls for the British Government to seek a peaceful settlement of the war. A further consideration concerned the impact that the V-weapon offensive had on the morale of those soldiers engaged in Normandy who were distracted and worried for the welfare of their loved ones at home in England.[11] Deliberate efforts were taken to mitigate this risk, including through the use of the press. This was reflected in an article in *The Times* in June 1944, which suggested, 'The aim of these nuisance raids is no doubt to shake the morale of the British public, which has never been stronger than today.'[12] This was one example of the leadership and authorities playing down the level of fear and the psychological effect of the V-weapons as a way of maintaining the support of the people.

But there is plenty of evidence to suggest that the V-weapons did have a significant effect on the morale of the population. Johnson highlights the level of fear the V-weapons caused by quoting a London resident, 'The flying bombs were the terror of our lives […] we sat under the table with our hearts in our mouths until the dreadful explosion came.'[13] Furthermore, the overall psychological effect and impact on morale was formally recorded by Squadron Leader Herbert Bates in a 1945 (although not released until 1994) study for the Air Ministry which stated, 'The toll of death, injury and damage to property from the flying bomb attacks was greater than anyone imagined.'[14] He went on to add, 'In reality it did a great deal to

morale.'[15] Although not used, it was also believed that the V-weapons had the potential to deliver chemical and biological agents. It is likely, therefore, that passive defence measures would have increased the psychological effect and level of fear of the weapons, particularly amongst members of the public who had long ceased to carry their gas masks with them at all times, confident that the much-feared threat of gas warfare had passed. This threat also affected the political and military leadership who were immensely relieved to discover that the V-weapons used against England did not carry chemical and biological weapons.[16] The attacks also caused a mass exodus of workers from London; those that remained were terrified and exhausted, and stayed away from work to deal with damage to their own properties.[17] As a consequence, it is estimated that the V-weapon offensive resulted in war production in London being reduced by 25%.[18] Despite this reduction in capacity however, it is unlikely that the attacks would have materially affected the war effort because of the proximity of the end of the war in 1944-45; moreover, the attacks would not have affected the industrial effort of the other Allied powers.

More recent events have shown that WME are likely to be used by an adversary as a weapon of strategic influence by capitalising on the fear and psychological impact that the asymmetric use of such weapons would cause. Pastel and Ritchie describe these weapons as 'effective agents of terror',[19] and this would be borne out by the devastating effect of Iraq's use of chemical weapons in its war with Iran in 1980-1988 which caused over 30,000 casualties.[20] The psychological effect of Saddam's use of WME during this war was significant. As well as witnessing the horror, the impact on morale caused by publishing the medical effects of the chemical weapons was such that volunteers for Iran's Revolutionary Guard fell by one third; moreover, the fear that Saddam's Scuds would be used to deliver chemical weapons during the 'War of the Cities' also reportedly resulted in up to one half of Tehran's population evacuating the city.[21]

Domenici argues, however, that chemical and biological weapons do not have to be used to cause fear and have a psychological effect; rather, their potential use could be sufficient.[22] This was very much the case with Saddam's use of Scud missiles in 1991 which was intended to alter the course of the war through their psychological

impact.[23] Although he did not use chemical and biological weapons on this occasion, the threat that they might be used had a strong psychological effect on Israelis and resulted in gas masks being issued to the civilian population. By the same token, though, the warnings issued to by a letter to Saddam from President George H W Bush and then face-to-face by Secretary of State Baker to Tariq Aziz over possible Iraqi use of WMD also had a clear psychological effect. Baker spoke of the American public demanding 'revenge' and of the United States having the means to exact such vengeance, hinting that the US would aim for the eradication of Saddam's regime rather than merely his eviction from Kuwait, while Bush's letter spoke of Iraq paying 'a terrible price' were WMD to be employed.[24]

Therefore, through delivering psychological impact, WME have proven to be effective weapons that could be used by a potential adversary to achieve asymmetric advantage by attacking civilian targets. The extent to which the V-weapons, and the threat that they could carry chemical and biological agents, affected the strategic considerations of the Allied leadership will now be explored, alongside related contemporary strategic implications.

**Impact on Strategic Considerations**

In order to minimise the risk of the V-weapons being effective in targeting civilians, the highest political priority was placed on pre-empting and neutralising the V-weapon threat before the first weapon could be launched; as King and Kutta argue, it would have been unacceptable for the civilian population to suffer again as they had during the Blitz.[25] The V-weapon threat was exacerbated by reports of Hitler's chemical and biological programme. This became an imperative in strategic decision making as the Allies embarked on a massive programme for developing their own chemical and biological weapons because they had to 'prepare for the worst'.[26] Although intended for retaliation, Churchill's serious consideration of the pre-emptive use of these weapons to counter Hitler's threat highlights the influence that the V-weapons had on strategic decision making.[27]

The imperative to counter the V-weapon threat also adversely influenced strategic planning decisions. For some time, Montgomery had been unsuccessful in securing Eisenhower's support for Operation MARKET GARDEN. As the V-2 threat became clearer, Montgomery

re-submitted the plan to include the opportunity to neutralise the rocket threat. Not only did Eisenhower agree to the plan, but he allocated it the highest priority.[28] This was ultimately a flawed decision as the operation was a failure. D'Este describes Eisenhower's decision to agree to the MARKET GARDEN plan as one made 'more from a sense of […] pressure to overrun and put out of commission Hitler's V-weapon sites in Holland than from a solid military foundation.'[29] Therefore, although the primary objective of MARKET GARDEN was not the V-weapons, it became the decisive imperative. The urgency of the requirement to neutralise the V-weapon threat therefore clouded military judgement and was the influencing factor that led to Eisenhower agreeing to the ill-fated plan.

The threat of the V-weapons also brought to the fore national imperatives and considerations within the Allies, with the inevitable potential for friction. In evaluating the most appropriate means to counter the V-weapon threat, the US proposed that a joint US/British committee should replace the British Air Ministry in having responsibility for countering the threat. This was refused by the British leadership in unambiguous terms on the grounds that it was the British people that were under threat, and therefore they would lead with the response.[30] The US was also seen to follow national interests with regard to the threat. For example, a key driver behind US support for the UK allocating a priority to the V-2 was that they believed that the rockets had the range to target mainland USA.[31] Intelligence sharing also became a source of friction. A report raised by a war committee established in Washington to evaluate the implications of the rocket threat highlighted discontent over a lack of intelligence sharing; it stated that the committee was 'strongly impressed by the hesitancy of British leaders to reveal the true nature of the danger.'[32] Although these frictions were an issue, there is little evidence to suggest that they had a major impact on either the cohesion of the strategic alliance, or the overall war effort.

In any future conflict, our strategic centre of gravity is likely to be the cohesion of a coalition, with support of the people a critical requirement. Therefore, the need to act to minimise the psychological impact will be just as much of an imperative in contemporary considerations as it was during the V-weapon campaign, as shown by the coalition imperative to keep Israel out of the Iraq war in 1991.

Recent events in Syria have also highlighted that WME will continue to be exploited by potential adversaries to introduce frictions in creating and maintaining cohesion within a coalition. In 2012 a Syrian Foreign Ministry spokesman stated that although his government had no intention of using chemical weapons, it might consider doing so if 'Syria faces external aggression'.[33] The intent behind this statement was to use WME to introduce uncertainty into the minds of potential coalition partners, and thus make creating coalitions more difficult, a point reinforced by Dominici in his discussion regarding the coalition in Iraq in 2003.[34] The discovery of a WME threat during an operation could also present strategic challenges. National imperatives would then determine how a coalition partner responded, potentially leading to a withdrawal of support or military contribution.[35] The implications that WME presents for a coalition could therefore be significant, with particular emphasis on the imperative to ensure that its cohesion is not undermined.

Ranger and Wiencek argue that the presence of WME will be a key factor that complicates strategic decision making,[36] and this will include challenges associated with deterrence and potential responses. While the Allies' chemical and biological programme may have deterred Hitler from use of his programme, a combination of ethical considerations, and adherence to *jus in bello* principles and treaty obligations quite rightly precludes this from being an appropriate form of modern deterrence for the West. Credible messaging, therefore, could be extremely important. President Obama's statement in 2012, aimed at deterring Syria from using WME, caused much debate and could potentially have wider strategic implications; in this instance the US did not follow through with a specific response despite the warning that, 'a red line for us is we start seeing […] chemical weapons moving around or being utilized […] That would change my equation.'[37] The decision to go to war with Iraq in 2003 also highlights the challenges that WME presents concerning intervention. The decision was taken because of the perceived need to counter the threat of Iraq's WMD; however the belief that Saddam had this capability at his disposal was based on ambiguous intelligence linking a chemical and biological threat with ballistic missiles.[38] As with the experience of MARKET GARDEN, history shows that the imperative to counter this perceived threat clouded political and strategic level

judgement and decision making. These examples highlight that the potential presence of WME could continue to have a significant, and sometimes detrimental, impact on strategic considerations.

Although the threat of the V-weapons did have an effect on strategic thinking for the Allied leaders in WW II, there is no evidence to suggest that this had a major impact on the overall Allied effort. Experience from more recent case studies would indicate that the imperative to counter the threat of WME could continue to lead to strategic challenges. The paper will now explore the resource implications associated with countering the V-weapon threat, and its contemporary parallels.

**Impact on Resources**

There is a strong argument that the greatest impact the V-1 and V-2 weapons had on the overall war effort was in the level of resources that were diverted to counter the threat. As Collier identified, 'The great question was whether a substantial part of the Allied bomber effort should be switched from the battle in Normandy or the bombing of Germany to the rather daunting task of knocking out […] sites.'[39] The majority of these resources were allocated to Operation CROSSBOW, the Allied effort to co-ordinate pre-emptive aspects of dealing with the V-weapon threat; this included the intelligence gathering contribution and offensive strikes against the range of targets associated with the V-weapons. There was general agreement amongst the Allied leaders that air power would be the key to countering the launch of the V-1 and V-2 weapons; this was predicated on the fact that the Germans still had control of continental Europe in 1943.[40] But this could only be achieved if sorties were diverted from other missions. From 17 August 1943, when the RAF conducted the initial raid against the Peenemunde rocket development complex, in excess of 6,000 bomber missions were diverted to pre-emptively attack CROSSBOW targets before the V-weapon offensive started in June 1944; in January 1944 alone, 38% of all missions were assigned to meet CROSSBOW requirements.[41] This would reinforce Joseph Angell's observation of the challenge as 'a diversionary problem of the first magnitude.'[42]

With such a high percentage of missions diverted to counter the V-weapon threat, it was inevitable that such action would lead to

frictions. Specifically, during the period 1943-1945, Operation CROSSBOW was competing with Operations POINTBLANK and OVERLORD for the same resources. Particular issues of concern were raised by both Air Chief Marshal Harris and Lieutenant General Spaatz who didn't want resources diverted from POINTBLANK, the offensive bombing campaign over Germany, to the defensive CROSSBOW campaign.[43] Central to this disagreement was a failure of the operational commanders to grasp the political imperative to neutralise the V-weapon threat and minimise any possible risk of losing the support of the population. Eisenhower, however, did understand the political imperative and with overall command for all bombing assets, he prioritised CROSSBOW missions over all other missions, except those that met, in his words, 'the urgent requirements of the battle.'[44] This was supported by Churchill. As the diversion of sorties to CROSSBOW became an enduring friction, Churchill personally intervened in July 1944 when he declared that, 'Subject to the overriding needs of the Battle of France, all Britain's available resources must be used to try to counter the flying bombs.'[45]

While the two V-weapons presented very different challenges in terms of counter-measures and the associated resources that needed to be allocated, their collective 'randomness' added to the resource burden necessary to counter the threat.[46] The nature of the V-2 rocket was such that it could not be defended against once airborne; therefore, destroying the launch sites became a critical requirement. The V-1 on the other hand could be intercepted with responsibility delegated to the Air Defence of Great Britain. Again, significant resource was required for the associated three lines of defence: multiple squadrons of fighters including Tempests, Spitfires and Meteors, provided the first line of defence; the second line was provided by anti-aircraft guns; and the third line by barrage balloons.[47]

Despite Harris' claim in July 1944 that diverting resources to CROSSBOW had contributed to undermining most of Bomber Command's efforts over the preceding three years,[48] there is insufficient evidence to suggest that it delayed the outcome of the war, particularly considering the numbers of aircraft available to the Allies. The conclusion reached by the United States Strategic Bombing Survey is that the diversion of resources had an insignificant impact overall on the Allied war effort.[49] Kipphut reinforces this, and points

to the fact that the CROSSBOW missions successfully delayed the use of the V-weapons by 3-6 months, which was long enough to enable the Normandy landings to take place as scheduled.[50] There is also an argument that Hitler's persistence with the V-weapons, and his obsession with the V-2 in particular, had a positive impact on the Allied war effort. In order to pursue the V-2, Hitler ordered that all available resources should be allocated to the programme. This resulted in the cancellation of projects such as the *Wasserfall* anti-aircraft programme with the resultant effect that there was no need for dedicated suppression of enemy air defence missions because allied bombers encountered significantly less German defences during their bombing raids.[51] While the V-weapon campaign was successful in meeting Hitler's objective of diverting resources, this did not have a decisive effect and did not have the desired impact of altering the course of the war. In particular, it came too late to delay the Normandy offensive.

It is likely that one of the most significant contemporary implications raised by WME would also be associated with the allocation of resources to counter the threat. The significant level of resource diverted to counter the threat of Scuds being launched at Israel in 1991, 1,500 strike sorties, mirrored that allocated to counter the V-weapon threat.[52] But Kipphut makes the point that future challenges will be greater because the threat is likely to comprise more technologically advanced ballistic and cruise missiles.[53] A mass of resource alone will no longer be sufficient (or indeed be available) to counter this threat, which will result in the need for a more sophisticated approach and a prioritisation of assets.

The threat that these weapons could carry chemical and biological (and nuclear) warheads is an additional imperative in the requirement for comprehensive defences. But countering the threat of these WME needs to go much deeper, and according to a senior Pentagon official, should comprise a layered approach, including prevention, and active defence, both of which will have implications for resource allocation.[54] While prevention will require international community enforcement of regulations and treaties, rogue states may not necessarily pay much heed to this. Iraq openly flaunted its disregard for the international community's efforts during the Iran-Iraq war, with Syria threatening to do the same in 2013. Another facet of

prevention therefore, is the possibility of offensive pre-emptive strikes. But pre-emptive strikes would not be acceptable in all instances, and, as discussed above, would the appropriate resources exist for a successful campaign?[55]

Amongst the range of counter-measures available, it is possible that defensive measures could be the most complex. Ballistic missile defence systems are at the forefront of these considerations. Given the challenges associated with developing a comprehensive defensive system, it is no surprise that the US is fostering a network of close partnerships including with NATO, Japan and Israel.[56] But at a time of restraint in defence spending, prioritisation in the allocation of scarce resource will be essential and will not be without friction. For example, the US announced in March 2013 that it would divert its missile defence efforts from Europe to the US west coast to counter the developing North Korean ballistic missile threat, but this could only be achieved by cancelling its proposals to deploy a similar capability in Europe.[57] Therefore, while the contemporary threat posed by WME has also been shown to require the diversion of resources, the future challenges are likely to be more complex with the potential for greater friction internally and amongst partners in determining the most effective means of allocating appropriate resources to counter the threat.

**Conclusion**

This paper has shown that the V-weapons did not, as Hitler had hoped, impact on the Allied war effort sufficiently to alter the course of the war. They did, however, have a significant effect which extended beyond military considerations. As terror weapons, and underpinned by the belief that they could be used to deliver chemical and biological agents, the psychological impact they had on both the population and war leaders had a major influence on strategic considerations throughout the later stages of the war, particularly with regard to the diversion of resources. Paradoxically, and rather than limiting their effectiveness, the inaccuracy and indiscriminate nature of the V-weapons reinforced their potential categorisation as original weapons of mass effect.

Analysis has also shown that there are many parallels with contemporary implications of WME. In particular, evidence suggests

that the psychological impact of these weapons could remain significant in influencing strategic considerations, especially those associated with protecting the centre of gravity. Not all historians, however, agree with the paper's thesis regarding the legacy of the V-weapons as WME. For example, Neufeld argues that 'The ballistic missile wasn't an effective weapon until you put a nuclear warhead on top of it – and suddenly it became a super weapon.'[58] But this misses the point regarding cognitive influence. Masters supports this view by arguing that while ballistic missiles may still not necessarily be very accurate, their greatest impact will be in the psychological domain by targeting populous regions.[59]

Finally, the statement quoted from *The Times* that introduces this paper is as valid today as it was in 1937. But even if a contemporary war is not 'waged' with WME, the threat posed by missiles with the capability to carry such warheads, even if not used, will ensure strategic influence by having psychological impact. The imperative to mitigate this impact will therefore remain strong and the enduring challenge will be associated with decisions regarding how to counter a possible WME threat. This is reflected in the fact that many senior interlocutors have recently highlighted the need for the UK and NATO to give serious consideration to robust ballistic missile defence measures.[60] As the UK begins to refine its thinking on SDSR15 considerations, investment in a missile defence capability may be a key outcome that mirrors the priority placed on cyber defence considerations in SDSR10. While it is impossible to predict whether this will be a key outcome, and at what cost, it can be predicted with a degree of certainty that prioritising such a decision will not be without its difficulties.

**Notes:**

1 Macfarlane, Allison; 'All Weapons of Mass Destruction are not Equal', *MIT Centre for International Studies, Audit of the Conventional Wisdom*, pp1-4, http://web.mit.edu/cis/pdf/Audit_6_05_Macfarlane.pdf, (accessed 25 February 2014).

2 Kipphut, Lt Col Mark; 'Theatre Missile Defense: Reflections for the Future' in *Airpower Journal,* (Winter 1996) p38.

3 Story Jr, Maj William C; *Third World Traps and Pitfalls: Ballistic Missiles, Cruise Missiles, and Land-Based Airpower* (Alabama, Air University Press, 1995) p12.

4 King, Benjamin and Kutta, Timothy; *Impact: The History of Germany's V-Weapons in World War II* (NY, Sarpedon Publishers, 1998), p148.

[5] *United Kingdom. Developments, Concepts and Doctrine Centre*. Joint NBC Defence. Joint Warfare Publication 3-61.1 (Shrivenham, Development, Concepts and Doctrine Centre, 2002) pp1-2.

[6] Perry, William J; 'Preparing for the Next Attack', in *Weapons of Mass Destruction: Threat and Response*, Foreign Affairs Editors' Choice (Council on Foreign Relations, 2001) p134.

[7] United States Strategic Bombing Survey, *V-Weapons (Crossbow) Campaign*, (Military Analysis Division, 1947) p1.

[8] Zambellas, Capt George, RN; 'The V-Weapons, Desperate Strategy or a Serious Threat?' in *Military History into the 21st Century*, ed P W Gray, Gp Capt (Strategic & Combat Studies Institute, 2001) p88.

[9] Jones, E; Woolven, R; Durodie, B and Wessely, S; 'Civilian Morale During the Second World War: Responses to Air Raids Re-examined' in *Social History of Medicine*, Vol 17, No 3 (2004) p473.

[10] Coblentz, Stanton A; *From Arrow to Atom Bomb: The Psychological History of War* (London, Peter Owen Limited, nd) p434.

[11] King and Kutta, *op cit*, p211.

[12] Goldstein, Lyle J; 'Pinpricks that Bleed: The Civil-Military Relations of Aerial Terror Weapons' in *Security Studies* 8, No 1 (autumn 1998) p87.

[13] Johnson, David; *V1 V2: Hitler's Vengeance on London* (Chelsea, Scarborough House, 1981) p64.

[14] Bates, Herbert E; *Flying Bombs Over London* (Kent, Froglets Publications Ltd, 1994) p53.

[15] *Ibid*, p64.

[16] McFarland, Stephen L; 'Preparing for What Never Came: Chemical and Biological Warfare in World War II' in *Defence Analysis*, Vol 2, No 2 (1986) p115.

[17] Collier, Basil; *The Battle of the V-Weapons 1944-1945* (London, Hodder and Stoughton, 1964) p125.

[18] Johnson, *op cit*, p88.

[19] Pastel, Ross H and Ritchie, Elspeth Cameron; 'Introduction to and Mitigation of Psychological Effects of WMD' in *Psychological Responses to the New Terrorism: A NATO-Russia Dialogue*, Vol 3, Issue 1, (2005) p9.

[20] Waters, Lee; 'Chemical Weapons in the Iran/Iraq War' in *Military Review* (October 1990) p61.

[21] Ali, Javed; 'Chemical Weapons and the Iran-Iraq War: A Case Study in Noncompliance' in *The Nonproliferation Review* (Spring 2001): http://cns.miis.edu/npr/pdfs/81ali.pdf (accessed 7 March 2014).

[22] Domenici, Pete V; 'Countering weapons of mass destruction' in *The Washington Quarterly* 18:1 (Winter 1995) p145.

[23] Kipphut, *op cit*, p36.

[24] See Kenneth B Payne 'On Nuclear Deterrence and Assurance' in Anthony C Cain (ed), *Deterrence in the Twenty-First Century: Proceedings* (Maxwell, Air University Press, 2010) p86 and Baker's testimony to the Senate Foreign Relations Committee, 19 May 2010, in which he offered his views on the effect the warning had:

http://www.foreign.senate.gov/imo/media/doc/BakerTestimony100519p.pdf (accessed 4 April 2014).

[25] King and Kutta, *op cit*, p167.

[26] McFarland, *op cit*, pp110-111.

[27] Goldstein, *op cit*, p91.

[28] Johnson, *op cit*, p138.

[29] D'Este, Carlo; *Eisenhower: A Soldier's Life* (New York, Henry Holt and Company, 2002) p615.

[30] Goldstein, *op cit*, p94.

[31] Garlinski, Joseph; *Hitler's Last Weapons: The Underground War Against the V1 and V2* (London, Julian Friedman Publishers Ltd, 1978) p78.

[32] Goldstein, *op cit*, p81.

[33] Gvosdev, Nikolas; 'The Realist Prism: Specter of WMD Changes Debate on Syria Crisis' in *World Politics Review* (2012): http://web.a.ebscohost.com/ehost/detail?vid=16&sid=6349c001-1d30-4ada-9591-28864ce6d3c8%40sessionmgr4001&hid=4101&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d#db=tsh&AN=78174204 (accessed 24 February 2014).

[34] Domenici, *op cit*, p146.

[35] Ranger, Robin and Wiencek, David; *The Devil's Brews II: Weapons of Mass Destruction and International Security* (Lancaster University, The Centre for Defence and International Security Studies, 1997) p33.

[36] *Ibid*, p31.

[37] Kessler, Glenn; 'President Obama and the 'red line' on Syria's chemical weapons' in *Washington Post*, September 6 (2013): http://www.washingtonpost.com/blogs/fact-checker/wp/2013/09/06/president-obama-and-the-red-line-on-syrias-chemical-weapons/ (accessed 20 February 2014).

[38] Report of a Committee of Privy Counsellors, *Review of Intelligence on Weapons of Mass Destruction*, (London, The Stationary Office, 2004)

[39] Collier, *op cit*, p77.

[40] King and Kutta, *op cit*, p160.

[41] McFarland, *op cit*, p111.

[42] Goldstein, *op cit*, p87.

[43] *Ibid*.

[44] Story, *op cit*, p10.

[45] Goldstein, *op cit*, p89.

[46] King and Kutta, *op cit*, p317.

[47] *Ibid*, p190.

[48] Probert, Henry; *Bomber Harris: His Life and Times* (London, Greenhill Books, 2001) p296.

[49] United States Strategic Bombing Survey, p36.

[50] Kipphut, *op cit*, p39.

[51] Johnson, *op cit*, p164.

[52] Goldstein, *op cit*, p101.

[53] Kipphut, *op cit*, p47.

[54] Jean, Grace V; 'To Counter Weapons of Mass Destruction' in *National Defense* 94, Issue 679, (June 2010) p40.
[55] Ranger and Wiencek, *op cit*, p44.
[56] Masters, Jonathan and Bruno, Greg; 'US Ballistic Missile Defence' in *Council on Foreign Relations*, http://www.cfr.org/missile-defense/us-ballistic-missiledefense/p3-0607#p8 (accessed 25February 2014).
[57] *Ibid*.
[58] Michael J, Neufeld; 'Wernher von Braun's Pact with the Devil' in *World War II* (December 2007) pp21-23. http://web.a.ebscohost.com/ehost/pdfviewer/pdfviewer?vid=8&sid=cf3eca8f-55f6-4fa9-8b24-1b8fc61019a0%40sessionmgr4004&hid=4212 (accessed 10 February 2014).
[59] Masters and Bruno, *op cit*.
[60] A theme stressed in a number of lectures to No 14 Higher Command & Staff Course (January-April 2014).

# FLYING ROLES FOR WOMEN IN THE RAF[1]

**Gp Capt Dr Kathleen Sherit**

If anything is commonly known about the history of women flying military aircraft in Britain it is usually accounts of those adventurous women who ferried aircraft during the Second World War. These civilian women were members of the Air Transport Auxiliary (ATA) employed by the Ministry of Aircraft Production. An initiative to train members of the Women's Auxiliary Air Force (WAAF) as pilots for the ATA in late 1943 was blocked by Sir Archibald Sinclair (Secretary of State for Air) on the advice of Air Marshal Sutton (Air Member for Personnel) on the grounds of a prevailing surplus of male pilots, administrative inconvenience and differing terms of service between ATA women and the WAAF.[2]

When regular service for women was introduced after the war, the Admiralty, the War Office and the Air Ministry adopted a principle that women would be regarded as non-combatants, although this was known at the time not to be their position in law.[3] The thinking in the 1940s is illustrated by the discussion on small arms training for women. Objections were raised about the cost of training, expenditure of ammunition, assumed adverse public opinion, parental objections which might deter recruitment, and the views of servicewomen who had joined without this obligation. Communist countries' employment of women as fighters, disparaged as 'little Olgas', was put forward as a reason for Britain to spurn arming of servicewomen.[4]

This non-combatant label was the principle on which servicewomen's employment policy hinged. It governed numbers to be recruited, roles, postings, promotion chances, pay and pensions. It later underpinned the armed forces' exemption from the employment clauses of the Sex Discrimination Act (1975) (SDA). The MOD gained this partial exemption by arguing that combat roles were not appropriate for women and, therefore, there was a genuine occupational requirement for such jobs to be open only to men.[5]

Women were integrated into the RAF from February 1949 – the term 'Women's Royal Air Force' was an administrative label, not an organization – and were employed alongside men, including on operational stations. The Air Ministry came close to admitting women as pilots. In 1947, Philip Noel-Baker (Secretary of State for Air)

announced in the House of Commons that women aircrew would be trained 'when circumstances permitted'.[6] Initial apparent enthusiasm, including endorsements of the policy by the Air Council in 1947 and 1949, waned due to familiar arguments: cost, lack of capacity in the training system, waste of places needed for men and a lack of suitable non-combatant roles.[7] The role under consideration was that of piloting military passenger aircraft, a task that could be justified as non-combatant. However, it was ruled out in the belief that, in the event of an emergency, passengers would have no confidence in a female pilot. Those women who had served so successfully in the ATA were permitted to join the RAF's Volunteer Reserve as pilots. In 1952, out of a total of 5,126 reserve force pilots, 59 were female. The scheme closed to new entrants in July 1953 when the budget for Reserve Flying Schools was cut.[8]

It would take some time before 'circumstances permitted' women to take on flying roles. The first concession came in the 1950s when it was agreed that women could be employed on passenger aircraft as part of the air quartermaster (AQM) establishment. A cascade of policy decisions ensued over a quarter of a century later. Female fighter control officers and aerospace operators for Airborne Early Warning (AEW) aircraft roles were approved in 1984. Flying training for female (civilian) undergraduates at University Air Squadrons (UAS) was introduced in 1985. RAF pilot and navigator roles in 'non-combat' aircraft came in from 1989 and the opening of remaining aircraft types from 1991.

Explanations put forward by military sociologists for the introduction of new policies in the late 1980s and early 1990s emphasise the RAF's desire to maintain a modern, egalitarian image, changing attitudes towards women of policymakers, the influence of American policies and the improved value for money of servicewomen as the gap between their average length of service and that of men narrowed.[9] These aspects certainly played their part. By drawing on documents released under the Freedom of Information Act (2000) and archive sources, this article shows that there were other important factors. Critically, the Navy Board's decision to open warships to women in 1990 finally overturned the precept that women could not be employed in combat roles, an idea that had become thinly stretched by then. Rather than shortages of men, a common

explanation of women's increasing opportunities, for the RAF the key factor was the issue of the quality of recruits, male and female. Perhaps surprisingly given the exemption, the SDA played an important part in making policymakers address the question of exclusion. The history of the RAF's flying policy is also about men who championed the case for female aircrew and those who opposed change.

**Air Quartermasters**

'Surely it [*was*] not intended to give women aircrew status?'[10] How would the aircrew Selection Centre cope? It had no female accommodation and selection exercises were not suitable for women. Thus wrote Wing Commander Dutt of the Manning Branch in 1960 when the case was made for the AQM role to become an aircrew trade.

Female Senior NCOs had been eligible for AQM duties since 1957. The idea of employing women on passenger flights had been proposed and rejected in 1946.[11] Revived and partially implemented on the Canal Zone route in 1953, it was dropped again the following year.[12] A new round of complaints about AQM work surfaced in 1956. At that time AQMs were men from ground trades who volunteered for a tour of flying duty. It was not a permanent trade. Faced with a growing establishment associated with new transport aircraft coming into service 'there was an urgent problem to attract sufficient volunteers of a high quality'.[13] Volunteers had to be NCOs. However, at that rank, men tended to be married and they were reluctant to become AQMs because of time spent away from home. The new aircraft gave an opportunity to create two AQM specialisations: one for freight and one for passenger flights. Women's suitability for work on freight-carrying aircraft was dismissed on grounds of lack of strength, but they could be employed on Comets in the passenger role. It was agreed to seek eight female volunteers as a trial.[14]

Problems with AQM work persisted. The Officer and Aircrew Manning Committee proposed that it should become a trade with aircrew status and flying pay (as opposed to the less generous crew pay that AQMs received) rather than relying on temporary volunteers.[15] Female AQMs having been deemed a success, the Committee overrode Dutt's objections to women having aircrew

status. In approving the establishment of AQM as an aircrew trade in February 1961, the Air Council also agreed to increase the number of women to 25 out of a planned complement of 310.[16] Delay ensued because the Treasury objected to the pay increase for men at a time when there was a pay freeze in force. It was also not convinced that women's employment aboard passenger aircraft amounted to duties worthy of flying pay. Treasury officials conceded in October 1961. Implementation was delayed until the following year's review of Service pay.[17] By February 1963 there were 15 female AQM aircrew.[18]

This modest encroachment of women into a flying role was threatened in the late 1970s. By then, female air loadmasters (ALMs - as AQMs were renamed in 1970), worked on passenger-cum-freight flights and cabin duties could also be undertaken by air stewardesses drawn from the catering trade.[19] Women were not employed on the Tactical Transport Force for what Air Chief Marshal Sir John Aiken (Air Member for Personnel) described, without spelling out, as 'obvious reasons'. The Force's task was listed as: moving heavy freight; conducting air drops; and carrying troops, potentially to forward airfields. The reader was left to deduce why women were not employed, presumably lack of physical strength, geographic issues of having women close to conflict zones, dealing with soldiers and women's non-combatant status. Women's employment on the Strategic Force's VC10 aircraft (used in place of Britannias and Comets) was now also questioned by Aiken. Withdrawal from overseas bases had reduced the need for passenger flights on which women worked. He also observed that female ALMs were physically unable to handle the aircraft's emergency evacuation chutes and dinghies, so a male ALM always had to be on board, thus creating financial inefficiency. In war, VC10s would be used for troop carrying and ammunition supply, tasks from which women were also excluded. Writing to James Wellbeloved (Under Secretary of State for Air) in January 1978, Aiken proposed disestablishing female ALM posts. However, aware that this could be politically sensitive just three years after the passing of the SDA, he sought ministerial approval.[20] Air Marshal Sir John Nicholls (Air Member for Supply and Organization) opposed disestablishment. He thought the principle of female aircrew was 'important and we should not walk back from it'.[21] Wellbeloved

agreed, deciding that 'the opportunity for women to become aircrew [*was*] highly important, both psychologically and presentationally.'[22] The ALM trade remained open to women. What had started as a need was preserved as a token in the new climate of workplace equality. Female ALMs became eligible for work on the Hercules fleet in 1981.[23]

**Airborne Early Warning: Expertise versus Gender**

New work emerged for the airborne early warning role. Shackletons, crewed by pilots, navigators, air electronics officers and air electronics operators were used for this task.[24] In the early 1980s, it was planned to replace Shackletons with more capable Nimrods, fitted with a new radar, surveillance systems and data processing equipment. The necessary skills of detection, tracking, recognition and reporting of all airborne traffic was akin to that of fighter control officers and the non-commissioned trade of aerospace operators in ground-based air defence control centres. Although these specialisations were short of personnel, it was decided to earmark up to a third of the posts on AEW Nimrod for them. The remainder would come initially from existing Shackleton crews.[25]

As women formed a significant proportion of fighter control and aerospace personnel, the question arose as to whether they would be eligible for the jobs. Making a case to include women, but seeking to conform to the non-combatant employment principle, Wing Commander Borrett (an air defence staff officer) sought advice as to the definition of a combat aircraft. He thought AEW Nimrod could be described as non-combatant as it did not entail 'bring[*ing*] weapons to bear directly on the enemy'.[26] He also thought that the risk to which women would be exposed was certainly no more than, and possibly less than, when they did similar work in UK control centres. He suggested that in war they might be safer when airborne than working at ground radar stations.[27] Once again, it was pointed out that there was no international or domestic legal prohibition on employing women in combat. It was a matter of MOD policy, and political and public acceptance.[28] However, the idea of employing women in AEW Nimrod was rejected by Air Force Board members. Air Chief Marshal Sir Rex Roe (Air Member for Supply and Organization) offered 'to field [*it*], presumably into touch?'[29] Air Marshals Sir Charles Ness

(Air Member for Personnel) and Sir David Craig (Vice Chief of the Air Staff) were also against, and Air Chief Marshal Sir Michael Beetham (Chief of the Air Staff) ruled that women would not fly in Nimrod aircraft.[30]

Despite this rebuff, the issue re-emerged due to the dependence on women in the proposed specialisations. Poor recruitment and high failure rates in training meant that the ability to master the skills was more important than capping the number of women employed.[31] Complete statistics for any one year are elusive. However, at a time when women formed about 7% of non-flying complements, of 378 recruits into the aerospace operator trade between April 1976 and March 1978, 128 were female.[32] In 1983 the fighter control branch was 25% short of its junior officer establishment. Over 20% of its officers were female.[33]

Air Marshal Sir Peter Harding, Craig's successor as Vice Chief of Air Staff, proposed employing women in Nimrod AEW. The case for describing it as non-combat work followed the same line as Borrett's in 1981. Harding added that exclusion would be bad for women's morale and could have an adverse impact on recruitment.[34] This was not something to be risked in the light of poor achievement of fighter control recruitment targets. This time Air Force Board members endorsed women's employment in the AEW role unanimously, recording surprise that their predecessors had been opposed.[35]

Ministerial approval was given on the understanding that, as Nimrod was essentially 'an airborne radar unit directly comparable to a ground radar unit', it 'did not conflict with the ruling that women should not be employed in direct combat roles' and women '[*would*] be placed at very little more risk through being airborne'.[36] Delay ensued because conversion of Nimrod to the AEW role was a fiasco. It was cancelled in 1986 and the MOD procured Sentry aircraft from the USA. When the crew complement was considered, the decision to employ women was carried over from the 1984 ruling.[37] The first woman entered training for Sentry in 1989.[38]

It seems unlikely that the description of airborne roles as 'non-combatant' would have been extended to men undertaking the same duties. A 1979 note from AMP's office made clear that all aircrew were combatant with the exception of female air loadmasters. Gender dictated the categorisation, not the work undertaken. As women's

airborne employment was extended, so the descriptive language changed. Exclusion now focused on 'direct combat'.[39]

**University Air Squadrons: Quality and Equality**

At the same time as AEW developments, the question of whether female undergraduates should be admitted to UASs and be given some flying training was raised. As with the preservation of ALM posts, equality issues and the Sex Discrimination Act played an important part. However, the key factor was the potential harm to elite male recruitment rather than a commitment to equality of opportunity.

With the demise of the Cranwell cadetship at the beginning of the 1970s, universities were expected to be 'the primary source of the future leadership of […] the RAF.' [40] Male undergraduates awarded cadetships received flying training; they were obliged to join the Service on graduation. Others were selected by UAS commanding officers as volunteer reserves and given fewer flying hours. Those of acceptable standard were encouraged, but not obliged, to join the RAF.

However, UASs experienced a crisis of recruitment. In 1977, only 91 of 183 available cadetships were awarded.[41] The aptitude for flying training of men accepted as volunteer reserves was declining. Air Vice-Marshal Harcourt-Smith (Commandant of RAF College Cranwell and responsible for UASs) put local difficulties down to 'the sex discrimination problem.'[42] In addition to anti-military views on campuses, he observed a worsening situation due to the growth in women's rights' movements. The RAF was seen in a bad light compared with the Army and the Royal Navy, which both admitted women to university units. Consequently, some Students Unions hindered recruitment to UASs by preventing them from attending Freshers Fairs. Harcourt-Smith proposed volunteer reserve membership for women, with some flying training, on the grounds that it would 'remove a major source of complaint and [UASs] would therefore have direct access to a larger pool of potential male recruits.'[43] Additionally, he saw such membership as a useful means of attracting female graduates into the Service though it was not suggested that they join as pilots.

In 1979, a draft Air Force Board paper recommended up to 10% of Volunteer Reserve places be open to women in competition with men.

Women would replace men at the lower end of the quality spectrum who were unlikely to be offered commissions. This was seen as a way of overcoming complaints without diminishing the pool of potential RAF pilots.[44] The paper was criticised by the finance department which argued that, as women could not join as pilots, it was inappropriate to train them to fly at public expense.[45] Another respondent was concerned about explaining in public why women could fly with UASs but not in the RAF.[46] Air Vice-Marshal Bailey (Director General of Personal Services) doubted that a 10% quota would 'mollify the women's rights firebrands at the universities'.[47] He hinted that the Air Member for Personnel was against women pilots. A revised version was circulated, setting out options without making recommendations. As predicted, Air Marshal Gingell decreed 'it should be put on ice'.[48]

Unlike the RAF, being educational rather than employment establishments, UASs were not exempt from the SDA, as legal advice to the MOD in 1978 revealed.[49] So criticism over lack of access for women continued. Under pressure from university authorities, student bodies and Ministers to address equality issues, the case was reopened in 1985. Not wanting to raise false expectations that they could join the RAF as pilots, it was proposed to recruit women as ground branch members, with an entitlement to some flying training to satisfy equality concerns. Flying for ground branch women in turn implied that male ground branch undergraduates would also have to have flying hours. The Air Force Board approved the proposals. A quota of up to 10% of the membership was opened to women from 1985.[50]

**Limited Pilot and Navigator Roles**

In the late 1970s, the RAF experienced one of its periodic crises of aircrew recruitment and retention. 'Recruiting [*was*] well down; quality of those accepted [*had*] reduced; wastage in training [*was*] higher than predicted; there [*was*] a bottleneck [*in training*]; retention [*was*] below expectations and premature voluntary release applications [*were*] well up on previous years.'[51] Failure to recruit was attributed to uncertainty about RAF careers; there had been a redundancy programme following the 1974 defence review. Retention problems were blamed on poor pay and conditions of service. The backlog of men wanting early release from the Service was such that junior

officer pilots were expected to wait until the mid-1980s for an exit date, causing 'a serious morale problem'.[52]

One potential solution was to recruit women as pilots and navigators for roles described as non-combatant, as in the USA.[53] While Air Marshal Sir John Nicholls (Air Member for Supply and Organization) wanted to debate the issue, Air Marshal Sir John Gingell was against.[54] All RAF pilots were recruited on their potential to become fast jet pilots. Those that did not make the grade could train for multi-engine or rotary wing aircraft. In an argument familiar from the 1940s, Gingell argued that non-combatant women would take training places needed for men. Furthermore, women tended not to serve as long as men. Finally, he doubted that the idea would receive support.[55] The suggestion was dropped.

A combination of a substantial pay rise awarded by the incoming Conservative government in 1979 and less onerous terms of service appeared to ease the situation. Instead of permanent commissions which kept them in the RAF until age 38 or the completion of 16 years of service (whichever was the later), pilots and navigators were again to be offered a 12-year term with an option to leave after 8 years. This was thought to be a more attractive period of service.[56] It was an important development. As female officers' average length of service increased in the 1980s, the argument that women did not serve long enough to make flying training economic weakened.

From the outset of regular service, women's careers were limited by policies on marriage and motherhood. Where both husband and wife were in the RAF, priority was usually given to the husband's postings. Servicewomen were not entitled to take married quarters in their own name as husbands were deemed responsible for establishing the family home. This made continued service particularly problematic for women married to civilians. Most critically, women who became pregnant were dismissed. Unable to combine family and career, female officers served for 4·5 years on average in the early 1980s.[57] More effort was made to collocate married couples and, following a review of policies initiated because of the SDA, servicewomen were permitted to take the licence for married quarters. Dismissal on pregnancy remained in place. However, as in society generally, there was a trend towards later marriage. Coupled with greater ability to control fertility through use of the birth control pill,

women could defer motherhood.[58] These changes were reflected in statistics on women's length of RAF service. By the early 1990s, female officers' average service was nearly 10 years.[59]

As women's length of service increased, so men's decreased in response to family issues. A greater expectation that spouses would have careers, growth in home ownership and a desire for stability for the sake of children's education influenced men's decisions to leave. This was exacerbated for aircrew by the ability of civilian airlines to offer better remuneration than the RAF.[60] The percentage of pilots leaving at optional retirement points rose from 28% to 38% between 1987 and 1989. Applications to leave early reached a five-year high in 1989.

Although pilot recruitment targets were met, more men from the lower end of aptitude test scores were accepted and failure rates in training increased. The situation with navigators was worse. This specialisation was largely populated by men who failed selection for pilot or did not make the grade in pilot training. Only 10% of navigators made the specialisation their first choice. The RAF missed its target for newly qualified navigators in all but one year in the 1980s.[61] Meanwhile, squadron establishments were due to rise from 1991 when a NATO policy of increasing crew to aircraft ratio from 1·2:1 to 1·5:1 was due to come into effect.[62]

The possibility of female aircrew as a way of increasing the recruiting base was revived in the Air Secretary's department. The idea was given a boost by Air Chief Marshal Sir Peter Harding, the incoming Chief of the Air Staff. In an interview for the *RAF News* in January 1989, he praised women flying with UASs, lamented that they could not join the RAF as pilots, and promised it would be considered.[63] A few weeks later, a draft paper by Air Vice-Marshal Bob Honey (Air Secretary) was circulated for comment. It recorded accumulated evidence in favour. The USA, Canada, Australia, New Zealand and the Netherlands had female pilots. The RAF already employed women in some rear crew roles. Female undergraduates were proving their aptitude at UASs. There was growing pressure for change from these women and from external bodies such as the National Audit Office and the Equal Opportunities Commission. Bob Honey suggested that aircrew roles for women would enhance 'the Service's reputation as an equal opportunities employer'.[64] He

recommended that women be employed as pilots and navigators in unarmed aircraft, with the best candidates being considered for employment as flying instructors. This limited approach was seen as a means of gaining experience of recruiting, training and employing women in flying roles.[65]

Dissenting views were expressed most emotively by Air Vice-Marshal Roger Austin (Director General Aircraft). Admitting that he had tried, but probably failed, to set aside male chauvinism, he rejected claims which might be made for equal opportunities. He argued that '[*our*] requirements are special (hence ... we are still allowed to reject homosexuals even though most other occupations cannot).'[66] If the case was associated with a shortage of men, he preferred to improve men's terms of service. He ended by supposing that women aircrew would be a reality sooner or later. But he thought he would be retired by then and could rest content that 'my air force [*was*] awake and alert - and powdering its nose as it admire[d] Robert Redford and Tom Jones on the Flight Safety calendar.'[67]

Some of those in favour thought the recommendation did not go far enough. Having just visited Cambridge UAS, where a female member had won the top prize for flying, Air Commodore Tim Garden foresaw problems if a woman came top in Basic Flying Training but was assigned a lesser role than men. He wanted women to fly fast jets.[68] Air Vice-Marshal Eric Macey (Director General Training) suggested adding air defence combat jets and reconnaissance aircraft to the list, drawing a line short of offensive action.[69] Air Commodore Farrer, Director of Air Defence, could not understand why women should be '[*confined*] to roles in which they [*could*] be shot at but [*could*] not themselves shoot back.'[70] Air Vice-Marshal Mills, Director General Medical Services, argued to swap 'excluded' and 'included' aircraft types. He thought that, as 'size for size and weight for weight women have less strength than men', they might be more suited to fast jets than to 'larger and heavier aircraft with a potential for asymmetric and other problems of control'.[71]

Bob Honey's paper glossed over women's potential short period of service compared with men which even those in favour of its recommendation observed. As compulsory discharge on pregnancy was to be retained as policy, value for money from investment in training remained a key concern. It was proposed that female aircrew

could be ‘allowed to complete at least their obligatory service sometime after childbirth’.[72] This was questioned both by those who favoured female aircrew and those opposed. Mills counselled against being dogmatic, suggesting that pregnancy was ‘unlikely to be a notable factor with the highly motivated young women’ who would initially volunteer to train as aircrew.[73]

Air Vice-Marshal John Thomson (Assistant Chief of Air Staff) was an important critic. He argued that, rather than being safe from poaching from other employers as the paper suggested, women were more likely to leave than men. He based his opinion on data from the United States Air Force.[74] But he had a more fundamental problem with Honey’s paper. His particular concern was the fast jet force. The paper suggested that women would replace male candidates who achieved the lowest scores in aptitude tests. Although such scores were not a reliable predictor of subsequent success, these men were more likely than the high scoring candidates to fail training, as 1 in 3 men did at this time, or be assigned to multi-engine or rotary wing aircraft.[75] Men who performed best in training were selected for fast jet roles or ‘creamed off’ to become instructors for a tour of duty, before later transferring to an operational squadron. Thomson observed that, as high quality female candidates would not be eligible for fast jet squadrons, only those women selected to be instructors would help to alleviate the shortfall of fast jet capable men. However, he was not in favour of a bolder policy. He felt ‘an underlying unease at the anthropological and psychological factors concerning women and combat and the further effects on male colleagues and the civilian population of placing them at risk.’[76] He urged the need to ‘differentiate between women’s ability to fly high performance aircraft in peace [...] and the appropriateness of commanding them to kill and be killed in action.’[77]

A revised paper, sponsored by Air Marshal Sir Laurence Jones (Air Member for Personnel) went to the Air Force Board Standing Committee in June 1989.[78] Despite Thomson’s complaints about inconsistencies in the paper, this final version was substantially the same as the draft. The minutes of the meeting focused on the acceptable list of aircraft, inclusion of support helicopters being contentious. As Chinook and Puma helicopters were used in close support of land forces, they were deemed to operate too near action

areas for women to fly. They were deleted from the list. The meeting approved women to serve in non-weapon carrying or dropping aircraft with a quota of up to 10% of annual intakes for pilots and navigators from 1 April 1990.[79] Secretary of State George Younger gave approval on 19 July 1989.[80]

**RN and Army Air Corps Developments: Women in Combatant Roles**

The RAF was able to adhere to the policy that women could not be employed in combat roles by categorising aircraft as 'combat' or 'non-combat'. It was the Navy Board's decision to open service in warships to women that overturned the non-combatant principle. Suffering a greater retention crisis than the RAF, and unable to recruit enough men of the required quality, it too was seeking a solution to its 'manning' crisis. It attempted unsuccessfully to follow the RAF's lead by describing some ships as non-combatant. However, this case was unconvincing and, anyway, permitting a small number of women to serve in the five minor vessels initially identified as allowable, would not solve the shortfall of 2,000 men for seagoing berths. Pressed by Archie Hamilton (Minister for the Armed Forces) to prove that the government had ever endorsed a formal policy that excluded women from combat roles, the Services' Historical Branches were unable to provide evidence. Describing the position as a 'precept' rather than a policy, the Navy Board gave way.[81] With the decision to employ women in warships announced in February 1990, women would be employed in naval combat roles. The first domino fell with women joining HMS *Brilliant* in the autumn of 1990; the ship deployed to the Gulf War a few months later.

The Navy Board turned its attention next to the Fleet Air Arm for which men were selected on their aptitude for flying training, rather than fast jet potential as in the RAF. It had a shortfall of 16% of its pilot complement. Vice Admiral Sir Brian Brown (Second Sea Lord) was keen to have 'consistent criteria throughout the Naval Service on the extent to which women should be involved in combat'.[82] However, he did not want to 'prejudice the achievement of tri-Service agreement on combat in non-seagoing contexts.'[83] Mindful of the RAF's reluctance to have female combat pilots, he suggested that Sea Harrier squadrons remain for men only. In December 1990, the Navy Board

agreed that female naval aviators would be employed in anti-submarine warfare.[84]

The Executive Committee of the Army Board also approved plans to widen women's employment. Although able to argue that land warfare in direct contact with enemy forces remained a role for men, it agreed that women could join the Army Air Corps as ground crew from 1991. The army's non-commissioned aircrew were selected from ground crew, so this move opened the way for women. It was also agreed in principle that women were to be eligible to join as officer aircrew, though an implementation date was not set. Nevertheless, due to a shortage of male aircrew, the Army was expected to have women flying Gazelle and subsequently Lynx helicopters. This would imply operational duty in Northern Ireland. The plan was endorsed by Ministers.[85]

**Ending Flying Restrictions in the RAF**

Under pressure from the concession of flying roles in the other Services, Air Marshal Sir David Parry-Evans (Air Member for Personnel in succession to Laurence Jones) concluded that the RAF should look again at widening women's employment. He confessed to 'a slight unease'.[86] The first women to complete training only joined squadrons in 1991 so any extension of women's roles would be taking place before 'non-combat' flying policy had had time to take effect fully. Nevertheless, Air Marshal Sir Roger Palin, the next Air Member for Personnel, put a further paper on women aircrew to Air Force Board Standing Committee colleagues in July 1991. He stated there were only two legal grounds for continuing to exclude women from a role. The first was that they would have an adverse impact on military operations. The second was statutory health and safety reasons.[87] However, the Navy now had Ministerial approval to employ women in all its aircraft, including Sea Harrier combat jets. Army Air Corps policy would also put women into combat zones. To go some way to matching these developments, he recommended immediate opening of support helicopter roles and maritime patrol aircraft. He stopped short of combat jets, suggesting instead that the experience of other countries should be investigated. He described this move as 'put[*ting*] our own house in order before find[*ing*] ourselves forced down possibly less welcome routes'.[88] This latter remark seemed to imply a

desire to maintain exclusion from combat jets. It was the only additional route not yet proposed.

Roger Palin's line was recognised as indefensible in the light of navy and army policy decisions by all but one reply to his paper. Remarking that it would be seen as 'too little, too late', Deputy Controller Aircraft speculated that the policy would fall to the first Parliamentary Question on the subject.[89] Tim Garden, now Assistant Chief of Air Staff, continued his previous support for unrestricted flying. He opposed the step-by-step approach claiming that it 'promote[d] the idea that we are entrenched male chauvinists – hardly ideal for the Service that should be most forward thinking.'[90] He thought that 'Ministers have moved rather more quickly than the military in their acceptance of women on combat duties'.[91] Moray Stewart (Second Parliamentary Under Secretary) urged the opening of all roles to 'widen the recruiting base' and to remove 'this contentious subject from the sex discrimination arena.'[92]

The decision to open all flying roles to women was taken in principle at a meeting of the Air Force Board Standing Committee in September 1991. As an immediate step, support helicopter roles and maritime patrol aircraft roles were approved. But suggestive of some continuing reluctance, Roger Palin was asked to produce a further paper on fast jet roles 'taking into account the legal position.'[93]

This final paper in the sequence on flying roles for women was sent to Board members on 27 November 1991. Roger Palin included an annex which attempted to assess women's effectiveness as combatants. It named historical examples starting from Boadicea. It mentioned female Soviet fighter pilots in World War II, dismissing them as 'few and far between'. It went on to say that Israel excluded women from combat because previously their presence had prevented men from 'operat[*ing*] with the necessary ruthlessness'. It observed that Britain now had armed policewomen but thought there was a difference between 'confronting a criminal and an enemy'. The annex tried to draw a distinction between combat at a distance from the combat experience of fast jet crews. It claimed that the latter 'involv[*ed*] a more intimate contact with the enemy than is the case [*in*] dropping torpedoes or depth bombs against an unseen submarine'. It concluded with two risks. The first was uncertainty over how women would react in combat. The second was whether women

would have a 'deleterious effect on their male counterparts.' While he used the annex to set out objections, Palin argued in the body of his paper for setting aside the remaining exclusions. He wrote that it would be difficult to make a legal case for excluding women from combat jets in the absence of firm evidence that they could not do the job. Also, such a stance had been undermined by 'our own and our sister Services' decisions to open other combat roles to women.'[94] He concluded that fast jet roles should be opened.

Again, Air Marshal Palin's position attracted criticism. He defended the mixed messages in his paper on the grounds that he had to 'cover the concerns that we know some senior officers feel and indeed, have voiced.'[95] His main supporter was former Assistant Chief of Air Staff and now Commander-in-Chief of Support Command, Air Marshal Sir John Thomson. Thomson would have preferred time for the first female aircrew to reach operational service before taking this step. He thought the subject 'merited further reflection and discussion' and that the annex 'represented a relevant starting point'.[96]

Far from seeing the annex as a starting point, Air Chief Marshal Sir Peter Harding asked for it to be withdrawn.[97] Palin agreed, mentioning that he had just attended a British Military Studies Group Seminar on women's roles in the armed forces and he was now 'persuaded that some of the more negative views expressed have their foundation in myth rather than in reality.'[98] Further, he did not wish 'future historians to look back and assume that the decision was taken solely on a negative view of operational factors.'[99] In December 1991, women's eligibility for combat jets was announced.

**Conclusion**

Policies on women's employment in various aircrew roles were first rejected, then reconsidered and finally conceded. Successive Air Members for Personnel, who perhaps should have been at the forefront of modernising RAF employment policies, were usually to be found amongst those reluctant to make change. However, the idea of a right to be different from society was seen increasingly as cutting down the RAF's access to the pool of talent available to be recruited. In addition, by the late 1980s, RAF policy seemed out of touch compared with that of allied nations that already employed women as pilots.

Pressure on the MOD to extend women's employment grew from external bodies such as the Equal Opportunities Commission and the National Audit Office. Although exempt from the employment clauses of the Sex Discrimination Act, this legislation altered the agenda. There was a clear shift in policymakers thinking in the 1980s. The question to be answered changed from 'why should we employ women in a particular role?' to 'why not women?' Women's exclusion became something to justify rather than assume. However, it would be a mistake to suppose that there was a sudden conversion to equality of opportunity. As is evident from the decision to retain female air loadmasters and to admit women to University Air Squadrons as flying members, change owed a great deal to fears of damage to the RAF's egalitarian reputation and potential harm to elite male recruitment.

Although the RAF was not short of men volunteering for aircrew roles, by the late 1980s social pressures exacerbated the usual struggle to retain experienced men in competition with civilian airlines. A more stable family life, allowing spouses to fulfil their own career aspirations, made long term RAF careers less attractive to married men. Young women were also more oriented towards a career, deferring marriage and motherhood. As female officers served on average for longer than the minimum period required of male aircrew, so the argument about the waste of training costs weakened.

Attempting to solve the growing problem of diminishing quality and experience levels of men, the RAF could and did make piecemeal change. It worked within the policy that women could not be employed in combat roles. While men's combatant status was axiomatic, policymakers found ways of describing employment as non-combatant when undertaken by women. It was a simple enough matter to classify aircraft types according to whether they were equipped with weapons. But the debate also considered the degree of risk to which crews were exposed. The new generation of air rank officers in the late 1980s expressed doubts about women accepting risk without also being able to volunteer for offensive roles.

The Air Force Board held back from challenging the non-combatant principle. It could afford to wait to see how women fared in the limited flying roles opened from 1989. It was the Navy Board, faced with a more acute problem of filling seagoing berths and by an

obdurate Minister, which conceded undeniably combat roles to women. Having defended exclusion of women from armed aircraft on the basis of the non-combatant principle, the RAF's stance was no longer tenable once the Navy decided to employ women in warships and in the Fleet Air Arm. Despite the reluctance of the Air Member for Personnel, remaining restrictions on flying roles for women were lifted.

**Notes:**

[1] The author is grateful to the Arts & Humanities Research Council for its support for this research.

[2] TNA AIR 19/331, correspondence, Sep 1943 to Feb 1944.

[3] TNA AIR 19/742, AUS(G) to PUS, 28 May 1947.

[4] TNA WO 32/13689, DSD (Maj Gen R A Hull) to DPA (Maj Gen J E C McCandlish), 14 Jun 1949 and draft paper for Army Board, 18 Jul 1949. There is no record of a final paper going to the Board. Air Ministry and Admiralty staff attended meetings to discuss arming servicewomen. Arming was introduced in the 1980s.

[5] Parliamentary Archive: ROY 1/3, House of Lords Select Committee, Anti-Discrimination (No 2) Bill, memorandum from MOD, circa 1972.

[6] House of Commons Debates, 5th Series, Vol.435, Col.106, 17 Mar 1947.

[7] TNA AIR 8/793, Flying Employment for Members of Permanent Women's Service, Jun 1947, and Air Council Standing Committee Minutes, Jun 1947; Peter Elliott, 'The RAF's First Women Pilots' in *Air Clues*, May 1990, pp170-74.

[8] TNA AIR 20/8985, McGlennon to PS/AMP, 24 Sep 1952 and Brief for Auxiliary and Reserve Forces Committee Meeting, 30 Nov 1953.

[9] See Christopher Dandeker, 'New Times for the Military: Some Sociological Remarks on the Changing Role and Structure of the Armed Forces of the Advanced Societies' in *British Journal of Sociology*, Vol.45, No.4, 1994, pp.637-54 and Christopher Dandeker and Mady Wechsler Segal, 'Gender Integration in the Armed Forces: Recent Policy Developments in the United Kingdom' in *Armed Forces and Society*, Vol.23, No.1, Fall 1996, pp29-47.

[10] TNA AIR 2/15501, Dutt to Director of Manning 1, 19 May 1960.

[11] Dame Felicity Peake (née Hanbury) private papers: Box 2, Hanbury to Staton, 3 May 1947. Commandant Hanbury was the Director WAAF in 1946.

[12] TNA AIR 2/11672, three women in training and three more waiting to start, Note for AMP 19 Mar 1953, Note to end the scheme, Wg Officer Arkell, 23 Aug 1954.

[13] TNA AIR 2/15813, Minutes of a meeting to consider the recruitment of AQMs, 8 Oct 1957.

[14] *Ibid*.

[15] TNA AIR 2/15707, Status and Conditions of Service of Air Quartermasters, Sep 1960.

[16] TNA AIR 6/131, Air Council Conclusions, 23 Feb 1961.

[17] TNA AIR 2/15501, handwritten note, 4 Oct 1961 & AIR 2/16376, S10(Air) to AUS(P)(Air), referring back to 1961, 3 May 1965.

[18] TNA AIR 2/15789, DWRAF to DGPS, WRAF Shortage of NCOs, 18 Feb 1963.
[19] Freedom of Information papers [henceforward FOI] Air Historical Branch [henceforward AHB]: V/9/962, WRAF Air Loadmasters, AMP to USofS (Air), 3 Jan 1978; interview with MALM Joy McArthur, transcript pp.20-21, 15 Dec 2015. McArthur worked on passenger-cum-freight flights from the mid-1960s.
[20] FOI AHB: V/9/962, WRAF Air Loadmasters, AMP to USofS (Air), 3 Jan 1978.
[21] *Ibid*, handwritten note on AMSO copy.
[22] *Ibid*, WRAF Air Loadmasters, PS/USofS (RAF) to PS/AMP, 6 Feb 1978.
[23] Reasons for this change of policy have not been traced by the author who would welcome information on this point from any member of the Society.
[24] C G Jefford, *Observers and Navigators: and Other Non-pilot Aircrew in the RFC, RNAS and RAF* (Shrewsbury: Airlife Publishing, 2001), p.216.
[25] FOI AHB: ID3/900/36, Nimrod AEW Manning Policy, 1 Dec 1980.
[26] *Ibid*, Nimrod AEW – Employment of WRAF Personnel, Borrett to S10(Air), 26 Jan 1981.
[27] *Ibid*.
[28] *Ibid*, Nimrod AEW – Employment of WRAF Personnel, S10(Air), 5 Mar 1981.
[29] *Ibid*, Nimrod AEW Manning Policy, AMSO, 16 Dec 1980. Manning came under AMSO until 1984 when responsibility transferred to AMP.
[30] *Ibid*, Nimrod AEW Crew, PSO/CAS, 30 Mar 1981 and Note of Action, 1 Apr 1981.
[31] FOI AHB: ID3/92/32, Part 5, Revised Structure for the Fighter Control Sub-Branch, AMP, 10 Aug 1978.
[32] FOI AHB: ID6/1006: Force Mix – Ground Airwomen Element, AMP, 30 Aug 1988 & TNA AIR 29/4666, Manning Plans 1977, 1978 & 1979.
[33] FOI MOD: Manning – Future Requirements Part 7, Draft – Nimrod AEW Manning, 18 Nov 1983.
[34] FOI AHB: Correspondence: 'Nimrod AEW - Employment of WRAF Personnel', VCAS, 8 May 1984.
[35] *Ibid*, brief for CAS, 19 Jun 1984.
[36] FOI AHB: Employment of WRAF Personnel on Nimrod AEW, DUS (Air) to USofS(AF), 9 Jul 1984.
[37] FOI AHB: ID6/1006, Employment of WRAF Personnel on the E-3, ACAS to Air Secretary, 6 Jun 1988.
[38] FOI MOD: AFBSC(89)11, Female Aircrew in the Royal Air Force, Jun 1989.
[39] FOI AHB: 110/21, Employment of Women in the RAF, PS/AMP to PS/USofS(RAF), 12 Feb 1979.
[40] AHB: Sebastian Cox, *History of University Air Squadrons*, quoting The Future of the University Air Squadrons, AMP, 17 May 1971.
[41] TNA DEFE 71/379, AVM Ness to S10k(Air), 30 Nov 1977.
[42] *Ibid*, Harcourt-Smith to Ness, 27 Jul 1978.
[43] *Ibid*.
[44] TNA DEFE 24/1599, Female VR Membership of UASs, AVM Beavis (Director General Training), 13 Aug 1979.

[45] TNA DEFE 71/379, F2(Air) to DGT, 22 Aug 1979.
[46] TNA DEFE 24/1599, DS9 to DGT, 21 Aug 1979.
[47] *Ibid*, DGPS to DGT, 17 Aug 1979.
[48] TNA DEFE 71/379, Women VR Membership, 2 Oct 1979.
[49] TNA DEFE 69/577 Flying Scholarships/Awards – Sex Discrimination Act, 17 Mar 1978.
[50] FOI AHB: University Air Squadrons, AMP, 26 Feb 1985 & FOI MOD: AFBSC(89)11, Female Aircrew in the Royal Air Force, Jun 1989.
[51] FOI AHB: ID3/92/32 Part 5, Brief for CAS, 24 Aug 1977.
[52] *Ibid*.
[53] The Navy was the first American service to train female pilots. Six women were awarded 'wings' in 1973. The Army followed with its first female pilots in 1974. The US Air Force agreed in 1975 to open some non-combat flying to women. Jeanne Holm, *Women in the Military: an Unfinished Revolution* (Novato, Ca: Presidio, 1992 edition), pp317-21.
[54] FOI AHB: V/9/962, Women Pilots in the RAF, AMSO, 28 Sep 1978 and AMP, 22 Sep 1978.
[55] *Ibid*, Women Pilots in the RAF, AMP, 22 Sep 1978.
[56] FOI AHB: ID3/92/32 Part 5, Short Service Commissions, 27 Jul 1977.
[57] R M B Montague, 'Women in the RAF', in Tony Ross (ed.), *75 Eventful Years: A Tribute to the Royal Air Force* (London: Lockturn, 1993), p.227.
[58] The mean age of mothers giving birth to their first child was 23·9 in 1972. By 1996 it had risen to 26·5. The percentage of women likely to remain childless was increasing. David Coleman, 'Population and Family', in A H Halsey and Josephine Webb (eds.), *Twentieth-Century British Social Trends* (Basingstoke: Macmillan, 2000), pp44-5.
[59] Montague, 'Women in the RAF', pp.226-7.
[60] FOI AHB: ID3/A/18/1, Part 3, Update on Personnel Policy Issues, AMP, 20 Oct 1986.
[61] FOI AHB: Female Aircrew in the RAF, Air Secretary, 1 Mar 1989.
[62] FOI AHB: ID6/1006, Conference on Pilot Shortages, 21 Dec 1988.
[63] *RAF News*, 20 Jan 1989.
[64] FOI AHB: Female Aircrew in the RAF, Air Secretary, 1 Mar 1989.
[65] *Ibid*.
[66] FOI AHB: Correspondence on female aircrew, Austin to DASB, 13 Mar 1989.
[67] *Ibid*.
[68] *Ibid*, Garden to DASB, 8 Mar 1989.
[69] *Ibid*, Macey to Air Secretary, 21 Mar 1989.
[70] *Ibid*, Farrer to DASB, 13 Mar 1989.
[71] *Ibid*, Mills to Air Secretary, 30 Mar 1989.
[72] FOI AHB: Female Aircrew in the RAF, Air Secretary, 1 Mar 1989.
[73] FOI AHB: Correspondence on female aircrew, Mills to Air Secretary, 30 Mar 1989.
[74] *Ibid*, ACAS to Air Secretary, 28 Mar 1989.
[75] FOI AHB: Female Aircrew in the RAF, Air Secretary, 1 Mar 1989.

[76] FOI AHB: Correspondence on female aircrew, ACAS to Air Secretary, 28 Mar 1989.
[77] *Ibid*.
[78] FOI MOD: AFBSC(89)11, Female Aircrew in the Royal Air Force, Jun 1989.
[79] FOI AHB: ID3/A/18/1, Part 3, Minutes of Air Force Board Standing Committee, 27 Jun 1989.
[80] FOI AHB: APS/Secretary of State to APS/Under Secretary of State (Armed Forces), 19 Jul 1989.
[81] FOI Fleet: Employment of Women in Combat, brief for Minister for the Armed Forces, 1 Dec 1989 & FOI MOD: WRNS Study, 11 Jan 90; minute to Navy Board, Secretary to First Sea Lord, 15 Jan 1990.
[82] FOI Fleet: Employment of Female Aircrew in the RN, Second Sea Lord, Oct 1990.
[83] *Ibid*.
[84] FOI Fleet: Post Options Restructuring of the RN, 22 Mar 1991.
[85] FOI AHB: Correspondence on female aircrew, AMP to Air Force Board Colleagues, 21 Dec 1990.
[86] *Ibid*.
[87] FOI AHB: Employment of Female Aircrew, AMP to Air Force Board Colleagues, 3 Jul 1991.
[88] *Ibid*.
[89] FOI AHB: Correspondence on female aircrew, DCA to AMP, 5 Jul 1991.
[90] *Ibid*, ACAS to AMP, 5 Jul 1991.
[91] *Ibid*.
[92] *Ibid*, 2nd PUS to AMP, 19 Jul 1991.
[93] FOI AHB: Air Force Board Standing Committee, Conclusions, 24 Sep 1991.
[94] All quotes in this paragraph from FOI AHB: Employment of Female Aircrew, AMP to Air Force Board Colleagues, 27 Nov 1991.
[95] FOI AHB: Correspondence on female aircrew, AMP to ACAS, 6 Dec 1991.
[96] *Ibid*, Thomson to Palin, 2 Dec 1991.
[97] *Ibid*, PSO/CAS to AMP, 6 Dec 1991.
[98] *Ibid*, AMP to ACAS, 6 Dec 1991.
[99] *Ibid*

# FIDO AND EMERGENCY RUNWAYS – A HAVEN FOR THE BOMBER STREAM

**Adam Sutch**

## Introduction

A 1910 report of the second aeroplane flight ever to cross the English Channel included the following:

> 'Arrangements had been made for the French destroyer "Escopette", the same which accompanied Blériot, to follow the aviator, but owing to the thick fog, each sighted the other but once for a brief moment in mid-Channel.'[1]

Blériot had suffered the same conditions a year earlier and both aviators elected the same solution to their problems of declining fuel reserves and the need to find somewhere clear to land. They landed on cliff tops; higher ground, where the necessary visibility was available. However, many of the areas in England that contained the bomber airfields of WW II were, and still are, low lying and prone to early-morning formation of radiation fog.[2] This would be a problem for night bomber crews returning from operations over the Continent.

In peacetime, there had been no necessity for military flight in such conditions. However, greater risks with the weather were taken in wartime and the doctrine of the Strategic Air Offensive (SAO) required the maximum possible tempo of operations with minimum diversion from base airfields. This, alongside a desire to reduce the considerable wastage from crashes and aircraft abandoned in the air, defined a need for the local dispersal of fog.[3] Even in fine weather, damaged aeroplanes, often marginally controllable, were crashing at base on return. This could block the active runway, causing difficulties or diversions for colleagues yet to land, complicating matters for any subsequent recovery and repair and, potentially, interrupting following operations. A haven had to be found for these aeroplanes.

## Overcoming Fog – The Beginning

Perhaps the earliest attempts to devise a way to land safely in fog were carried out by the Royal Naval Air Service (RNAS) in 1916. These involved trailing a rope, which incorporated a mechanism called a 'ground proximeter', behind an aeroplane. Upon ground

contact, this illuminated a light in the cockpit to initiate the landing flare.[4] Starting in the 1920s, civil aviation turned to electronics to ensure safe arrival during bad weather. Lorenz beams in Europe or the Standard Radio Range in the United States, coupled with Direction Finding (D/F) techniques, usually sufficed for the experienced and technically competent airline pilots of the day.[5] There was, however, a steady stream of dreadful accidents.[6]

In 1921, Prof Frederick Lindemann (later Lord Cherwell and Churchill's scientific adviser) wrote a paper for the Aeronautical Research Committee.[7] He doubted that it was an economic possibility to disperse fog from aerodromes, but with an awareness of the earlier RNAS work and its failings, he envisaged a line of marker balloons projecting above the fog as a visual glide slope.[8] Lindemann thought that: 'all that the pilot had to do [...] was to maintain his line of flight […] to touchdown on the airfield.'[9] Further work, with little budget, was carried out, largely at Farnborough, on balloon-assisted landings, infrared beams and, from 1936-37 onwards, the use of heat to disperse fog from a landing surface.[10]

In Seattle, Professor Kirsten proposed a neon light system to produce a beam for blind approach and landing. High intensity airfield lights did eventually play a role in landing, but as a contemporary (1937) Farnborough report makes clear:

> 'They (*the US Civil Aeronautics Administration*) did not pin much faith in illuminated landing beams and were of the opinion that the satisfactory solution of blind landing would be achieved by radio means.'[11]

Although broadly in agreement with the US conclusions and devoting attention to what became Standard Beam Approach (SBA), Farnborough experimented with methods of generating heat for the dispersion of fog. Science was also applied to investigation of the injection of water droplets into fog and other schemes, but by 1936 general scientific principles for the use of heat had been isolated. Methylated spirits were quickly discounted and coke and petroleum were the primary choices for combustion.[12] As a budget became available, a number of experiments, including testing of burners at Martlesham, were carried out.[13] By April 1938, the future of these experiments was in doubt.[14] However, in May 1938, the results of

practical trials at Martlesham were reported:

> 'Preliminary experience shows that visibility in a fog drifting at 3 mph will be increased to about 3 times the original range through the arrangement of point sources of heat in a line burning alcohol-petrol fuel at a rate of a gallon per hour, per yard width. The result is promising but to be of real value more heat concentration should be provided.'[15]

This was sufficient to allow experimentation to continue, using increasingly large burners, both at Martlesham and at Brough, by the fog-bound Humber.[16] The pace was leisurely, focused on generating more heat per yard and by May 1939, with little progress, work was halted.[17]

**Overcoming Fog – A Practical Reality**

As with other elements of the SAO, particularly anything that could weaken the main effort, Winston Churchill became involved.[18] There is evidence that Cherwell, who had been involved in the earliest experiments, sparked these enquiries.[19] In October 1940, Churchill wrote to Portal, Chief of the Air Staff (CAS):

> 'What arrangements have we got for blind landings for aircraft? How many aircraft are so fitted? It ought to be possible to guide them down quite safely, as commercial craft were done before the war, in spite of fog. Let me have full particulars. The accidents last night were very serious.'[20]

and again in November:

> 'Last night at least seven of our planes crashed on landing or were lost […] are our aerodromes far more weather-bound than theirs?'[21]

The RAF used 'ZZ' wireless procedures and SBA equipment in multi-engined aeroplanes, which were adequate as approach aids, but not for a landing by an inexperienced service pilot. Portal's lengthy reply to Churchill stated this and also anticipated many of the issues in a report by Ludlow-Hewitt, Inspector General of the RAF, some three years later, which was compiled from the candid observations of operational bomber pilots and their seniors. Portal explicitly presaged the difficulties caused by crashes on 'the landing lane' that ultimately

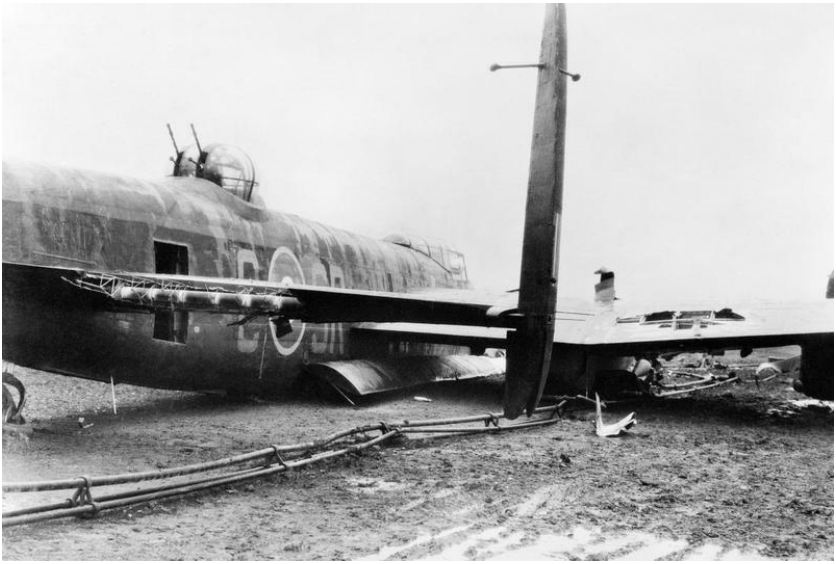
led to Emergency Runways.[22] This was a well-crafted document, combining a statement of policy, current progress and limitations. However, it does raise the question of why the Air Staff, and Portal in particular who had just come from commanding Bomber Command operating in winter, did not do more to initiate urgent action to facilitate blind-landing.[23]

Perhaps, hopes were pinned on an accurate radio-altimeter for use in conjunction with SBA.[24] Even the disastrous losses of the night of 7/8 November 1941, which led to Peirse's departure from Bomber Command, did not force a change.[25] However, as a result of War Cabinet discussion of losses, Portal did look again at methods.[26] Cost estimates were deemed prohibitive and there were to be many more lives and aircraft lost before Churchill, again prompted by Cherwell, took firm action in late 1942.[27] On 26 September, he tasked Geoffrey Lloyd:

> 'It is of great importance to find means to dissipate fog at aerodromes so that aircraft can land safely. Let full experiments to this end be put in hand by the Petroleum Warfare Department (PWD) with all expedition. They should be given every support.'[28]

This was the decisive moment.[29] Lloyd and his PWD harnessed scientists and engineers from Government and Industry. An injection of practical men into what had become something of a moribund research backwater produced rapid and spectacular results. Harris personally interviewed and then seconded an experienced bomber pilot, Sqn Ldr Wooldridge, to PWD as a liaison officer with significant powers.[30] Harris gave his initial requirement to PWD as 'clearance of a space 1,000 yards in length by 150 yards in width by 100 feet high.' Activity was frantic, on three fronts: the construction of a wind tunnel within the ice-rink at Earls Court, to generate fog for small-scale experimentation; an oil burning system at Moody Down and the installation of both petroleum and coke trial burners at Staines Reservoir.[31]

Although a complete coke-burning system was installed at RAF Lakenheath, it was never used operationally. Coke was satisfactory as a combustible but the installations were cumbersome and dangerous obstructions, almost impossible to control once ignited and manpower



*A Lancaster of No 101 Sqn that has carried out an emergency landing at Ludford Magna, and damaged the FIDO piping in the process.*

intensive. Alcohol was not available in quantity and therefore all efforts were focused on petrol.[32]

Bennett was keen that his Pathfinder Force should profit from any usable results and the first operational, petrol-based, system was installed at Graveley where, on 18 February 1943, Bennett, in a Lancaster, carried out the first landing during thick fog, which had been dispersed locally over the runway by FIDO.[33 & 34] Whilst many problems had been overcome, particularly with burners and methods of delivering large amounts of fuel, many remained. However, progress was sufficiently encouraging to begin further installations, having first secured Treasury authority.[35] This system, now universally known as FIDO, was ultimately installed at fifteen airfields in Britain, most belonging to Bomber Command. Although Manston belonged to Fighter Command/Air Defence of Great Britain, it became the third of the Emergency Runways, to be described later. The logistics were difficult, particularly the supply of huge quantities of petrol, as the tankers and local roads of the day were inadequate to the task. The National Petroleum Pipeline network, together with the

railways, largely solved these problems.[36] Other issues included: quickly-moveable burners for the intersections with the non-active runway; design of approach funnels and adaptations for local topographical characteristics.

**Overcoming Fog – FIDO in Action**

Landing with FIDO has been described by a wartime navigator on 35 Squadron as 'like entering the jaws of Hell', whilst Bennett, a Master Aviator with vastly more experience, described it as:

> 'like lions jumping through a hoop of flames at the circus. The glare was certainly considerable and there was some turbulence but nothing to worry about.'[37]

However, it worked and crews were universally grateful for an apparatus that exposed the runway for landing in otherwise hopeless conditions. For an average pilot, FIDO bridged the gap between the position in the vicinity of the runway that he could achieve by SBA or visually, and a safe arrival. Wooldridge reports of a test landing in severe conditions:

> 'It is the considered opinion of the two pilots in the machine that a medium experienced four-engined pilot (400 hours) could have landed his machine safely.'[38]

FIDO was spectacular: crews reported seeing huge fires whilst still on the return flight, some from the Dutch coast, 80 miles from RAF Woodbridge. The glow could be seen through cloud and the huge consumption of petrol was by far the biggest operating overhead although, when set against the fuel cost of a large bomber operation, FIDO's costs appear more reasonable.

By February 1944, Bomber Command used the following formula for calculating standard fuel load.[39]

$$\text{Fuel Required} = \frac{\text{Overall Track Mileage}}{\text{Track Miles per Gallon*}} + 200 \text{ Gallons (}\textit{Safety Allowance}\text{)}$$

** 0.95 for Lancaster I/III*

Thus, for a round-trip to Berlin, with track mileage of perhaps 1,600, due to indirect routing, the fuel load would be around 1,900 gallons, plus any that Group might add.[40] At 1942 values, petrol cost approximately £1 for 10 gallons.[41] Fuel cost was therefore £190 for

each of, say, 900 aeroplanes, giving a total cost of £171,000 and total consumption in the order of 1,710,000 gallons.

In the year to January 1945, the average monthly quantity of fuel consumed by FIDO at an operational Bomber Command airfield, was 150,000 gallons (£15,000) and that at an Emergency Runway was 575,000 (£57,500).[42] It is true that these FIDO costs could be incurred at several airfields at once and perhaps should therefore be multiplied, but equally they are for a month when there would have been several operations and burnings. 100 Octane is also more expensive than the Motor Transport fuel used for FIDO.[43]

There is not enough data for absolutes, but two computations are valid and telling. Total consumption by all three Emergency Runways for a month approximates the amount of fuel consumed on an average raid and, given that the cost of a Lancaster was circa £42,000 (depending upon equipment fit), each FIDO installation in operation at an operational bomber station only had to 'save' one bomber every three months to break even.[44] FIDO at the Emergency Runways each had to 'save' 1·3 per month. In fact, FIDO accounted for between 2,500 and 2,706 safe landings over an 18-month period, giving an average of 11 per month across the fifteen installations.[45]

There was no distinction between Allies and several hundred aeroplanes of the 8th United States Army Air Force are included in the totals. Churchill was given regular updates of progress and was obviously delighted when FIDO delivered significant results. 'Bravo' was the Prime Minister's response to a note by Lloyd on successful 'rescues' by the FIDO at Fiskerton.[46] Ultimately, FIDO fulfilled Churchill's requirements and expectations.

**Emergency Runways – Genesis, Siting and Construction**

It is likely that the origins of Emergency Runways lie, at least partly, in the 1941 construction of a grass landing strip of over 9,000 feet across Wittering and its satellite, Collyweston, initiated by Basil Embry, Station Commander at Wittering. Although a fighter aerodrome, Wittering began to receive numbers of 'lame duck' bombers taking advantage of a long approach without obstructions.[47] Harris ascribes the origins as 'born of a suggestion in No 5 Group in 1941.'[48] This probably refers to a Group Commanders Conference on 3 October 1941, where growing concerns at the number of aeroplanes

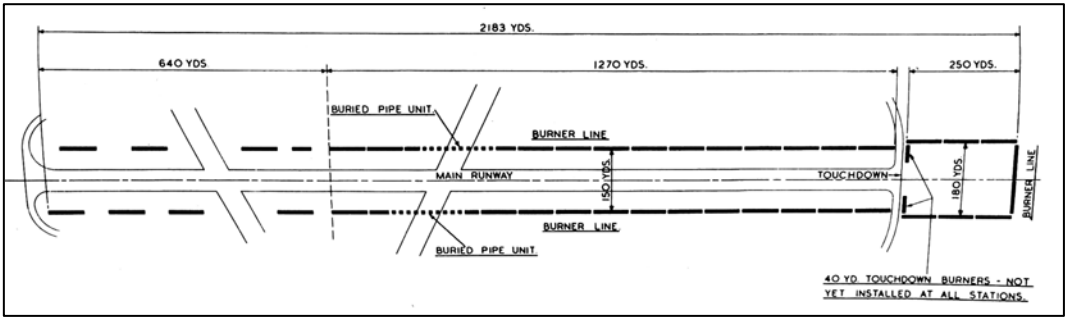
lost while trying to land at their home airfields were discussed.[49] One idea, supported by HQ Bomber Command, was the creation of Emergency Runways that would be easier to use by crippled aeroplanes, minimise interruptions to the landing pattern at base and act as diversion airfields during intruder activity.[50] Several Air Ministry objections were raised but, after a Conference on 18 December, the Director General of Aircraft Safety advised Bomber Command that:

> 'It has been agreed that three Emergency Landing Grounds of the type envisaged in your letter shall be established. I am to ask that you will consider the location and details of constitution of these landing grounds and that your proposals may be forwarded in due course.'[51]

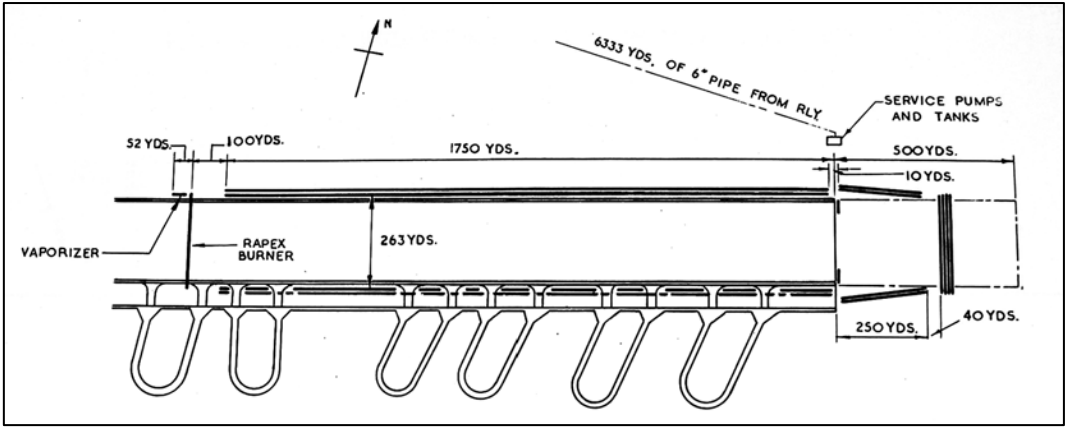
Basic requirements were established: a paved, 3,000 yard runway, with a width of 250 yards, to give three parallel, 75 yard-wide landing lanes, the left hand lane as an emergency strip for crash-landings, and 500-yard undershoot and overshoot areas. The then new improvements in airfield lighting and other equipment were specified: giving high-intensity sodium lighting, funnel lights, angle of glide indicators, inner and outer markers and Drem-type circuit lighting, in addition to embedded lighting delineating separate lanes and taxiways.[52] A landmark beacon/pundit light and an occulting light, Sandra Lights, SBA equipment and Darky facilities were all specified, alongside landline and teleprinter connections to HQ Bomber Command and Group Flying Control.

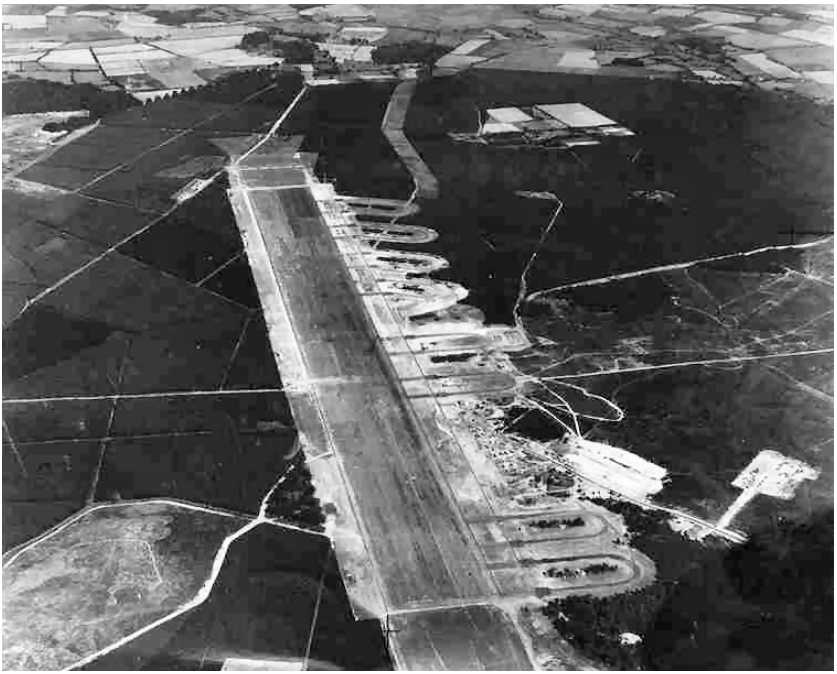
More risks with lights would be taken than in usual operations and this was given as a reason for new locations, rather than existing aerodromes. The runways would be on low-lying coast, close to the routes of the returning bomber stream, to make things as easy as possible for aeroplanes in distress. The Aerodromes Board identified Woodbridge, Carnaby and Canterbury.[53] Choices could not be perfect. For instance, it is surprising that Woodbridge, subject to the local 'Dagg', should have been chosen, particularly before FIDO had proved itself.[54] Its location near Orford, a frequent exit and entry point for the bomber stream, must have taken precedence.

Due to Cabinet restrictions on airfield construction in January 1943; the Canterbury site was not developed.[55] Manston, a fighter




*Above – The basic layout of a FIDO installation. Below – FIDO at an Emergency Landing Ground.*





*RAF Woodbridge.*

airfield near the Channel, which already attracted many bombers in distress, was chosen instead, despite concerns for the chimney pots of nearby Ramsgate. Prior to the cancellation of Canterbury, there was some acerbic correspondence between Harris and Courtney, Air Member for Supply and Organisation. At an Air Ministry Conference on 16 May 1942, representatives of the Directorate-General of Works (DGW) indicated that each Emergency Runway would require six times the men and material to construct as a conventional bomber station. Alarmed, even before Cabinet curtailment of his building programme, Harris initially agreed only to the construction of Woodbridge, provided it was confirmed as requiring no more than twice the normal expenditure.

The Air Ministry Works Directorate decided that the runways would be constructed from a 5-inch deep sand and bitumen mixture on a tamped base, a method successfully used in the Middle East.[56] At Woodbridge, much of this surface remains extant after 70 years. It

quickly became apparent that, due to the methods of runway construction and the relative lack of surface infrastructure, the DGW's cost estimates were much too high and all three runways were built, after Courtney had secured Air Staff backing, despite Bomber Command disquiet over layout and the Carnaby and Canterbury proposals.[57]

Bomber Command was, however, the driving force behind the coordination of construction, supply and the myriad other requirements for these runways; from anti-aircraft defence to special jacks for lifting crashed Lancasters and Halifaxes from the runways.[58] 'Crash' parties and RAF Maintenance Unit detachments were provided; the latter to effect repairs on damaged aeroplanes where possible, and to break down those which were to be fed into the repair organisations.[59] An 'Operational Directive' was prepared in late 1943, which does not appear to have survived. However, an amended version, circulated in July 1944, after FIDO was installed, states:

'The primary function for which the runways are designed is: -

(i) To provide emergency-landing facilities at all times for Bomber Command aircraft returning from operations in bad weather conditions.
(ii) To be used by aircraft in distress at any time of the day or night
(iii) To be used for diversion purposes by Central Flying Control, Headquarters Bomber Command and, in special circumstances only, including Intruder activity at home bases.
(iv) To be used by aircraft of all Commands (including the USAAC) in emergency as for any bomber operational stations in similar circumstances.'[60]

Saundby, Deputy AOCinC, was involved in both the practicalities of the installations and the need for Flying Control procedures to be as simple as possible.[61] However, files from both Bomber Command and the Air Staff, are full of references to, or by, Flt Lt Broadhead, who became ubiquitous during 1943, particularly in respect of Woodbridge. His drive and actions did a great deal towards bringing the Emergency Runways into operation, perhaps at the cost of his own health. [62] Williams cites Broadhead as the (un-referenced) source of

the initial Emergency Runway proposal noted by Harris.[63]

Building work at Woodbridge was approved in July 1942, with an Air Ministry Works Department (AMWD) estimate of four-and-a-half months to completion.[64] Over half a million trees had to be removed and this estimate was far too optimistic. Woodbridge actually opened on 15 November 1943.[65] This was preceded by a short period of testing by two Stirlings with experienced crews, leading to adjustments to the location of some landing aids and recommendations for changes to runway lighting to increase landing rate.[66] Carnaby, with a rolled slag base for the runway due to soil conditions, opened on 15 April 1944 and Manston, with the surface amended to concrete, just five days later. FIDO was not initially specified for these runways, but this changed when its utility was seen at Fiskerton and Graveley. The largest of all FIDO installations became operational at Woodbridge on 29 April 1944, after much difficulty caused by the distance from the (fuel) railhead and fires due to the proximity of the trees. Carnaby FIDO was ready on 19 July and Manston at a similar time, although first used in September 1944.[67]

**Operation and Results**

By any sensible criterion, these runways met their objectives. The numbers tell a remarkable story. Taking Woodbridge as an example, from 15 November 1943 to the end of April 1944, it received the following arrivals, through the stated causes:

| Technical | Enemy Damage | Fuel Shortage | Diversions | Total [68] |
|---|---|---|---|---|
| 160 | 92 | 203 | 58 | 513 |

*Table 1. Emergency Landings at Woodbridge November 1943 to April 1944.*

The figure for 'Fuel Shortage' gives real substance to crew and Group concerns over the issue. Also prominent is the total number of aeroplanes in some sort of trouble that had been taken away from the returning stream and would not cause disruption, or worse, in the circuit of home airfields. Almost 50% of the aeroplanes were damaged and would, in most cases, be repaired at far less than replacement cost. Those with fuel shortage went, along with their crews, swiftly back to

their operational stations and the rapid tempo of operations. The wounded were taken initially to Ipswich and East Suffolk Hospital and the dead had, at least, returned to Great Britain for burial, as some comfort for loved ones.[69]

Combined figures for the month of May, after the opening of Carnaby and Manston, were

| Technical | Enemy Damage | Fuel Shortage | Diversions | Total [70] |
|---|---|---|---|---|
| 111 | 101 | 439 | 22 | 682 |

*Table 2. Emergency Landings at Woodbridge, Carnaby and Manston – May 1944.*

Again, the figures for fuel shortage are startling and reflect an obvious source of gnawing concern for crews and Command, although largely from opposite ends of the telescope. Given that the basic Measure of Effectiveness (MOE) of the SAO was the weight of explosive delivered to Germany, the primary concern at Bomber Command was that routes were flown accurately and engines handled correctly, so that the allotted fuel load would suffice. Logs from navigators and flight engineers were scrutinised by Section Leaders to that end and the Command's Operational Research Section (ORS) conducted regular investigations of bombing raids.[71] Crews just wanted to get home.

| Technical | Enemy Damage | Fuel Shortage | Diversions | Total [72] |
|---|---|---|---|---|
| 2,511 | 1,308 | 3,178 | 4,403 | 11,400 |

*Table 3. Total Landings at Emergency Runways November 1943 to May 1945.*

Churchill was regularly apprised of progress and results from a number of sources. He would doubtless have been as happy as the crews at the above total of 11,400 landings on the Emergency Runways during the Second World War (Table 3).

Woodbridge and Manston also played a part in operations in bad weather over Christmas, 1944, to support the Allied counter to von Rundstedt's Ardennes Offensive. In addition, Woodbridge was used

as a mounting base for the Rhine Crossing operation on 24 March 1945, when 60 Halifaxes departed towing 48 Hamilcars and 12 Horsas.[73] Finally, to this list of achievements should be added the arrival, in error, at Woodbridge on the night of 13 July 1944, of a Ju 88 night fighter containing German radar equipment of the latest type.[74] This, fortuitous, delivery also contributed to risk reduction for the bomber crews.

**Conclusions**

FIDO was a known solution to the problems of a fog-covered runway, with a good chance of success as a result of previous experimentation, albeit with problems, such as burner design and flow rate. The system also required the provision of considerable infrastructure and costly consumables. Experimental evidence showed that a number of alternative methods were neither suitable nor realistic, particularly in respect of the large numbers of aeroplanes in the SAO. The possibility of electronic, blind landing alternatives were known, but with no definite timescales. However, there was considerable delay before serious work was put in hand. Portal's decision that a solution was too expensive, after examination of the issue in late 1941, was unfortunate. There are no discovered signs that this was due to shortage of the requisite fuel stocks or materials and undoubtedly lives and aeroplanes were lost over, perhaps, a wasted year.

Churchill's monitoring of losses and accidents, plus constant demands for explanations and improvements, were fundamental to the development of FIDO. His tasking of the PWD, almost over the heads of the Air Staff, imparted the necessary momentum, whilst Lloyd assembled the necessary consortium and programme. Enquiries and demands by Churchill, and Cherwell, also played a significant role in the instigation of Emergency Runways.

Given the crashes, bale-outs and operational difficulties caused by fog and unknown timescales for other methods, FIDO was the appropriate choice, particularly with the twin-track solutions of coke and petrol pursued by the PWD. FIDO became highly effective in a short timeframe and entirely fulfilled its purpose. It saved thousands of aeroplanes and lives, with the minimum of disruption to operational tempo, and reduced the risks of operating in the shadow of bad

weather. FIDO was expensive in fuel, but these costs are put into perspective when considering over 2,500 successful landings in fog and the lives and aeroplanes saved. FIDO barely survived the end of the war. The costs were, once again, prohibitive for the RAF in peacetime; the bomber stream of a thousand plus aeroplanes was no more and electronics, in the form of Ground Controlled Approach and more accurate instrumentation, provided a superior answer.

The concept of Emergency Runways and the principles behind their construction and general location were a sound response to the issues of damaged and distressed aeroplanes, the disruption they would cause at their home bases and the possibility that they would crash on the way there. Risks taken with increased lights and beacons were justified by the results and the lack of enemy interference. Initial cost estimates imposed a delay, as did discussions between Bomber Command and the Air Ministry over detailed locations. Other factors, including material and manpower shortage, make the delays more understandable than those for FIDO, although construction estimates that significantly underestimated the task did not help.

Nevertheless, after becoming operational, these runways eventually collected thousands of distressed or diverted aeroplanes. The addition of FIDO at each added greatly to their utility and success and the Emergency Runways entirely achieved their aims. From the statistics, it is clear that the Emergency Runways did a great deal to aid the survival of aeroplanes that were short of fuel.

Despite the addition of safety margins, it is clear that, probably as a result of the chosen Measure of Effectiveness, the bomb load/fuel equation was often weighted too heavily against the average heavy bomber crew. Many of them have particular reason to be grateful to Woodbridge, Carnaby or Manston.

**Notes:**

[1] 'The Channel Again Crossed,' in *Flight*, 28 May 1910 – a report of the flight made by M. Jacques de Lesseps on 21 May. Interestingly, this won him the £500 Ruinart Prize for the first crossing, Bleriot's exploit in 1909 having failed to qualify owing to a technical problem with his paperwork.

[2] Bercuson, David; 'Errant Aircrew: A Case for 'Grey' Insubordination in No 6 Group (Royal Canadian Air Force), Bomber Command in 1943' in *The Insubordinate and the Non-Compliant*, ed. Howard G Coombs (Ottawa, Canadian Defence Academy Press, 2007) p133.

[3] TNA AIR 2/4925, Encl 1B shows Harris' policy, as AOCinC Bomber Command, supported by the Air Staff, was 'live aircrews are more valuable than the aircraft. He therefore encourages the Captain to abandon the aircraft when there is little hope of a safe landing.' Despite this, many were killed in attempting to save their aircraft.

[4] TNA AIR 1/2103/207/31. RNAS Aircraft Height Indicator, May 1916.

[5] Many early Notices to Airmen contained details of 'Radio services in Connection with Civil Flights' or 'Aerodrome W/T services' from 1921. A full list is available at http://www.ab-ix.co.uk/notams_1921-39_1945-49.pdf and they are available for inspection, by appointment, at The National Aerospace Library, Farnborough.

[6] One of the worst, but by no means the first, crash in fog at Croydon was that, on 9 December 1936, of a KLM DC-2 which resulted, *inter alia*, in the death of Juan de la Cierva and Arvid Lindman, a former Premier of Sweden.

[7] TNA DSIR 23/9474 and DSIR 36/3059. Note on Landing in Fog, Reports and Memoranda, (MN1) February 1921.

[8] Lindemann had been a First World War pilot at Martlesham and Orford Ness testing bombsights and other items.

[9] Charnley, John' 'The RAE Contribution to All-Weather Landing' in *Journal of Aeronautical History* Vol 1, Paper 2011/1.

[10] See variously (all TNA): AVIA 6/3256 Flying and landing aircraft in fog 1932; AVIA 6/3264 Landing an aircraft in fog by the aid of a captive balloon 1920; AVIA 6/3357 The Balloon Buoy method of landing in fog 1934; AVIA 6/11341 Fog dispersal experiments 1937; AVIA 13/592 Dispersal of fog, experiments and tests 1936-37.

[11] TNA AVIA 13/524. Kirsten Neon Light Fog System 1938.

[12] TNA AVIA 8/449. Burners for Dispersing Fog, ARC Minute of 11 March and RAE Inst/956/29 of 14 April 1936.

[13] See TNA AVIA 13/592. Dispersal of Fog, Experiments 1936-37, including an estimate of £59.0s.9d for flame tests.

[14] See TNA AVIA 13/593. Dispersal of Fog, Experiments and Tests, 1937-38, Air Ministry letter, DSR/645 dated April 1938 to the Chief Superintendent, RAE, Farnborough.

[15] TNA AVIA 13/593. Report M/RES/106 of May 1938.

[16] TNA AVIA 13/593. Reference AM 517355/36/D.D.S.R. of 19 July 1938.

[17] See AVIA 6/11366. Fog dispersal experiments at RAE 1939, Note No CH 281 dated July 1939.

[18] See TNA CAB 120/306.

[19] Most related correspondence, particularly between Prime Minister and CAS, was copied to Cherwell.

[20] TNA CAB 120/306. PM Personal Minute M/198 dated 18 October 1940. Also at PREM 3/20/4. This relates to the loss of ten aeroplanes, from 73, that crashed on landing in bad weather to add to three lost to the enemy.

[21] TNA CAB 120/306. PM Personal Minute M/276 dated 6 November 1940. A further eleven, from 82, were lost in bad weather after raids on Germany.

[22] See TNA PREM 3/20/4. E18, 25 October 1940 for a half-page note by Sinclair setting out the key points. This was the RAF Political and Military heads acting in concert and treating the matter with considerable seriousness.

[23] Williams, Geoffrey; *Flying Through Fire* (Stroud: Alan Sutton, 1995) p4.

[24] TNA PREM 3/20/4, Report from Sinclair to Churchill, 26 July 1941, 'The Blind Landing Position in the RAF'.

[25] From a total of 392 aeroplanes despatched on operations in vile weather, including severe icing, 37 failed to return. Chorley, W R; *Bomber Command Losses of the Second World War: 1941* (Earl Shilton, Midland Counties, 1993) pp173-178.

[26] TNA AIR 8/781 quoted by R J Ogden, 'Fog Dispersal at Airfields,' in *Weather*, Vol 43 (1988), pp20-25.

[27] See Petroleum Warfare Department Progress Review, September 1942-March 1943. Copy No 64 held at the Science Museum Archive, Wroughton as Reference MS202 'Papers of SW Hendry (Project No 01574).

[28] Churchill, W S; *The Second World War IV: The Hinge of Fate* (London: Cassell, 1951) p798.

[29] Portal had looked again at methods in autumn 1941, but estimates of fuel cost were then deemed prohibitive.

[30] See Bennett, D C T; *Pathfinder* (London: Sphere, 1972) p219 for an account of an encounter with Wooldridge. Also TNA AIR 14/2724, Fog Clearance, E9 & 10, for examples of close working relations with Pathfinder Force.

[31] See Edge and Macpherson; *The Meteorological Aspects of Fog Dispersal by Heat*, Meteorological Office Synoptic Division Technical Memorandum 112, dated February 1946, for experiments and results. It can be viewed at Met Office Library Archive Exeter as Item 38078000739815 with Shelf Mark ARCHIVE X14. C1-2.

[32] TNA AVIA 53/58. Hartley, Claims to Royal Commission 47-50. Enclosure 4, Report 473/R/JDM-S/11 dated 11 September 1942, Draft Specification of Equipment used in Fog Dispersal tests at the RAE.

[33] TNA AIR 2/12660. Fido Projects, E10A from Wooldridge to Ops9 at the Air Ministry dated 22 October 1942.

[34] There is a perfectly sound explanation that the acronym stands for 'Fog Investigation Dispersal Operation'. It is however equally, if not more, plausible that an unknown wit, with a knowledge of Disney and musing on other work upon which PWD was engaged, namely Pipe Line Under The Ocean (PLUTO) for the Invasion of France, decided that there should be two dogs of war – hence FIDO and an assemblage of related words to suit.

[35] See AIR 2/12660, Enclosures 42b and 42c, for correspondence.

[36] For some airfields, notably RAF Woodbridge, railway sidings were built. Those for Woodbridge were 3 miles away at Melton, and a 6-inch pipe and pumps were installed to connect with the storage tanks at the airfield.

[37] Both quotes are from Gray, Jennie; *Fire by Night* (London, Grub Street, 2000) pp.62-63. Bennett, *op cit*, p221 is the source of the second.

[38] Quoted in 'Clearing the Air', *Flight*, 6 March 1947, p193.

[39] TNA AIR 14/557. Operational Planning of Bomb and Fuel Loads.

[40] Track Mileage calculated from data on two Berlin Raids 1/2 January and 23/24 March 1944 in Middlebrook, M; *The Berlin Raids* (London, Viking, 1998).

[41] Petrol cost data from the United Kingdom Automobile Association and accessed on 12 September 2014 at www.theaa.com/public_affairs/reports/Petrol_Prices_1896_todate_gallons.pdf

[42] TNA AIR 2/4462. Dispersal of Fog from Aerodromes – Policy, pp43-47, Table 2 of 10 February 1945.

[43] TNA AIR 2/4462. Walker FIDO Report, p3.

[44] TNA AVIA 15/1565. Report by W Dunn, DD Control, MAP dated 2 August 1944 cited by McKinstry, Leo; *Lancaster: The Second World War's Greatest Bomber* (London, John Murray, 2009) p317.

[45] 2,500 was computed by BC (ORS). See Harris, Arthur T; *Despatch on War Operations 23rd February 1942 to 8th May 1945* (London, Cass, 1995) p189. It is also given by the RAF Museum http://www.rafmuseum.org.uk/research/archive-exhibitions/worth-a-thousand-words-air-diagrams/fog-dispersal.aspx. Williams, *op cit*, p 40-41 gives 2,706 as the figure from PWD sources.

[46] TNA PREM 3/4/6 contains examples of detailed progress reports for every installation, together with notes and reports of operational outcomes, such as the quoted PWD Note of 17 March 1944, at E57.

[47] MOD, History of RAF Wittering at http://www.raf.mod.uk/rafwittering/rafcms/mediafiles/3A91A8D7_1143_EC82_2ED2C74AA3B6E274.pdf

[48] Harris, *op cit*, p189.

[49] Osborn, Mike; 'Aspects of Bomber Command's WW2 Emergency Runways' in *Airfield Review*, April 1999, p24.

[50] Bomber Command letter BC/S.25795/Air of 23 November 1941 to Air Ministry in TNA AIR 24/286.

[51] Air Ministry S.71261/DGAS in TNA AIR 24/286, undated but clearly late December 1941 or early January 1942.

[52] See TNA AIR 14/1404, RAF Woodbridge for the diagrammatic representation developed for use in various instructions and information posters for aircrew and Flying Control staff.

[53] In the event, the Woodbridge circuit was in close proximity to those of Martlesham, Debach and Bentwaters, whilst Carnaby was practically in the circuit of Lissett and Driffield and close to the Cottam bomb storage site. See TNA AIR 24/286 'Emergency Runways' BC/S.31408/3/Air/FC dated 3 July 1944, Appendix C.

[54] 'Dagg' is the local name for the fog occurring on nearby coasts and the Sandlings where RAF Woodbridge was constructed. Derivation is thought to be Old Norse *dǫgg* meaning 'dew'.

[55] See TNA CAB 66/32/14, Memorandum by Bevin, Minister of Labour dated 16 December 1942 and CAB 65/33/12 Conclusions of War Cabinet 12 (43) on 20 January 1943.

[56] Depth information is from Higham, Robin; *Bases of Air Strategy: Airfield Construction for the RAF and Its Antecedents, 1914-45* (Shrewsbury, Airlife, 1998) p135. Application to Emergency Runways is from Osborn, *op cit*, p24 and

TNA AIR 27/10/AM10 Examination of Samples of Sand from Proposed Airfield at Woodbridge.

[57] TNA AIR 24/286 for Harris-Courtney correspondence at Enclosure 49 and 50. Courtney was also much involved with the progress of FIDO, as he had been charged along with Cherwell and PWD, to produce results.

[58] TNA AIR 14/1607. Emergency Runway Woodbridge.

[59] No 54 MU, at Cambridge, maintained a detachment at Woodbridge. The unit's ORB at TNA AIR 29/1012, details, with photographs, some of the challenges that they faced.

[60] See TNA AIR 24/286. 'Emergency Runways', BC/S.31408/3/Air/FC dated 3 July 1944, p1. [The reference to the USAAC was anachronistic, as the US Army Air Corps had been restyled the US Army Air Force (USAAF) three years previously – 20 June 1941. **Ed**]

[61] See TNA AIR 14/1608, Enclosures 32A and 106A.

[62] Reginald Malcolm Broadhead (78091). As a pre-war pilot with No 504 Sqn AAF he crashed a Wallace (K6046) on 5 April 1936. He relinquished his AAF commission in May 1939. Re-engaged in the wartime RAFVR, initially in the General Duties Branch but subsequently in Admin and Special Duties, he was on the staff at DCAS War Room in the Air Ministry by 20 November 1944. He retired as medically unfit on 1 August 1945. See National Library of Scotland for Air Force List entries and London Gazette.

[63] Williams, *op cit*, p59.

[64] Osborn, *op cit*, p27.

[65] TNA AIR 24/286, Enclosure 52, BC/S.27997/Air/FC dated 1 February 1944.

[66] TNA AIR 14/1609, Enclosure 3a, Note by Flt Lt Broadhead of test flights on 18 October 1943, with recommendations to improve landing rates using 'simultaneous' lanes of 1,000 yards length.

[67] See Williams, *op cit*, p61 and p142.

[68] TNA AIR 24/286. BC/S. 31408/4/Air/FC Monthly Landings Report, dated 1 May 1944.

[69] TNA AIR 28/954. RAF Woodbridge Operational Record Book.

[70] TNAAIR 24/286. BC/S. 31408/4/Air/FC Monthly Landings Report, dated 19 June 1944.

[71] TNA AIR 14/4546. Hanover, 22-23 September 1943, is an example of the detailed scrutiny carried out by BC (ORS).

[72] Osborn, *op cit*, p35 totals from all the BC 31408/4 reports. Harris, *op cit*, p189 gives 11,250 total only.

[73] Corbell, Peter; 'Woodbridge' in *Air Pictorial*, Vol 29, No 1 January 1967, pp22-24.

[74] See AIR 40/3126 for technical reports and photographs and AIR 14/2814 for intelligence reports.

# GUNS IN THE SUN AND SNOW (RATHER MORE SNOW) THE RAF IN NORTHERN RUSSIA 1918-19

**Air Cdre Phil Wilkinson**

The Editor was kind enough to allow me 30-odd pages in Journal 60, last year, to review some of the newly-born Royal Air Force's activities during the Intervention into the affairs of post-Revolutionary Russia. That article covered the air operations in southern Russia. This time I shall deal with the equally complex challenges faced by British (and many other Allied) forces as they fought and died in the inhospitable North.

I noted, last time, the incongruity of launching men and machines into action at the time of the November 1918 Armistice. But operations in (and for) Russia, not least the delivery of military supplies, and shipment home of raw materials through the main ports (Murmansk and Archangel in the North and Vladivostok in the East), were well under way from as early in the war as 1915. The Second World War's Arctic Convoys were merely a re-run, complete with similar hazards and losses, not a new idea.

A well-placed attaché staff (Major General Sir Alfred Knox, the senior attaché, had been appointed to Petrograd in 1911, and on outbreak of war he was designated as principal British liaison officer to both Court and Imperial Military Staff [1]) kept open the main lines of information flow between capitals and War Cabinets. Military advisory and training Missions were inserted into Russia, to provide support to the Russia ally, and to ensure productive use of materiel shipped in such large quantities – by the beginning of 1917 Britain was shipping some three million tons of equipment annually. Thus, long before November 1918, it was clear to London that there needed to be some effective safeguard against German manoeuvres under the terms of the Brest-Litovsk Treaty of March 1918. There should be no easy transfer of German divisions from their eastern front to add to the weight of attack in their spring offensive in the West. Nor should there be any pillaging and/or transfer of those considerable logistic stores that were now gathering dust in both Murmansk and Archangel. Thus, as a first action, came the deployment of a batch of Royal Marines for shore duty, under the orders of the Royal Navy's North Russia Squadron Commander, Rear Admiral Thomas Kemp. Let his despatch

set the scene in precise detail: [2]

‘SIR:

I beg you will lay before Their Lordships the following despatch dealing with Naval affairs in North Russia during the year 1918:

In December, 1917, it was decided to withdraw from Archangel all Naval elements. I therefore embarked these in H.M.S. "Iphigenia" on December 19th, together with as many British subjects as could be induced to leave, arriving at Murmansk next day.

The position, whether regarded from a political or military point of view, was very simple. The complete breakdown of the Russian Military system had left Russia open to German invasion. This reacted on the naval position in Murmansk.

It was, nevertheless, decided to retain an allied footing in Murman Province, which afforded the only means of physical communication with European Russia. This decision in itself involved no ulterior motive with regard to the internal policy of Russia. Such elements of Russian life as were friendly to the above aims were to be welcomed, and such as were hostile were to be opposed. This, put in simple terms, was the gist of my instructions. At the same time I was given plainly to understand that the military situation elsewhere did not admit of the despatch of an expedition, and that I must do my best with the naval forces at my disposal, together with the assistance of such units of Allied Military Commissions, etc., which rendezvoused at Murmansk from time to time for despatch home.

The same process applied to Pechenga, the nearest important Russian harbour to the Norwegian boundary. In order to hold Kola inlet it was necessary to hold Pechenga, since the occupation of the latter by a hostile force would have turned it into a German submarine base. Finland was then dominated by Germany, and the possession of Pechenga affording a northern outlet was a Finnish aspiration. All indications tended to show that a German Finnish movement against the place was in contemplation.

With these considerations in view I begged to be sent an

armoured cruiser and 500 Royal Marines. Accordingly H.M.S. "Cochrane" was sent and reached me on March 9th. She was to be followed by French and American armoured cruisers, both of which were to come under the British command. Later on, both these ships took their full part in operations ashore and afloat, and I was indebted to their captains for much sound advice on various matters. The detachment of Royal Marines did not reach me until later, but the arrival of the "Cochrane" enabled me to make immediate dispositions for the defence of Kola and Pechenga. A small body of R.E. officers and men which she brought, trained in demolitions work, rendered good service, as the nature of the surrounding country made the Murman Railway the only avenue of hostile approach. In the meantime a force of 300 French Artillerymen had collected at Murmansk, and it was believed that a similar number of Serbians were available at Kandalaksha.

On arrival of "Cochrane" an armoured train manned by "Cochrane" and 150 French Troops was despatched to Kandalaksha under command of Chef de Bataillon Molier of the French Army. Their orders, were to hold Kandalaksha, to collect and organise all friendly elements, to regulate the passage of armed men in the direction of Kola, and if unable to hold the position to retire to Murmansk, destroying the line behind them. Though their position was often critical, this force held the post until the arrival of reinforcements in June, and the opening of the White Sea relieved the situation, and their presence at Kandalaksha assured Murmansk against surprise.

At the same time a landing party from HMS "Glory" and "Cochrane" was put ashore at Murmansk, and the necessary arrangements made for the guns of the ships to assist in the defence. The general arrangements were under the Rear-Admiral Commanding, while Colonel Mercier of the French Army was in immediate command ashore. On May 2nd information reached me that a German Finnish attack on Pechenga was threatened. The arrival of the French armoured cruiser "Amiral Aube" on March 19th enabled me to detach the "Cochrane" for its protection. The "Cochrane" arrived at Pechenga on May 3rd, blasting her way through the ice. A

landing party was put ashore, and a defensive position prepared. Scouting parties of friendly Finns were organised and sent out to the Norwegian frontier. On May 12th the position was attacked by some 400 Finns on skis, with two guns. The attack was repulsed with loss to the enemy. Later on the defence of Pechenga was taken over by a detachment of the force commanded by Major-General C. C. M. Maynard, C.M.G., under Colonel G. S. McD. Elliot. The "Cochrane", however, remained as a support until her return to England in November.

The above affords a general view of the situation until the arrival on May 24th of Major-General Sir F.C. Poole, K.B.E., C.B., C.M.G., who took over the command on shore. From that date onward the Navy remained in constant co-operation with the military forces under his command. At my request all Naval elements serving ashore came under the Army.'

Of note, of course, the absence of any reference to any air component. But these were early days for the Royal Air Force, and RFC or RNAS influences (not to mention uniforms and rank titles) prevailed through all the reporting of operations throughout 1918 and 1919. As a further layer of British involvement in Russia during the later years of the war, it bears noting that there had been a British air training mission operating in Russia, with various aircraft involved: BE2e, various Sopwiths, etc. One member of this mission (and recorded as having engaged in joint operation with the Imperial Russian Air Service) was a Major (temporary Lt Col) A C Maund. He would become a key air adviser to the incoming Major General.[3] He, Poole, had virtually written himself into the job of running some kind of British – and possibly Allied – operation in North Russia, when he provided a crisp short brief to the War Cabinet, on 5 April 1918.[4]

And that's the way it turned out, so in order to get the main mass of despatch quotes out of the way, and to complete the scene-setting, here is an extract from his valedictory despatch. The following are his final paragraphs of the despatch before commending certain individual officers in the customary way ('Mentions in Despatches'). I quote:

'GENERAL REMARKS, In considering the operations carried out by the Forces under my Command since our arrival at Archangel,[5] I would point out that we have been confronted

with many abnormal difficulties. These have been for the most part overcome solely by the display of energy, determination, and goodwill which has been displayed in a marked degree by all troops under my command.

The following have been some troubles with which I have had to contend:

1. The mixture of nationalities of Troops accentuated these difficulties. I have had under my command troops from Great Britain, France, America, Russia, Italy, Poland, with Czechs, Chinese, Lithuanians, Letts, Finns and Esthonians (*sic*), so the difficulties of conversing with and administering these mixed nationalities can readily be imagined.
2. Shortage of Troops. On landing I had too few troops under my command to enable me to proceed far down in Russia. The Russians here have not come forward in any large numbers under voluntary enlistment and the various political crises have delayed mobilisation. The state of anarchy and confusion under which the country has lived for the last nine months cannot be shaken off in a few weeks. There is a regrettable tendency to look to the Allies for food, pay, and protection, thus leaving the Russians themselves free to indulge in their favourite pastime of political intrigue. Mobilisation is now in train, and I am confident it will be a sufficient success to give me at last 10,000 troops from this district, who should be ready for the spring operations.
3. Shortage of good river craft. The Bolsheviks took away all the best and fastest of the river fleet. The tugs that remain are in a bad state and this renders difficulties for our supply questions for the river force.
4. Shortage of artillery personnel. I brought some 18 pdr guns and a few NCO instructors but it has been most difficult to obtain personnel to man the guns. A detachment of 40 Polish officers whom I trained at Murman has been the main nucleus of my Artillery Force. The uneducated Russian is very hard to teach.
5. Political Troubles. The Government which had assumed control about 2 hours before our arrival here was hopeless to a degree. It was composed entirely of Left Social

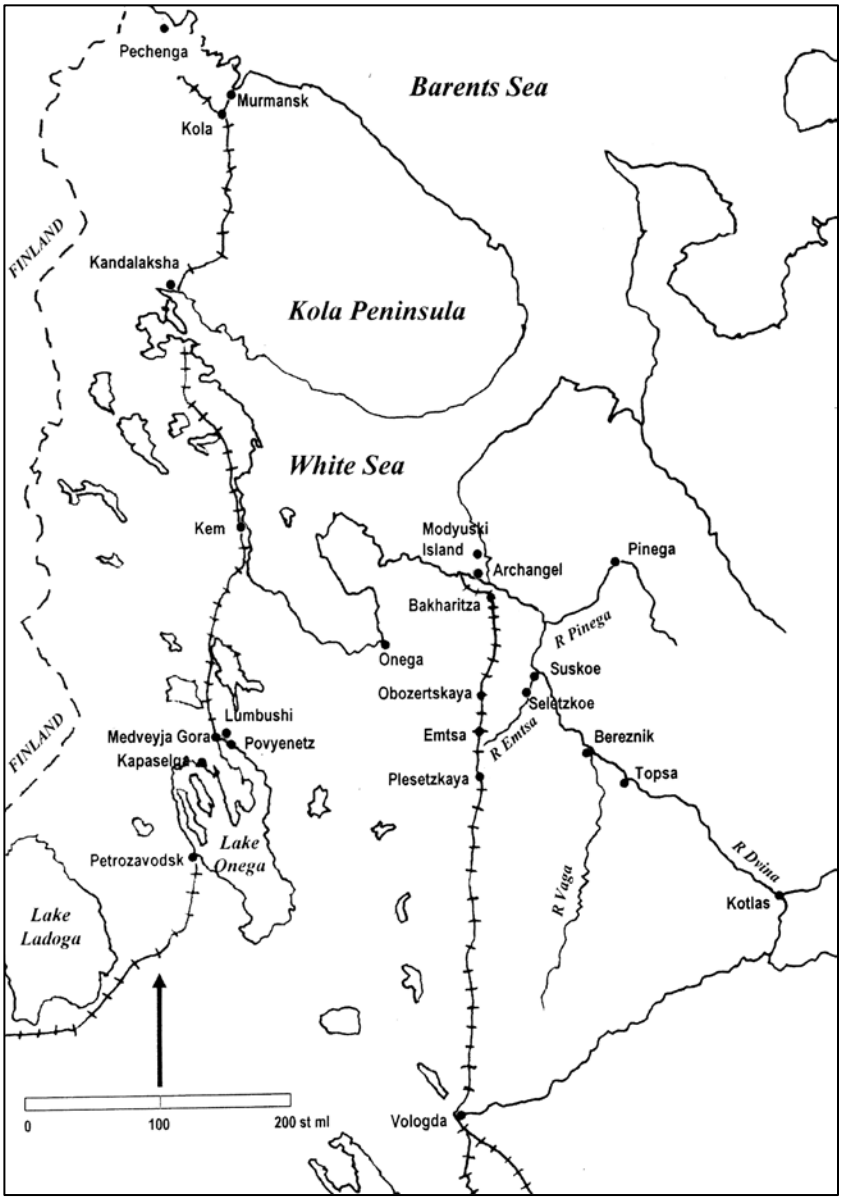
> Revolutionaries who in politics and ideas are not far removed from Bolsheviks. They assumed control – on paper – over the whole of Northern Russia and had devoted the whole of their energies to that District. Their immediate need for urgent necessities for the Town and occupied districts they absolutely neglected. They were totally incapable of understanding the necessity of any military precautions being taken for the safety of the port. Any action of this kind they considered as repressive and as undue interference with the liberties of the people. Past masters of intrigue, they immediately commenced to play off the Military against the Diplomatic Representatives. Thus we have in one small area, the separate interests of the Government, the Diplomatic Corps, and the Military, with a singularly unhappy result. It does not require a deep study of history to realise the outcome of continual attempts of civilian interference in military measures. I trust that now under the reconstituted Government which places more control in the hands of the Governor General, Colonel Duroff, with whom I have established a good understanding, that matters will progress more smoothly in future.
>
> I attach a list of Officers and Men . . . etc'

Poole's despatch hints at a degree of grumpiness for which he gained an increasing reputation during his time in Russia (and also for other 'irregularities': he deserves an article all to himself). But suffice to say that it arrived in the War Office and the minute sheet of the fileis a classic example of what goes on in the corridors of power while the troops are about their unsavoury tasks.[6]

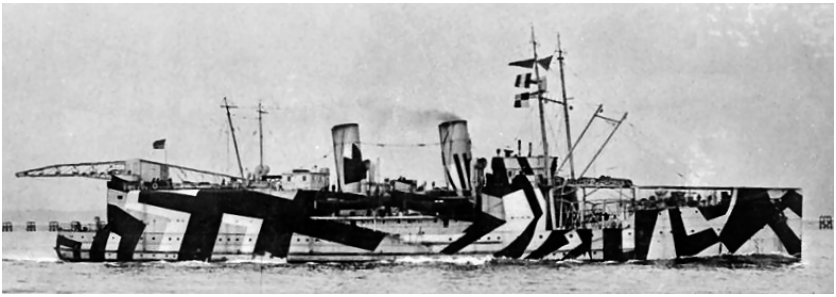
On 26 October 1918, a minion (name of Meade, unidentified any further) signed off a minute to DCIGS (at that time Maj Gen Charles Harington), saying: 'For you in the first instance. Do you advise publication?' It was a considerable despatch and it was not until 6 November that Gen Harington replied: 'This should not be published at present. The Admiralty have received a Naval Despatch and are not going to publish it. Even after suggested excisions are made, there is no doubt that considerable capital could be made out of this Report both by Bolshevists in Russia and their sympathisers in this country.

In view of the fact that the whole question of action or inaction against the Bolshevists is now under discussion it would be extremely unwise to publish.' The next day Meade minutes the paper up to Secretary of State.[7] 'Perhaps copies might be sent to the War Cabinet.' On 9 November, a certain Creedy in SofS' office reports: 'SofS approves of circulation to the Cabinet but not of publication for the present.' A file margin note reports that copies have been ordered – and this is on the day of the signing of the Armistice. Two weeks later, on 25 November 1918, Creedy minutes 'Copies circulated to King and Cabinet.' The next entry in the file is not until a year later, on 8 November 1919, when Col A Steel, Col GS in MO5, asks for a copy 'as its publication should now be re-considered.' On 13 December, instructions are given for the report to be set up in type, but 'Sub-paragraphs 1-5 of the paragraph 'General Remarks' are to be omitted for publication.' As indeed they were, when Gen Poole's Report was finally published.[8] General Harington's 'excisions' had prevailed. But for Poole, in the heat of a confusing deployment, they reflected the basic chaos that the British and Allied forces encountered as they embarked on the Intervention.

How would that Intervention be brought to bear? Admiral Kemp's report gave the view of the naval man on the spot during the first months of 1918. But back in London the War Council, nervously watching developments on the Western Front, and responding to Gen Poole's brief to the War Cabinet, were authorising the assembly of a North Russian Expeditionary Force, basically intended to secure and safeguard the Murman coast and the railway down to Petrograd/St Petersburg. It would be code-named 'Syren' and, with 600 personnel, be commanded by Major General Sir Charles Maynard. A further small force, code-named 'Elope' would form and move at the same time, with the intention of going further forward to Archangel once the ice broke on the White Sea. Its aim, under the command of Brigadier General R G Finlayson, was to train local Russians to take the field against Germany on a re-constituted Eastern Front. Supplementary was the planned training of Czechs, who had fought with Russia, and who would make their way across central Russia to Archangel, and then deploy with the locally-trained Russians to this new Eastern Front. Once the forces had been gathered and inserted they would come under single command – that of Major General




*The extent of the region in which the Allies operated in 1919. NB Some locations mentioned in the narrative have proved elusive.*



*The seaplane carrier HMS* Nairana *wearing the dazzle camouflage scheme adopted during WW I.*

Poole.

Poole was on the move early, as noted below, and arrived in Murmansk on 24 May 1918.[5] He was carried in some style on the USS *Olympia* and was some four weeks ahead of the main party of Syren and Elope troops and their generals.[9] Poole made a series of estimates of the way things might advance, and once ashore – on 23 June – General Maynard set about detailed and long-range reconnaissance of his likely sector of operations, well written up in his memoir.[10]

Air operations? Those would be concentrated, at the outset, in the Archangel sector of North Russia. The first use of aircraft was as part of the modestly-sized assault force that was to move from Murmansk, cross the White Sea and get ashore in Archangel. It was a very mixed fleet, with HMS *Nairana* the seaplane carrier, steaming behind the British light cruiser HMS *Attentive* (commanded by Capt Altham, who recorded his part in Intervention operations in a 1923 RUSI journal.[11]) *Attentive* had 100 French infantry on board; *Nairana* had 200, plus her Fairey Campania seaplanes. A French cruiser, the *Amiral Aube*, had a further 200 French infantry plus 100 Royal Marines (but it was a little late on parade, having got stuck on a sand bank on the approach). A cluster of armed trawlers and minesweepers made up the rest of the flotilla and there were some 1,500 men all told to assault this well-protected port. All manner of subterfuge had been going on in Archangel ahead of the assault – which has to be considered the first ever fully combined land, sea, and air operation in history – and is best read up in the definitive account of the whole Intervention.[12] For the assault itself, Admiral Kemp's later Despatch does it justice:

'*Attentive* was sent on to the lightship (which, contrary to our expectations, was in place), with orders to seize her and any pilots found, and to telephone an ultimatum to Modyuski Island. The Island was required to surrender within half-an-hour. *Nairana* followed as soon as the last seaplane was in the air. The Island agreed to surrender, and to hoist the white flag on the battery, *Nairana* and *Attentive* accordingly stood in, and prepared to land troops. A tug then arrived from the lightship with a message from the battery refusing to submit, and saying that landing parties would be fired on. Troops were therefore re-embarked, and *Attentive* and *Nairana* anchored close to the north point of the Island. *Attentive* was ordered to open fire and seaplanes to bomb. The fort, which was about 5,000 yards distance, replied, and made pretty good shooting. *Attentive* was hit through the base of the foremost funnel, putting one boiler-room out of action, but without casualty. *Attentive* made good shooting, and the seaplanes bombed effectively.[13] The fort gradually ceased fire, and the troops were landed in ships' boats with some difficulty owing to the necessity of finding a channel and the shelving nature of the beach. The troops were under the command of Captain Alliez, of the French Army, who had orders to work down South and occupy the battery and all mine-firing posts found. It was afterwards found that the battery and minefield arrangements were in good order. The landing party encountered slight opposition from rifles and machine-guns, and the Island was in our possession by 8 p.m. Some prisoners were made, but the majority of the garrison escaped in boats. Our casualties were slight. In the meantime the *Amiral Aube* got off and joined me at 3 p.m. on August 1st. The result of the action at Modyuski was so discouraging to the Red garrison in Archangel that they retreated by rail and river, leaving the town temporarily in the hands of the pro-Ally element. They were afforded no time to rally.'

Job done – or at least started. For once the modest force was ashore, it was now up to General Poole to consolidate and sort out requirements for his proposed operations (considered by analysts with hindsight, and indeed at the time, to be relying on some exuberant

optimism). A key file in the National Archives covers all the interchanges between Poole in-theatre and a War Office in some difficulty as the war continued along the Western Front. On 7 August, Poole launches a secret cipher message with a clear call for support for his aviation assets:[14]

> 'Urgent. Please inform Air Ministry there are sufficient Sopwith and Nieuport machines in Archangel to form 2 squadrons and 70% pick *[sic]* from Russian Flying Corps with remaining 30% more than assured. Lack of tent hangars special tools and castor oil. Can you dispatch immediately 10 RE7 tents, 5 sets Clerget engine tools, 5 sets Le Rhone engine tools, carpenters' and fitters' tools for 3 flights,100 galls paraffin, 500 galls Castrol. Until arrival of this equipment work of these machines is held up. At present success of expedition practically depends on energetic aviation work as it prevents enemy blowing up bridges and hindering our advance also reconnaissance of country almost unmapped.'

He was clearly right down in the detail (and no doubt drawing closely on the advice of air component chief, Maund), for five days later, in another cipher telegram to the War Office he referred back to the 7 August message and said:

> 'My requirements in personnel for the formation of base HQ at Archangel for repair of aeroplanes and stores and instructional purposes are as follows: 1 adjutant 2 equipment officers 3 officers with experience of RAF DH4 Sopwith and Nieuport engines 3 experienced storemen 1 sergeant wireless instructor 1 sergeant machine gun instructor 2 riggers for Nieuport and 1½ Strutter aeroplanes 2 fitters for Le Rhone and Clerget engines 1 Sergeant photographer. Can corporal Howse who was in Russia last year be sent out? Thornhill[15] in a cable states the necessity for at least 20 extra officers 10 of which should have had experience with an Expeditionary Force; remainder could be civilians but all must speak Russian. Whole country teems with spies; I fully concur.'

Further terse messages were winging back to the War Office daily, principally complaining about the lack of supplies and the lack of

*Among the aeroplanes provided by the Russians themselves were single-seat Nieuports and two-seat Sopwith 1½ Strutters, like this one.*

focus on his needs for support. No doubt, therefore, he was less than delighted to receive a telegram (serial 64662) from London on 20 August which said:

'1. Following information is required by us;
   a. For what duties aircraft are chiefly required
   b. What intelligence have you concerning enemy aircraft
   c. What do you anticipate will be the depth of snow?

2. Apparently *[sic]* your Air Force at present consists of 8 seaplanes, 8 DH4, and in addition a certain number of Nieuports and 1½ Strutters. How many of each are considered serviceable (and unserviceable) and how many in addition with the material on the spot be made serviceable? Are there any spares and are those Nieuports single-seaters or 2-seaters?

3. Now that winter is approaching it is proposed to bring 'Nairana' seaplane carrier back and you will presumably take anything you want in the way of materiel and personnel out of her before she returns.

4. It is proposed that a Wing Commander with sufficient personnel and equipment to organize and command all aviation units shall be sent out.'

Given Poole's evident relish for 'telling it like it is', he was already well into another telegram when that War Office piece got to him. He opened up, vigorously, on 21 August:

'Effectiveness of RAF detachment Elope completely ruined by

unpardonable omissions and oversights of departments supplying DH4 aeroplanes bombs wireless rigging materials, also ridiculously small supply of photographic expendables.'

After a further litany of various mismatches – for example, wrong wheels for the airframes – and the issue of engines beyond their approved life, surface damage to aircraft, and no bomb racks for the standard bomb, he concluded:

'May I also have the 3 dismantled DH4s replaced by new ones. Owing to nature of operations, GOC is forced to count very largely upon work of aeroplanes. A full report will follow but do not wait for same before sending this material.

I consider that had it not been for the apparently gross neglect in packing and in the despatch of this aviation material which left me without the vital support of the aeroplanes, my advance would have progressed considerably further and that my casualties would have been considerably reduced.'

The next day (22 August) he expands on his theme, giving as strong an endorsement for air support as he could. He told the War Office:

'Owing to peculiar conditions and type of warfare, the North Russia Expeditionary Force has to be dependent to very large extent upon RAF. Work demanded is already beyond capacity of existing RAF flight and Russian unit formed since arrival. Great demands for long distance bombing reconnaissance photography and wireless work by machines capable of resisting cold.

Can you please supply complete DH9 squadron with personnel and with BHP engines fitted with metal hood fitting closely over engine to protect from cold. Complete and comprehensive spares to last unit until 15 June as port closed until then.'

The notion of air support was taking hold in the War Office because on 25 August came a telegram from MO5 to General Maynard in Murmansk, repeated to Poole, saying:

'The provision of a flying detachment for you is being

considered here. Your views as to possibility and desirability of utilizing aeroplanes bearing in mind climate and local conditions are required.'

It is tempting to think at this distance that the launch of this twin-target expedition was not supported by the right sort of staff work, and it is clear from the files that the management of the newly-formed Air Force was causing departmental difficulties. Another great demand for supplies from Gen Poole on 22 August ('on account of shortage of cipher officers, impossible to give full details, but following in addition to previous demands is indispensable') called for – as usual with no punctuation – DH4 wire swages strut tie rods brass rivet mashers chamois leather sponges glue putty soap rubber solution French chalk cotton waste bulbs and refills for torches and lamps photo plates paper [. . . *it goes on considerably longer*].

Back in London the suppliers were noting on file that dispatch was being planned for 26 August (fairly brisk response) but DAQS minuted to O1 in DAirO that Aeroplane Tents and Engine Tools are a supply of the DAE. The supply of everything else has been arranged and is being shipped on the SS *Susquehanna*. Also on 26 August, Poole was replying to the War Office 64662 of 20 August (page 104 above) and all its leading questions. His response reads:

'Following are my answers:

1. a. Bombing photography reconnaissance artillery observations firing at ground long distance essential.

b. Aerial preparations reported being [*3 groups indecipherable*] anticipated but nothing definite as yet.

c. Snow 4 to 6 feet deep. Russian winter skis to replace wheels can be manufactured here.

2. 2 Nieuport single-seater type 23 and 17 and 14 Sopwiths all Le Rhones besides 4 with Clergets at present. Sufficient spares but absolutely no tools and expendables. We will pick up more machines as we advance. Many of their pilots famous Scout pilots: would like to mount them on Nieuport Le Rhone engines in case of enemy opposition in aircraft this winter.

3. Yes – if she is instructed to comply re personnel and materiel otherwise this cannot be done as she comes under


*Seen here at Bereznik, this DH9, F1210, would have been one of those despatched in response to Poole's urgent request of August 1919.*

> Navy.
> 4. Already Wing Commander here. Lt Col Maund: do not need additional Wing Commander. Re material: DH9 squadron complete with personnel and equipment to June 1919 as per telegram E332 of 22 August most urgent. Also all the others detailed.'

Here we see another of Poole's clashes building – who would be his senior airman? But before that is resolved, it is on record that, after a War Office conference on 28 August, strenuous efforts were made to gather the men and material to satisfy Poole's strident demands. A Wing HQ was to be formed ready to ship out, with a commander, adjutant, and specialist equipment, armament, photographic, wireless and medical officers. Sixty other ranks would include drivers and batmen, plus aircraft ski fitters, and one interpreter. Supplies would be scaled for nine months. An RE8 flight would be shipped, using the basic establishment scale quoted as AF/F/17, and including wireless operators, photographic and wireless mechanics. Finally, there was to be shipped out the manpower nucleus to manage two Russian squadrons: two commanders, two each SNCO fitters and riggers, six engine fitters for mixed types, four riggers and four interpreters. And 60 tons of bombs various.

The actions to achieve all that were immediately under way, in

particular the selection and posting of manpower and sending them all to the kitting-out centre at Blandford, where all the winter gear was maintained. But Poole had got a bee in his bonnet about his senior airman, and his telegram E424 of 4 September said:

> ‘I would point out that in posting of new officers here the tendency now appears to involve superseding of heads of departments who came out with the original force, who have gained valuable experience of the difficult conditions out here and who have done their work to my entire satisfaction. This naturally tends to discourage my heads of departments and does not make for efficiency of the force. I am more than satisfied with the work that all my officers have done and I have no wish whatever to have them superseded. I trust this question will not be overlooked in future postings.’

Back in London, O1 minutes DAirO: ‘This will affect the question of recalling Lt Col Maund and sending out another Wing Commander.’ DAirO responds: ‘Not to be interfered with.’ And thus, the reply to Poole’s complaint on 4 September comes in cipher telegram 66058 on 10 September:

> ‘When officers are sent out the claims of officers who are already on the spot have been and will be considered but all theatres of war must share promotion and the best men should be utilised.’

And on 12 September, replying to Poole’s 26 August list of requirements, War Office (MO5) telegram 66248 reads:

> ‘Following information given by Air Ministry:
> 21 officers and 147 other ranks being despatched. The following are weights of material: 3380 shipping tons of which 543 tons are already on the high seas. This includes 9 RE8 machines. Transport nil. The list of stores being supplied has been scrutinized by and is being brought out by Lieutenant Colonel Vanderspey *[sic]* who is proceeding to your command.’

Poole’s response of 15 September is terse:

> ‘I presume that Lt Col Vanderspey is junior to Lt Col Maund.

Confirm this please.'

The War Office reply on 18 September says:

> 'Lt Col van der Spuy *[this is at last the correct spelling]* is senior in rank to Lt Col Maund. Van der Spuy conveys orders for return of Maund to this country to report personally on situation from the Air point of view. Question of seniority therefore does not arise in the circumstances.'

Poole's reaction to this in his Archangel office is not on record, but the routine of his HQ continues, as with the regular signal of personnel strength. By 27 September this is reported as:

| | **Officers** | **Other Ranks** |
|---|---|---|
| Total British strength | 140 | 1707 |
| (inc RAF) | 13 | 62 |
| Allies: | | |
| Italian | 1 | 25 |
| American | 146 | 4558 |
| French | 20 | 978 |
| 'Locals' | | |
| Finns | 28 | |
| Chinese | 214 | |
| Czechs | 13 | |
| Estonians | 16 | |
| Lithuanians | 95 | |
| Russians | 1920 | |
| Poles | 154 | |

On 19 September there is a telegram request to:

> 'Transfer 2nd Lt D MacDougall RAF from Flying Personnel 'Nairana' to British squadron force. MacDougall has been with force since 10th August. Senior Naval Officer concurs with this application. As 'Nairana' shortly leaving for home please cable approval.'

Reply confirmed 'No objection' (but see Note 13). Further refinement of Poole's establishment came in a War Office telegram of

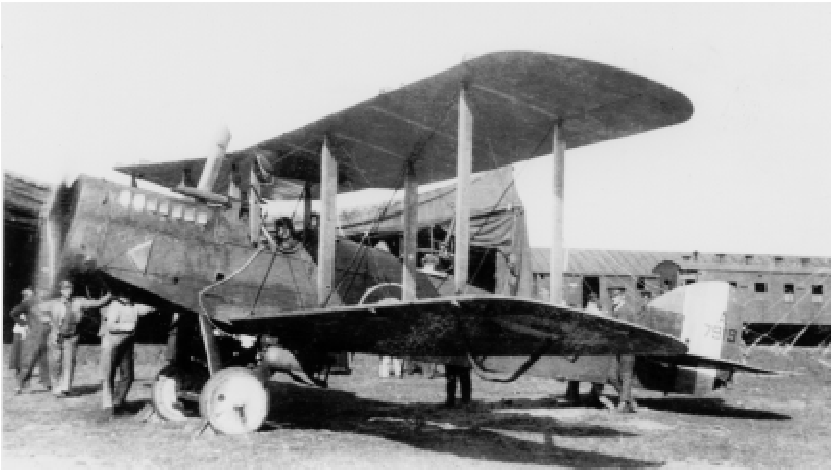
20 September, sent to GOC Murmansk (ie Maynard) repeated to GOC Archangel:

> 'It is anticipated that the following RAF personnel and stores will sail early in October for Murmansk:
> Personnel officers 15 other ranks 66
> Aeroplanes RE8 machines 9 (complete with engines)
> Spares 150 shipping tons
> Oil 250 gallons machine gun
> Oil 2,250 gallons mineral
> Petrol 30,000 gallons'

By 30 September, this first wave of reinforcements is beginning to appear in Murmansk and Archangel. But the winter will soon arrive and Archangel and much of the White Sea will be iced up. General Ironside and Lieutenant Colonel Van der Spuy travelled out on the same vessel, leaving Dundee on 21 September and arriving in Archangel on 30 September. Van der Spuy's activities will be dealt with later on, but another aspect, not clear to either Ironside or Poole at this stage, was that Ironside was posted out to be Poole's Chief of Staff, but would eventually take his place completely when Poole went on leave to London on 14 October, and was retained there. Ironside, confirmed in the rank of major general, was formally appointed as Commander-in-Chief Allied Forces North Russia on 19 November 1918.[16]

By the time Poole left, the ground and naval forces had seen considerable action on the main fronts – down the river Dvina south of Archangel, and along its tributary the Vaga, similarly southwards along the railway towards Vologda; southwest towards the White Sea port of Onega and eastwards from Archangel along the Pinega river. In Maynard's Murmansk zone, the focus was also on a railway front, guarding against Bolshevik attacks up the line from Petrograd, with most attention given to the port infrastructure around Murmansk and also to the White Sea ports along that railway: Kandalaksha and Kem. It must not be forgotten that the Armistice was still a month away.

Despite the constant calls for logistic support, the operation of the RAF and Russian units had been steady throughout August and September. Russian pilots (including Lts Shebalin, Kropinov, Svetchnikov, Modrach, and Capt Kozakov[17]) had used their Sopwith



*Armed with a pair of (probably 112 lb) bombs, this is the DH4, A7919, flown by Lts Furlong and Topham on 18 August.*

and Nieuport mounts to good effect for reconnaissance and bombing. A typical recce report, from a sortie flown in Sopwith 2404 on 22 August by Kropinov with Abramovich as observer, reads:

> 'Airborne 0835 Landed 1050. Route SUSKOE – SELETZKOE – MEJNOVSKAYA – KOTCHMANSKAYA Stn – PLESET-ZKAYA Stn – EMTSA Stn – OBOZERTSKAYA – SUSKOE. Camp fires 4 versts[18] from destroyed bridge over Emtsa river. In forest between ADVINSKAYA and KOTCHMANSKAYA there were men and one vehicle. On road from PLES to the NE about 10 loaded vehicles moving……Dropped bomb on PLES Stn – it exploded near the barracks in NW sector of Stn. Dropped proclamations in ADV and KOTCH.'

The RAF were providing similar cover and a typical report comes from an 18 August sortie, in DH4 serial A7919, with Lts Furlong and Topham airborne from 1630 to 1835:

> 'Ht 4-5000. Weather fair. Photos:
> 1&2 Position S of river KYAMA and E of railway
> 3 – 6 OBOZERTSKAYA railway and village
> 7 Supposed trench leading from wood pile between R, KYAMA and OBOZ

*The response to Poole's request for 'Camels or other rotary scouts' eventually included Snipes (centre) plus some DH9As (E8765 at left).*

> 8 Position S of R. KYAMA and W of railway
> Movement trains: at 1730 rolling stock for 3 trains in OBOZ Stn; 2 engines without steam in Stn. At 1720
> 6 trucks just S of R. KYAMA. No engine.
> Rounds fired 480 at OBOZ Stn
> Miscellaneous: The bridge over R. KYAMA appears black and burnt and sags in the middle.'

As with similar reports it is suffixed 'Copies to proper quarters: B G Finlayson, Col Skene, Col Guard (on his train) Office'.[19] The Russians flew 26 such sorties between 19 August and 30 September. The RAF flight provided 47 in the same period, and all were invariably a mix of reconnaissance, combining often with artillery spotting and directing, and bomb or gun attacks against ground force targets.

Poole was unceasing in his identifying of air support requirements to maintain any air operations already underway in support of ground and waterborne combat, and to ensure readiness for later operations. On the day he left for London, 14 October, he signalled to War Office, 'for Air Ministry':

> 'Following is list of portion of requirements in machines personnel and spares in view of Spring offensive. Camel or other rotary scouts 18 machines. DH4 27 machines. Spares for above on special basis for Russia. General spares for Nieuport Scout and Sopwith 2-seater. All spares will be specified by

Colonel Maund on arrival. Officer personnel 4 Scout pilots 8 DH4 pilots 1 squadron equipment officer. Men personnel: 1 Flight Camel complete. 2 Flights DH4.'

In the War Office, there is a 16 October note that says 'Col Edwards says that nothing can be sent out for many months; the matter is being held over. DFO will bring it forward again later. Col Edwards will reply.' But Poole had left, having evidently absorbed the loss of his senior airman of choice.

And by this time Van der Spuy had settled in and been taken on a tour of inspection and information by Maund. Maund had submitted a report on his period in command of the air echelon, and in particular detailing the arrangements for the Russian personnel, all formerly of the Imperial Russian Air Service, absorbed into his command, and identified for clarity as forming the Slavo-British Aviation Corps (SBAC). He said the Corps consisted of two flights at the front, a third flight under formation, and an HQ staff, 'all trained to act under British administration methods and British discipline so interpreted as to harmonise with the Russian character.' He reported on the high reputation that the SBAC's Russian pilots had earned on operations, and recorded that 'Capt (Lt Col) Kozakov has been awarded the DSO, and 2nd Lt Abramovich the MC.' He noted at the head of his report that although no RAF staff could be provided beyond one Wing Commander when the total RAF officers permitted had to be limited to 10, the following has been done **over and above the actual fighting** *[author's emphasis]* by 8 of the 10 RAF officers forming the RAF Flight.

The other achievements beyond the forming of the SBAC were forming a recruiting and clothing department; forming an intelligence section for operations and assisting in obtaining recruits from the interior and the defection of pilots with machines from the enemy; forming an effective base workshop; preparation of two effective aerodromes at Archangel with permanent winter heated hangars for 25 machines; feeding all RAF detachments at the front; salvage of all aviation material left behind by the Bolsheviks and finding sufficient tools etc, useful to the aviation service, to carry on with until arrival of further supplies from England. And with that, he was gone (but will reappear in this article). Now the command of air resources passes to

*Kenneth Van der Spuy as an RFC captain in 1916.*

South African born Kenneth Reid Van der Spuy.

To give a flavour of the atmosphere that must have accompanied the departure of Maj Gen Poole and senior airman Maund, I must quote from Van der Spuy's memoirs.[20] Having been named to take command of a Training Group in England, he records that 'early in 1918' he was invited to form and command an air arm to operate, with Allies, in North Russia, with Archangel as the base. He was given a free hand to select personnel and material, and notes that he chose three South Africans, three Australians, two Canadians and a few men 'with experience in the colonies and dominions […] I had found that such men were well fitted to adapt themselves to strange and severe conditions.' He notes the value of having the time on board ship to Archangel in the company of Ironside, and is unsparing in his assessment of (some) of the men he would have under command. He had been told he had command of the RAF element of the 'Elope' force, but found out on arrival that this command also included the SBAC. The men were in the main Russian, he notes, but the aircraft mixture defied description – all sorts and sizes, flown up to Archangel to escape the Bolsheviks. He homes in on the pilots who had already been successful in combat (the 'famous Scouts' that Poole had referred to in his 26 August telegram) – these included already-decorated Kozakov, plus Smirnov, Babanenko and Svetchnikov, who would, he said, 'face death in any old aircraft, as many of them did, rather than submit to the hated Bolsheviks.'

Van der Spuy describes the HQ at Bakharitza, just across the Dvina from Archangel, with its base workshops and a rudimentary airfield. But he was not pleased with some of the officers he inherited: he shipped the senior engineer home on the next boat because he was

finishing off a bottle of brandy before breakfast. He also had difficulty with the HQ enclosing both offices and messing space, and since the SBAC officers tended to have their female 'secretaries' along ('for amusement as well as warmth in the cold climate') he had to deal with this. Not least because, before his arrival, 'this had been countenanced by the Air Force commanding officer.' He finished his early appraisal by recording that he had hoped to implement his flying officer strength by the inclusion of the odd twenty already at Archangel but had to send many of them back to the UK – 'including their commanding officer.' 'I was rather young at the time' he says, 'only 25, and found it a difficult decision to make, but to unscramble the mess it was a necessary one.' He describes the tour of inspection with the commanding officer and the distinctly adverse report he tendered at the end of it, before that commanding officer departed for England. He comments: 'I discovered subsequently that not long after his return to England he had been promoted.'

So the 'new broom' enters the scene. In fact his report to Air Ministry, on 10 October, was far more measured and positive than his recollection of 50 years later suggests. On the file (see Note 14) he sets out the general situation clearly and honestly without 'over-egging' anything. His statement of aircraft and manpower requirements annexed to his report is clear and straightforward: he would need 27 DH4s (18 active and 9 spare); 18 Camels (or other rotary Scout); 12 and 6 Nieuport and Sopwith 2-seaters – a simple request for spares to keep them flying. Manpower would need boosting to provide sufficient to operate those fleets. The final footnote says that 'all these requirements will be fully explained by Lt Col Maund, in person.'

Now established, his memoir starts to give the flavour of air operations in the increasingly hostile environment – both the climate and the increasingly effective Bolshevik forces were taking a toll on the ground, and conditions in the air were often challenging. The air units were widely scattered. One was at Bereznik, about 200 miles from Archangel, where the Dvina and Vaga rivers join, another at Obozerskaya, southwest of Archangel on the rail line to Vologda. Once away from the river or railway, however, there was nothing but dense forest, and forced landing was never going to be safely achieved. He has several anecdotes about his misadventures, not least

*The RAF's HQ on the River Dvina was accommodated in this barge; note the lieutenant colonel's rank pennant.*[21]

the excursions into the forest to collect bits of crashed aircraft to make up for that lack of spares, so vigorously asked for by Gen Poole. On two occasions this meant also bringing back the body of a dead pilot. He writes:

> 'On the Obozerskaya front, I led a party into the forest some 20 miles behind the Bolshevik lines to find the crash of a DH4 and recover the body of Prince Svetchnikov. On crash landing after engine failure he had been so gravely injured that he begged the observer to shoot him and put him out of his misery. The observer, a Canadian, could not do it. He thought that if he made his way to the railway he might find some means of reaching our HQ quickly enough to get assistance and rescue the pilot in time. [*The Canadian finds the railway and an engine going to Obozerskaya; the rescue party uses the engine to return to the area, carrying stretcher, axes and tools; hours of hard going through the snow; etc.*] Prince Svetchnikov had, of course, been dead for many hours, frozen stiff in the pilot's seat, his arm still outstretched with his hand clutching the controls. We had to chop away the cockpit to recover his body. [*Return journey through the deep snow, with the frozen body on a stretcher, still sitting bolt upright. Back to the railway at four the following morning and back to base.*] Then followed the customary three or four days' mourning by the Russian pilots,

*HMS* Step Dance, *a 265-ton tug, commissioned into the RN as a shallow-draft minesweeper, on the Dvina with a Short 184 on a lighter lashed to her side.*

after the elaborate funeral.'

Van der Spuy's own moment of truth came in April 1919 (and Chapter 10 of his memoir tells the story perfectly – just not the space here) when he had an engine failure in his Camel, flying out of Bereznik. He got down safely, but was captured by Bolshevik troops. He was no doubt anxious, given the threat well spread by the Bolsheviks (and referred to in the Southern Russia article in Journal 60) of crucifixion of captured pilots. In his case, he was well handled, but forced into a long march to Vologda and eventual imprisonment in Moscow, from where he was only repatriated in late 1920.

But that might uncharitably be termed the loneliness of command. What were the others doing? One excellent record is the published diary of another British born aviator, who had – like Maund – been in Canada at the outbreak of war, enlisted in the infantry, come to England and on to France, been wounded in 1917 and, whilst convalescing back in England, transferred to the RFC.[22] His training, as an observer, and personal life are thoroughly recorded, with time at depots in Hastings and Reading before flying training in Kent, at Hythe (near Dymchurch) and New Romney for air gunnery, then Blackpool and Winchester for other elements. Next came preliminary information – on 5 September 1918 – that he and five other Canadians were to be 'on a special assignment most likely in Russia', and that they were to report to Blandford in 48 hours' time. Suitably kitted, they left for Dundee and got on the same ship that would carry General Ironside and the new CO, Van der Spuy. As the ship eventually drew up alongside in Archangel on 30 October, Shrive

records that ‘although our base, when we disembark, will be in Bakharitza we understand we will be allowed to cross the river and look over the city. There are picture shows and an Officers’ Club there. Hope it has a good bar.’ [Aircrew priorities correctly noted.]

Shrive and his colleagues are briefed that there are no squadron numbers as in the RAF proper, but a simple arrangement of flights, with A Flight on the railway front and B Flight on the river front. Those of his colleagues who – like him – were trained as Corps observers will go to the RE8 flight for artillery cooperation. The DH4s were for long distance reconnaissance and bombing. For nearly four weeks there is very little activity around Archangel, and the crewing-up ritual takes place. Shrive will fly with an Englishman, Tyley, who had seen much action in Africa. There were several other Canadians as pilots, plus South Africans – including one of the flight commanders, Capt Albu, whose wealthy father had arranged for a suitably sized shipment of whisky for the gallant aircrew. It was vast! Accommodation was established in some permanent buildings in the town, then the group was moved to a train, where they stayed for ten days until it had to move, to deliver the personnel of the Railway Front to their airfield at Obozerskaya – where the DH4s of A Flight were to operate.

While the B Flight team make their final preparations, they have briefings from some Canadian Field Artillery officers, whose brigade is similarly split along the river and railway fronts. One very firm briefing point was that there were no good maps, just pen and ink sketches which lack in accuracy and durability. On 29 October the contingent leaves by barge, on tow from an ancient tug, and heads south up the Dvina. With groundings, attacks from shore, towline breaks, etc, the 200 or so mile journey took almost eight days. The RE8s were to fly to the airfield at Bereznik, but of the first three, only two arrived. They were being flown solo to allow use of the back seat for extra supplies. The pilot of the missing aircraft, Lt Grant, came down safely and a search party brought him back after three days of considerable discomfort. Once again, a second priority was to salvage as many bits as possible, given the poor spares situation.

Other RE8s arrive and Shrive has his first flight over the lines on 6 November: target for their 20lb Cooper bombs was the town of Kotlas, but low cloud forced them to turn back and the bombs were


*D6792, one of the RE8s flown from Bereznik.*

dropped on some river barges. The daylight is now limited to very few hours each day, but that was not the only operational difficulty. Their Bereznik airfield had been cut out of the forest and had only one strip, very short, and thus tricky when the wind was wrong. Shrive's next trip, with Tyley, was on 11 November, but it went badly. The armourers had loaded four Cooper bombs on each side's wing rack, but also a 200 lb bomb on the undercarriage rack.[23] With four full gun ammunition drums, there was a heavy load to get off the ground, and the take-off was longer than ideal and when only a couple of feet into the air the undercarriage hit a tree stump. Wing centre section stays had parted and Tyley urged immediate dropping of the bombs since they had also lost a wheel. Shrive tried to jettison the left wing bombs but the cable jammed. He got rid of the starboard side, three of the bombs landing in the scrub but the fourth falling in the HQ yard causing a panic, and the opening of machine gun fire at a supposed enemy intruder!

With his stay wires adrift, Tyley could only risk a very flat turn to get back to the airfield but that brought them over the river and gave a chance to dump the 200 lb bomb. When it hit the water a couple of hundred feet below the machine it lifted them up a good fifty feet, and woke up the local inhabitants. The final approach was slow and flat and there were still four hung-up bombs on one side and only half an undercarriage. The landing was inelegant and the nose-over broke the propeller. Shrive's gun broke free from the Scarff mounting and hit him hard in the back. The bomb safety devices did their job, but the

airframe was in bad shape. Nevertheless, the mechanics said they would have it serviceable again – if they had the spares.

Flight Commander Albu got the flight together after this mishap and gave them the news of that day's Armistice. Good news, he said: the war is over. Bad news: no effect on the North Russian expedition, and thus operations would continue UFN. Two days later a crew – Canadian Lts Moffoot and Gordon – failed to return from a reconnaissance sortie over Kotlas. Frost-bitten but otherwise healthy (and whole) they re-appeared on foot four days later.[24] By then, as Shrive records, they have been joined at Bereznik by some of the Russians, including Kozakov, bringing with them their Sopwith 1½ Strutters. 'This will ease our work' notes Shrive 'as we had only 6 RE8s to start with, and now have lost two, with another being repaired.' He then has a pilot change when Tyley is moved to HQ as adjutant. Shrive's new pilot is a Lt Green and their first trip was nearly their last. Phase 1 was simple: eight Cooper bombs for a single structure in a village 15 miles behind the Bolshevik front line. 'House with blue roof', said the brief. But the extra overnight snow meant all roofs were white, so the bombs were – as before – dropped on likely-looking barges on the river nearby. Phase 2 was dropping propaganda leaflets, multi-lingually announcing the Armistice and promising warmth and good food for all those who would leave Bolshevik forces and join the Allies. A big bunch of the leaflets got caught in the rudder wires and the rudder jammed hard-over forcing the aircraft to fly in steady (but not ever-decreasing) circles. The only solution was for Shrive to crawl down inside the tail section and, once far enough back, punch a hole in the fabric and pull out the offending bits of paper. Job done, he found the return crawl terrifying as he risked going out through the bottom fabric.

Flight Commander Albu departed for some R&R in Archangel on 17 November and was replaced by a Major Moller, American-born, sporting an MC for actions in France in 1916, and later to be awarded a DFC for his North Russia exploits.[25] The flying rate continued to drop as the weather deteriorates: Shrive records a maximum of two flights each in three weeks for his colleagues. They are kept well occupied, however, in manning the defensive blockhouses that ringed the airstrip, and patrolling the area on foot. Christmas came and went, accompanied by the mail that was now arriving regularly.[26] An ice-


*Ira Jones in the front cockpit of DH9A, E8765; this aeroplane was among those recovered to see further service with the RAF at home. The bomb in the foreground is a 112 lb.*

breaker came across the White Sea from Murmansk to Archangel once a week, and one of the serviceable RE8s was used to move mail from there to Bereznik and back. x

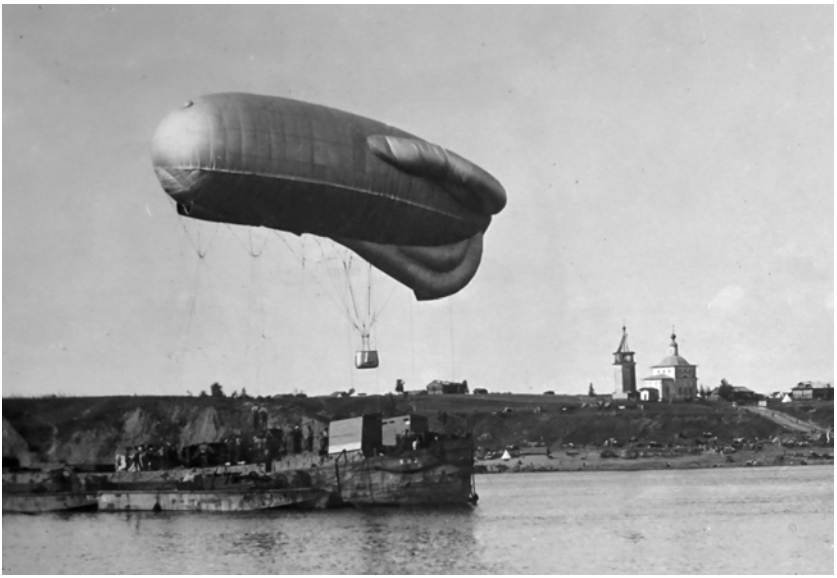
1919 opened thus for the Allies in Russia. The winter was harsh. The 'mission creep' was now causing concern to Governments and by spring it was clear there would have to be a rescue mission to cover the return of troops and equipment. Thus the call for volunteers for a North Russia Relief Force was recorded in *The Times* of 10 April 1919. It was this poster that caught the eye of another man of action who was wondering what to do after his war had ended in November: Ira Jones. I will use elements of his memoir[27] to illustrate the way in which air operations continued until final withdrawal in late 1919. He was to operate over the river and railway fronts of the Archangel sector, the original 'Elope' area. The diary of another aviator will be drawn on, that of Guy Blampied, who spent summer and autumn 1919 in a seaplane unit working the various zones in the Murmansk sector, the Syren area.[28]

First, Jones, who had been kicking his heels around London after November 1918, having brought his beloved 74 Squadron back from France. Once that April 1919 poster went up, he saw an opportunity to

get back into the air. Many of his contemporaries felt the same way and thus some fairly seasoned aviators arrived in Archangel on 21 June. Once there, they re-acquainted themselves with old friends from earlier service and settled into the routine. By this time the long-awaited reinforcement and the DH9s and 9As had arrived. Shrive, and most of his Canadian colleagues, were on their way home by late June. Van der Spuy having been captured, the RAF commander was now a Lt Col Robin Grey[29] – for whom Jones has little regard, since he had little if any operational experience.

Jones has his first flight on 28 June. Grey – to Jones' obvious distaste – insists that he takes a pilot in the back seat of his DH9A to advise on handling. Jones had noted the small size of the airstrip, much shorter than any he had been used to in France, and reflected that he had never flown a DH9A before. A Canadian – Lt Bulsh – accepts the challenge and no doubt had second thoughts when Jones over-ran the landing strip and went up on his nose. His next trip, two days later, a delivery flight from Archangel to Bereznik, ended the same way. His Flight Commander was relaxed about the damage and Jones reflected that 'senior officers who get annoyed with a pilot who crashes display their ignorance of psychology […] to scold the unfortunate pilot will decrease the confidence he has in himself.' He also confessed that the reason for his frequent crashes was that 'I was never taught properly how to land […] and I just simply cannot get into the right way even with persistent practice.' He continued to cause such distress, but lived to tell the tale. Unlike the unfortunate Lt Charles Knight who was brought down by ground fire with his observer, Lt Neil, on 21 June, during an attack on enemy positions at Topsa. Knight was seriously wounded and although Neil tried to get him out of the cockpit, as Bolshevik troops approached, Knight told him to save himself, since he was 'done for'. Later that day, as British troops advanced, his body was found and buried in a makeshift cemetery at Topsa.[30]

By now the 'RAF River Force', equipped with seaplanes (Short 184 and Fairey IIIC), was operational over the same areas of the battlefield, under command of Lt Col Lancelot Tomkinson RAF.[31] He was reporting on operations up the chain of command – to Captain E Altham, Senior Naval Officer Dvina Force (see Note 11), who reported in turn to Rear Admiral White Sea (John Green). As with the



*No 51 Balloon Section's barge-based observation balloon on the Dvina.*

landplanes, the seaplanes flew reconnaissance and bombing sorties. During the period 11 June to 10 July they accumulated some 170 hours. There could have been more, but the aircraft strength report for that period had 3 Fairey IIIC serviceable, 3 under repair, 4 'fitting out', and 2 'casualties'; the Shorts were 2, 2, 1 and 1 in those categories. The unit was based on its own complex of river barges, with a rear base HQ aboard the seaplane carrier HMS *Pegasus*, three flights in the barges, and a further barge-borne section: No 51 Balloon Section, under command of Capt M Hunter RAF until replaced by Lt V de Savigny RAF.

All units maintained their tempo during July and August, in support of ground operations and those of the gunboats and other river craft, who were encountering fierce activity from the Bolsheviks. This was exacerbated by a mutiny in one of the Russian units, with British officers murdered. Mutineers were subsequently executed by other Russians from the battalion, and buried in a grave they had dug for themselves earlier. Losses continued from accidents and combat damage. Among the seaplanes, on 14 July, Lts Marshall and


*Left – Maj Alexander Kozakov (sometimes Kazakov) DSO MC DFC RAF had been the most successful Russian ace of the Great War (with about 20 victories – sources vary). Right – the wreckage of the Snipe in which he died on 3 August 1919 – possibly an act of suicide.*

Lansdowne were brought down on a river sandbank, and although attempting escape by swimming across the river they were captured and held in Moscow until 1920. On 15 July Lt Boyd's observer, Lt Prowse, was seriously wounded. On 21 July Lt Rankin crashed into an ammunition barge as he attempted take-off; he was shaken but otherwise unhurt, but his observer, Lt Gondre, was thrown out and killed. Most sadness, however, met the death of Russian ace Kozakov, in early August. He spun in straight after take-off in his Snipe (E6350), and the word went round that he had done it deliberately as it became clear that the Allies were now preparing to withdraw. He could expect no mercy from the Bolsheviks once his friends had left. His funeral surpassed all those seen previously by the air echelon.

Reflecting the uncertainty of the situation, HMS *Argus* had arrived in Archangel on 30 July, with a complement of reinforcements: officers and men plus 12 Short 184s.[32] The next day Gen Ironside was informed that Gen Lord Rawlinson was coming out immediately and, as Commander-in-Chief North Russia, would direct the evacuation of all Allied forces. Activity continued as normal, however, and Lt Col Tomkinson's periodic report for 16 August to 20 September recorded close on 300 hours flown, with 23,500 rounds fired and 5 tons of bombs dropped.[33] The kite balloon had logged 123 operational airborne hours. Losses continued, however, and on 20 August Lt

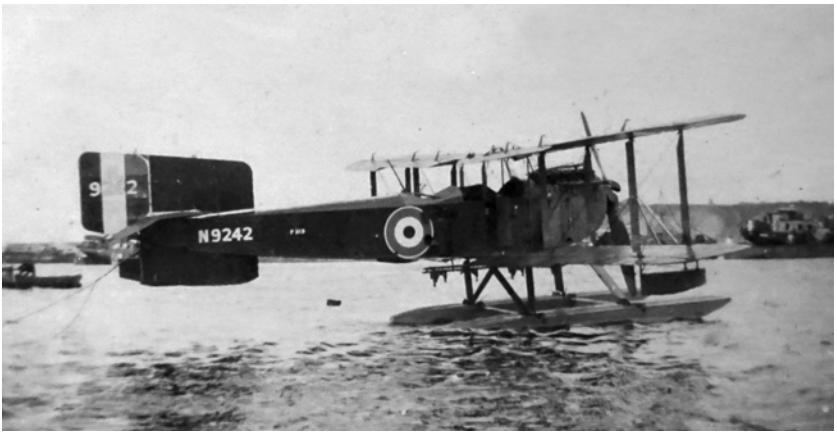
Claude Lemoine took Short 184 serial N9090 up for air test. Aeroplane fitter Flight Sergeant Quantrell was along for the ride. After 20 minutes the aircraft was seen to enter a steep spiral turn, which developed into an unrecovered spin. Lemoine was killed and Quantrell seriously injured.

Along the river, there was another tragedy when the gunboat HMS *Glowworm* was virtually destroyed when its skipper tried to douse the flames on an ammunition barge alongside that had caught fire (thanks to Russian sailors' negligence). Some of the RAF contingent at the Bereznik airfield had been on board for dinner, and RAF and Navy men were killed in the huge explosion that shattered the vessel, killing 28 of the 32 still on board. Among them was the Lt MacDougall who had volunteered to remain behind after the initial *Nairana* attack in August 1918.

Another incident had a happier outcome. A standard armed reconnaissance sortie was undertaken by Lts Moscrip and Bowen. They were attacked by a Bolshevik Nieuport, and his shooting was good, seriously wounding Moscrip in the left arm and shoulder and shattering his elbow. Bowen was also wounded in the right arm, but – as Moscrip fainted from loss of blood – he managed to lean over across the considerable distance between the seats and fly the aircraft back to base. Moscrip recovered sufficiently to land the aircraft. Bowen received a Bar to his DFC for this effort.[34] But that 20 September report by Tomkinson concluded '22 September: Personnel of both flights with HQ staff were posted to HMS *Pegasus* and the Dvina River Expedition ended for 1919.'

The final sailing of Allied forces from Archangel was on 27 September, and operations were similarly drawing to a close in the Murmansk sector. Their pattern, and the intensity of combat on ground and at sea as well as in the air, resembled in every respect the experience around Archangel. Similar, too, was the effect of climate on the air equipment. At the helm for most of the 'Syren' air activity, through to completion in September 1919, was Maj/Temp Lt Col Reginald Bone.[35] Highlights from his various reports to higher authority give a sense of all his operational and environmental challenges.[36]

As elsewhere, the lack of decent mapping is highlighted (for operators and the staff). Covering minute to his 20 August 1919 report




*A Fairey IIIC, N9242, on the Dvina.*

stresses that the attached photographs and map for the area Povyenetz to Petrozavodsk must be forwarded with the report. 'Without this map operations can convey but little to the Air Operational Staff.' Bone describes his arrival and first meeting with Gen Maynard, well forward at Maselga, who tells him to get down to the preferred (and only recently captured) advanced bases at Medveyja Gora and Lumbushi – for seaplanes and landplanes respectively. He notes that the RE8s were difficult both to maintain and fly, and only when Camels arrived were landplanes in any real way effective. Accidents invariably occurred on the rough and poorly drained strip 'except when skilful and experienced pilots flew.' In the next sentence, however, he declares 'The pilots of the original Kem Flight were, with one exception, neither experienced nor skilful.' Even the skilled ones were adept at crashing the RE8, for 'even when light of armament there was insufficient space at Lumbushi for an error of judgment in landing or getting off.'

The 'getting off' was a challenge to the seaplane pilots, too. Lt Blampied got caught out by an onshore wind at 0100 hr on 30 June and gained insufficient height after take-off to avoid ground fire. The petrol tank was holed as was one radiator. There was sufficient fuel in the other tank but not enough cooling from the remaining radiator, and down came the Fairey, N9235, to 'land on the trees'. He and his observer, Lt Harvey, were unhurt and they walked out of the forest,

hitched a horse and cart ride and were back at base by 1200 hr. They had been tasked for a recce to confirm damage to a key rail section, very effectively bombed by Lts Haines and Eades late on the evening of 29 June. They had spotted a train heading south near Kapaselga and contrived to lay down a 230 lb bomb – from a height of 70 feet – ahead of the engine, and with a 2½ second-delay fuse the explosion wrecked the train and left the remains in a large crater.[37] Following this attack, the Russians stopped moving their trains – for artillery positioning – by day. Operations continued for the next three months, and also the training role, still endeavouring to bring on more Russian aircrew. But the withdrawal was always looming. By rail and ship, the various elements made their way to Murmansk and back home. Blampied and his colleagues were back in Scotland on 12 October.[38]

**Notes:**

1 Gen Knox's memoir, *With the Russia Army 1914 – 1917* (London, Hutchinson, 1921), is chiefly drawn from his extensive diaries of – especially – the 1917 upheaval. Post-war he served as Conservative MP for Wycombe, 1924-45.

2 This despatch was dated 29 April 1920, and was published in *London Gazette* No 31970, dated 6 July 1920.

3 English by birth, but in Canada at the outbreak of war, Maund enlisted in the Canadian infantry. Having arrived in Europe, he transferred to the RFC, qualified as a Flying Officer (Observer) and was with No 7 Sqn in September 1916. He went to Russia in June 1917. See also Note 7 to the Journal 60 article, at page 107.

4 This is in a War Cabinet note re 'British Occupation of Murmansk' (TNA CAB 24/47/102) and the key limiting element of his proposal was that 'Great Britain will hold the Port of Murmansk to safeguard the sea route to Archangel against Germany and definitely guarantees not to hold same after the conclusion of the present war, and hand same back to Russia so long as law and order is restored there.'

5 The General had arrived in theatre in May 1918, after having previously (until March 1917) been in Russia as the head of the British Aviation and Artillery Mission, managing the supply to Russia of those elements of military equipment. As seen later, he deployed to Archangel in early August 1918. This despatch was sent to the War Office, for the Secretary of State for War (Lord Milner) on 5 October 1918.

6 TNA WO 32/5703, 'Report on Operations in North Russia'.

7 Lord Milner was replaced by Winston Churchill in January 1919.

8 *London Gazette* edition No 31850, dated 06 April 1920.

9 The *Olympia* was a warship with some history and is still preserved. A cruiser, first commissioned in 1895, and with service in the Spanish-American War in 1898, its final duty – before decommissioning in 1922 – was to carry back from Europe the remains of the USA's 'unknown soldier'. The vessel remains in an historic dockyard in Philadelphia, but – like so many museum artefacts – it is the subject of earnest fund-raising to keep it whole.

[10] Maynard, Major General Sir C; *The Murmansk Venture* (London, Hodder & Stoughton, 1928). His memoir is rightly concentrated on operational matters, and his political appreciation of Russian affairs may be thought contentious.

[11] Altham, Captain E; 'The Dwina [*sic*] Campaign' in *Journal of the RUSI*, Vol 68 (1923) pp 228-253).

[12] Kinvig, Clifford; *Churchill's Crusade* (London, Hambledon Continuum, 2006). Chapters 2 and 3 cover the build-up to and the opening of operations in Archangel, with helpful footnoting to the memoirs of Robert Bruce Lockhart.

[13] One of the pilots was a Canadian, Captain Dugald MacDougall, who was moved across to join the RAF's Archangel team. His DFC, for the *Nairana* action, was gazetted on 1 January 1919, *London Gazette Supp* 31098. In June 1919 he volunteered to remain behind after the main party had returned to UK. He was killed on 28 August 1919, in an incident described later in this article.

[14] TNA AIR 2/86 has two linked sub-files: B3839 'Despatch of Personnel and Stores to 'Elope'' and B6742 'Reports of Operations of the Royal Air Force Detachments ('Elope') with the British North Russian Expeditionary Force'.

[15] Col C J M Thornhill was Poole's senior intelligence staff officer, and had previously been assistant military attaché on Maj Gen Knox's team in Petrograd.

[16] Gen Ironside – later Field Marshal Lord Ironside, ennobled as Baron of Archangel and of Ironside – produced his memoirs nearly 35 years later, as *Archangel 1918 – 1919* (London, Constable, 1953).

[17] Alexander Kozakov was the top scoring Imperial Russian Air Service fighter pilot. Details are in Shores, Christopher; *Air Aces* (Novato, CA, Presidio Press, 1983).

[18] A verst is a Russian distance measurement, equal to approx. two-thirds of a mile, or 1·0668 km

[19] Lt Col F H W Guard, originally of the Royal Hampshires, then the Scots Guards, had won a DSO for action in France in 1917. In the early stages of the action in Russia he was heading the 'A' Force (with Allied troops including American and French) on the Vologda Railway Front, operating from an armoured train HQ. Briefly invalided home he returned to Russia as GSO2 on Ironside's staff, and was appointed CMG in the 1 January 1919 *London Gazette* – a good day since it also saw an AFC for Frederick Sowrey and another CMG for Hugh Dowding. After post-war service with the controversial Auxiliary Division of the Royal Irish Constabulary, he transferred to the RAF with the rank of squadron leader, commanding armoured cars in Basra, also qualifying for his 'wings' on Bristol Fighters.

[20] Van der Spuy, Kenneth Reid; *Chasing the Wind* (Cape Town' Books of Africa, 1966). An extraordinary career, leading him to leadership of the SAAF. His Royal Aero Club Aviator's Certificate, No 803, was gained at CFS Upavon on 2 June 1914. He had seen action over France with No 2 Sqn before being sent to South West Africa to engage in air support for General Botha, later transferring for service in East Africa, before returning to England to take command of an RAF Training Group.

[21] Strictly speaking, and depending on the date, this pennant may actually have been that of a wing commander, as RAF ranks were introduced with the publication of Air Ministry Weekly Order 973 of 27 August 1919, although it may well have taken some time for this news to reach Bereznik.

[22] Shrive, Frank J [edited by Norman Shrive]; *The Diary of a PBO – Poor Bloody Observer* (Erin, Ontario, Boston Mills Press, 1981).

[23] Unless it was a locally acquired Russian weapon, what Shrive describes as a 'two hundred pounder' would probably have been a standard British 230 lb bomb. **Ed**

[24] Their escape and evasion, 'A fine example of courage and determination', won them a DFC each, recorded in *Supplement to London Gazette* 5 April 1919.

[25] *Supplement to London Gazette* 5 April 1919, noting his 'fine leadership, personal disregard of danger, and splendid example . . .'

[26] Mail arrangements, as always, were of great interest to the men far from home. A detailed review of arrangements specifically for Canadian servicemen in the 'Syren' and 'Elope' forces is in '*Maple Leaves'*, the Journal of the Canadian Philatelic Society of Great Britain, Summer 2001. It also contains a comprehensive listing of all Canadian airmen serving with the RAF in North Russia.

[27] Jones, Wing Commander Ira DSO MC DFC MM; *An Air Fighter's Scrap-Book* (Harmondsworth, Penguin Books, 1942).

[28] Blampied's diary forms the heart of Tomaselli, Phil; 'Faireys over Lake Onega – Air Operations with RAF Syren, Murmansk, 1919' in *Cross & Cockade International, Vol 28 No 3,* 1997). Tomaselli has also developed the article in Chapter 3 of *Air Force Lives* (Barnsley, Pen & Sword, 2013).

[29] Grey was an early aviator, with Royal Aero Club certificate No 563, gained on 16 July 1913 on a Bristol biplane of the Bristol School at Brooklands. He crossed to France with No 5 Sqn in August 1914 but on 5 October engine failure in an Avro 504 resulted in a forced landing on the wrong side of the lines and he spent the rest of the war in Germany. Hence the lack of airborne experience observed on by Jones.

[30] Most of those killed in North Russia were buried in make-shift local grave sites. Many of these original burials were lost in the post-Intervention period and the names of those so lost are recorded on the Memorial to the Missing in the Commonwealth War Graves Commission cemetery in Archangel.

[31] Royal Aero Club certificate No 804 – right next to Van der Spuy in the Aero Club album, shown then as Sub Lt RN, and like Van der Spuy he was tested on a Maurice Farman at CFS Upavon, 2 June 1914.

[32] *Argus* would return to these waters in 1941, delivering Hurricanes of No 151 Wing, whose pilots would be in action over these same areas, but this time as Allies of the Russian Government.

[33] Tomkinson's reports are all in TNA AIR/1/10/15/1/35, signed off as commanding RAF Dvina River Force.

[34] *London Gazette* 18 November 1919.

[35] Bone had qualified for his Royal Aero Club Certificate No 627 on 16 August 1913, on an 'EAC' biplane at the Eastbourne Aviation School. He had a 1916 DSO for forcing down a German seaplane over Deal, and had been on the original *Nairana* seaplane complement in August 1918.

[36] In TNA at AIR 1/9/15/1/33.

[37] DFCs for both in *London Gazette*, 18 November 1919.

[38] The complex evacuation of Allied troops and Russian civilians is reported in detail in the 45-page Government paper Cmd 818, 1920.

# MY FATHER'S 'PILOTS FLYING LOG BOOK' CRANWELL AND INDIA 1920-26

**AVM David Brook**

On his nineteenth birthday my father – W A D (Bill) Brook[1] – joined the RAF (Cadet) College, Cranwell. He was one of 56 hopefuls joining the College's No 1 Entry on 5 February 1920. Just before Christmas 1921, twenty-nine of them were commissioned. In his first year at the College, he flew 9 hours as an observer and in the second year 17 hours dual and 20 hours solo, all in Avro 504s.

Entries in his log book (carrying the reference 'Army Book 425' until 1925!) sound rather quaint: for example in the column headed Course comments like 'round aerodrome' and 'reconnaissance of Newark and Grantham'; in the Remarks column 'take-offs, landings, steep turns, loops, rolls', etc. and frequent weather observations 'low cloud, strong winds'. Quaint, we might think, but the depth of ex-World War I flying and flying instructional skills – on aircraft we would now find difficult to fly – should not be underestimated. Worthy of respect too, is the modest number of flying hours he was allowed before service on the Indian North-West frontier. By comparison, as a College Flight Cadet in 1954-56, I flew 155 hours dual and 91 hours solo – in Chipmunks, Provosts, Balliols and Vampires.

The aircraft at Cranwell in 1920-21 appear to have been reliable – just two 'broken pistons', one causing a forced landing with his instructor and the second a solo landing on Cranwell airfield.

## No 5 Sqn at Quetta

In May 1922 Plt Off Brook joined No 5 Sqn at Quetta, 370 miles south west of Peshawar. They flew the two-seat Bristol F2B and were in the RAF Group under the Commander-in-Chief, Army, India. Within a week he was introduced, flying as observer, to communication with the 92nd Punjabi Infantry using the Popham Panel. This enabled Army units to convey messages and requirements to overflying aircrew.[2]

The RAF role in India was to join with land forces in securing our historically troubled north-west frontier. Throughout the 19th century tribal wars along the frontier and incursions from Afghanistan – often

*Bristol Fighters of No 5 Sqn.*

Russian inspired – troubled Britain's Indian Empire. In 1893 the frontier between Afghanistan and 'British India' was agreed but it straddled mountainous territory – home to tribes who had little, if any, respect for British rule of law. Further, a parallel administrative border was established fifty miles into what became the British Indian North-West Frontier Province (NWFP), thus creating a zone some 450 miles from south to north comprising about 27,000 square miles of difficult mountainous territory which was home to over two million warrior tribes people. It was agreed that the tribes should be free from outside interference – free to live their lives as they always had. Such was not an easy recipe for law and order; turbulence, particularly in Waziristan, resulted in the establishment of permanent ground force garrisons like the one at Razmak, some 250 miles north-east of Quetta.

Before joining No 5 Sqn Brook had already flown twenty hours as pilot at the RAF India School, Ambala and, after some seven hours as observer or pilot in the squadron, he flew LAC Jones to Pishin (30 miles north of Quetta) and back at up to 9,000 feet. The aircraft were normally flown with both seats occupied but young pilots needed experience flying with other pilots before being allowed to fly high-value skilled ground crew! On the flight to/from Pishin the 'engine was inclined to overheat' – the purpose of the flight perhaps being for Jones to monitor this.

During his four months with 5 Squadron Brook flew 10 hours as pilot and 20 hours as observer. In preparation for the Army support role his flying included photography and plenty of Popham Panel and infantry co-operation sorties. There is one mention of 'wireless gear out of action' and also the release of a carrier pigeon 'which headed for home and has not arrived yet'! His final bombing practice was

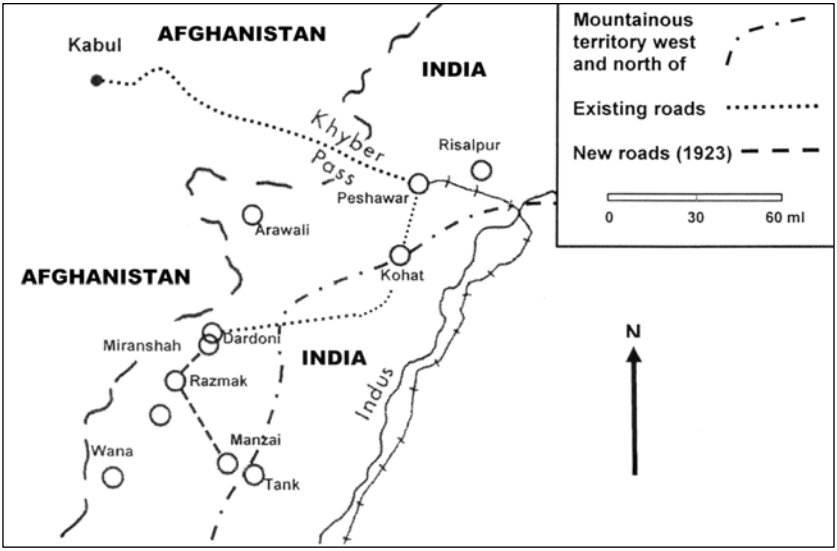
with his Squadron Commander – Sqn Ldr Maltby.[3] Then, after a two-month break, he was posted to No 27 Sqn at Risalpur.

**Shortage of Finance and Aircraft Spares for the RAF Role in India**

His 10 hours flown as pilot in the four summer months of 1922 is a stingy ration of flying hours for a newly arrived 'junior' pilot and this was undoubtedly because of the acute shortage of spare parts for the ex-WW I aircraft. Bombing raids plagued by aircraft unserviceability and – in addition, serious flying accidents – were the subject of heated debate in Westminster: the unacceptable situation for the RAF in India was forcefully drawn to the attention of Prime Minister Lloyd George.

The value of air force action to control rebel tribes would soon be amply demonstrated in the Middle East under the successful command of Air Vice-Marshal Sir John Salmond. But in the summer of 1922, before taking up his appointment in Iraq, he was detached to India to report on the RAF there. He emphasized to the Viceroy and senior Political and Indian Army Officers the RAF's potential for quick reaction effectiveness with fewer casualties than the Army had suffered and costing far less. As a result of Sir John Salmond's report, the RAF in India was reorganised, the rank of its commander was raised to air vice-marshal – on a par with senior Indian Army Officers – and improved budgetary arrangements were promised. There was, however, only a slow improvement in the supply of aircraft spares.

Early in 1922 important policy decisions were made: to garrison Razmak and to build a road through central Waziristan. This was to run north/south to connect with existing roads which ran eastwards from Dardoni in the north and eastwards from the Wana area in the south. The new road would be over 70 miles in length, not only traversing difficult mountainous territory, but also running through the potentially hostile Tribal Zone established within 50 miles of the border with Afghanistan. Not surprisingly, one of the Pathan tribes objected strongly and on 12 December 1922 the army officer supervising the road building was murdered. There followed 13 weeks of bombing/machine gun sorties and soon after joining No 27 Sqn Brook flew, on 17 December, his first operational sortie as observer on a bombing raid to the south-south-west of Fort Dardoni, where the squadron deployed from Risalpur at the end of November.




*The North-West Frontier Province of 'British India'.*

**Pilot Officer Brook's First Six Months in No 27 Sqn**

First, however, he had to convert to the DH9A, the 'Ninak', which had entered service with No 27 Sqn in the last year of WW I. It had a single 400 hp engine, could deliver a bomb load of almost 600 lb and could have a pilot-operated forward-firing Vickers machine gun plus a Lewis gun for the observer mounted on a Scarff ring which enabled him to aim and fire by swivelling, raising or lowering the gun as required. Depending on atmospheric temperature and the elevation of departure airfield, a DH9A climbed at 5-600 feet per minute with a full war load. Brook's log book has frequent entries testing this. His first three 'dual instruction' sorties in the Ninak at Risalpur on 6, 7 and 8 November, were with his Flight Commander, Flt Lt Houghton. They then swapped seats and Brook recorded 'two landings, first one extremely bad'! He then flew training sorties at Risalpur before his first nine operational sorties flown from Fort Dardoni in December 1922. On these he flew as observer against tribal villages some 60 to 70 miles south-south-west of Dardoni at a recorded height of 8,000 feet carrying four 112 lb bombs. Two or three of the bombs were recorded on each sortie as 'OK in village, one on house.' On 18 December, flying with Flt Lt Houghton, and after dropping their four


*The DH9A squadrons usually had at least one dual-control machine; this one, E8673 was on charge to No 27 Sqn in 1924.*

bombs, he recorded 'oil system gave out, forced landing at Saidji, engine seized.' Then on 28 December he recorded, during a raid: 'Turner hit by bomb from above, plane knocked off, machine spun into village.' Sadly Fg Off Turner and his observer were killed.[4]

On 4 and 5 January 1923, Brook flew as observer with Plt Off Hayter-Hames. On 4 January the log book records an unusually heavy bomb load of one 112 lb and two 230 lb bombs – dropping 'two OK's' in the Waspas Kalai area. On 5 January they flew due south of Dardoni on a 3-hour sortie – twice the normal length – 'patrolling Jelal Isel country, carrying four 112 lb bombs, dropped 2 on Junction Village and 2 on Pelose.' With his Flight Commander, Brook then flew two more bombing sorties on Larli Khel, south-west of Dardoni, and after a short dual instruction sortie he flew solo to Saidji, 'landing rather fast' on the return to Dardoni, then to Razmak and back in formation shortly before Razmak was garrisoned on 23 January 1923. Plt Off Brook's work up to operational status was completed with five bombing sorties as observer, a local dual sortie with his Flight Commander, a short solo 'Test Flight' and a solo flight, lasting 1 hr 30 min, due south to Jelal Khel, dropping two bombs on Junction Village. He then teamed up with LAC Murphy and they flew three bombing sorties on villages to the south of Dardoni, dropping four 112 lb bombs on houses, starting fires with incendiaries and they 'shot up

cattle '. On the last of these sorties the log book records 'crashed on landing'. A week later his Flight Commander took him for a short test flight in the same aircraft (DH9A E8500), which Brook then tested in flights with LACs Murphy, Wright and Ellis – its 'engine [*was*] still cutting out' (possibly relevant to the crash on landing) then 'slight improvement, two new carburettors fitted'.

Between 18 February and 11 March 1923 Brook and Murphy, flew E8500 on eleven bombing sorties, each now lasting up to 2 hr 40min, heading south to Wana Plain, Shakai and Ahmadwan. They dropped 230 lb, 112 lb and 20 lb bombs on villages, caves and cattle; they also shot 400 rounds at cattle and 'observed casualties'. Their DH9A got a new engine which Brook tested with LAC Wright on 8 March. Unfortunately E8500 with its new engine lasted only a further four days because, on 12 March, Brook and Murphy took off with two 112 lb and one 230 lb bombs, two of which hit houses in Sperkai. But the log book then records 'Engine cut out, crashed in river bed, captured by Waziris, machine burnt by Waziris.'

Bill Brook was close to his sister and she later wrote as follows:

> 'In those days our Sappers were building a road in the Wana area and resentful mountain Tribes were always sniping at, and killing, the chaps working with picks and shovels directly below. Warning messages in their own dialects were repeatedly sent to the Head Men of the little villages explaining that, if this sniping did not cease, punitive measures would be taken. These warnings were ignored and Sappers continued to be killed and wounded.
>
> Air attack was therefore required to deal with the offending tribes: simple on paper but suicidal! The sides of the ravines sheltering the villages were towering and vertical. Expert native marksmen had only to observe the approaching slow-moving biplanes below them with the pilots and observers in open cockpits intent on their targets. When they came within range, as the terrain forced them to do, hitting the aeroplane – if not the occupants – must have been 'money for jam'.
>
> On the fateful sortie, after destroying all but one of the huts in his allotted area, he had to make a crash landing near the middle of the hornets' nest! He and Murphy climbed out of the


*One of No 27 Sqn's 'Ninaks' over typical NWFP terrain; Fg Off Bill Brooks flew this particular aircraft twice in January 1926.*

crippled machine into the melee of the naturally infuriated natives. The occupants of the one remaining hut got to them first, pushed them inside and barred the door while a conference went on about what to do with them. Meanwhile the homeless people set fire to the aeroplane and clamoured for the prisoners.

For hours a sort of siege went on while Bill, making use of his study of native dialects, tried to convince his hosts that, with a chit provided by him, a runner to Wana Military Outpost would bring back the promise of a ransom if the prisoners were returned unharmed. He said he had felt fairly certain that his plan would work, in spite of the mob outside yelling for revenge. But then the hut door opened admitting the rays of the setting sun and the sinister form of a man wearing a black puggaree headdress – exactly Bill's childhood nightmare bogeyman from his nursery picture book! Until then he had felt reasonably optimistic – but now his blood ran cold . . . castration or worse!

However, the outcome of the argument resulted in a runner being sent to the Wana Military Outpost. At the end of an interminable wait the men returned with the promise of a ransom for safe conduct. Accordingly, with the prisoners

> disguised in the robes of unknown females, the party slipped into the night unseen by the muttering groups outside the main door. After a tough journey in the dark they duly arrived at Wana Fort where the negotiations for the ransom ensued. During these, Bill spotted the lovely hilt of a dagger protruding from the cloak of one of his escorts and, as the party returned complete with ransom, he removed the dagger explaining to the owner that he needed – and had earned – 'a keep sake'.

On the following day – 13 March – Flt Lt George picked up Brook and Murphy in a DH10 and flew them from Wana back to Dardoni. Within four days the Brook/Murphy team was back in business. On 17 March they bombed villages and cattle in Dana Valley (Wana Plain area) with two 120 lb and one 230 lb bombs but the engine of DH9A H52 was 'cutting out badly'. Brook tested this on 26 March with AC Boggis and again on 28 March with Fg Off Broomfield. Then on 2 April the Brook/Murphy team flew H52 on four short bombing sorties on Garsi Algad. The central Waziristan road was finally completed in the autumn of 1923. On 19 April No 27 Sqn left Dardoni and redeployed to Risalpur, Brook and Murphy arriving after the other squadron aircraft because 'petrol trouble' caused them to make a forced landing at Dardoni.

There follows a three-and-a-half-month break in his log book by which time he had flown, in his first five months in No 27 Sqn, over 50 hours as pilot and 37 hours as observer. Operational necessity and the serviceability of the Ninak may account for a ration of flying much more generous than that in the summer of 1922 with No 5 Sqn. In letters home during the break from April to July 1923, he might have described his adventures to his parents and sister. Later he deposited the dagger in his mother's desk where it lay treasured for fifty years, until his sister moved from the family home in Wales.

**July 1923 to February 1925**

Brook returned to flying at the end of July 1923, promoted to flying officer. He might not have enjoyed the pay rise because the Air Officer Commanding was said to have noticed the size of the Officers Mess bar bills and cut pay accordingly! During the period August 1923 to February 1925 Brook recorded just a single operational bombing sortie, one pamphlet drop, one demonstration sortie and a


*Another DH9A (DC) that spent some time with No 27 Sqn.*

'political flight'.

Following the reorganisation of the RAF in India, No 2 Wing was established at Risalpur, including Nos 27 and 60 Sqns based there. Wg Cdr R C M Pink took command of the wing in November 1923 and his drive and energy demanded purposeful training – which paid handsome dividends in 1925, in 'Pink's War' (see below). One of his initiatives was to encourage the use of forward operating airstrips nearer to troublesome areas, thereby reducing transit time, increasing sortie rates and establishing emergency landing strips. Thus, on 27 February 1924 Fg Offs Brook and Colam were in a three-aircraft formation which landed at Mianwali and on 5 March at Kohat. On 15 April Brook and LAC Fearne returned to Dardoni from where a 27 Squadron detachment operated between 23 May and 3 June. Noted in the log book is 'practice bombing in 'Y' force formation – seven machines'. Then on 28 May, Brook and AC1 Bunyan took off with four 112 lb bombs which they 'dropped on Dre Algad targets in formation'. This campaign continued sporadically until October (see below). Four days after returning to Risalpur in 'Y' formation Brook landed away at Arawali, breaking 'tailplane coming in to land'. This took a day to repair before 'returning from Political flight' to Risalpur on 9 June.

Training initiatives included long distance flights between Risalpur and Quetta – some 400 miles at around 12,000 feet to remain clear of

high ground. Brook recorded on 29 June his frustrating '3 attempt to go to Quetta via Dardoni' – 'returned Risalpur, engine overheating.' Overheating is quite frequently mentioned during his time in the Indian NWFP, necessitating, for example, a forced landing at Lachi police post on 22 May. He had a break from flying between July and October, missing some operational reconnaissance and bombing sorties in South Waziristan by all the NWFP squadrons. There was uneasy peace by October but, temporarily based at Arawali, Brook took a Major Gompertz on a four hour 'Demonstration flight over Waziristan' on 1 December.

Bombing practice continued throughout the period July 1923 to February 1925 and there are several references to potential bomb aiming help with camera obscura. Early in 1925 the training became more structured and on 18 and 20 February the log book records 'Individual' and 'Formation' competitions – for the Ellington bombing Trophy (Air Vice-Marshal Sir Edward Ellington was by then Air Officer Commanding). There are also frequent references to gunnery practice using a 'camera gun (Observer practice)'. Between 1 and 3 October 1923, for instance, Brook had flown eight half-hour sorties at 500 feet on which five airmen had taken their 'Aerial Gunners Annual Test' on a 'Ground target one mile west of [*Risalpur*] Aerodrome'. In addition, on some sorties camera gun film was taken against a practice hostile aircraft.

Reconnaissance and photography feature on some sorties – of potential landing grounds, a water tower and one coupled with map reading in and around the Kohat area on 25 January 1924. Two days before, the log book records 'Practice photography 'P' type camera, six exposures' in the Attock area.[5] There were three Popham Panel Sorties in 1923, noted is 'one mistake' on 28 September 1923. Thereafter there is no record of Popham Panel work, possibly attributable to the development of wireless (radio) communication. In 1923 and 1924 he flew three 'wireless test' sorties, all 'OK'.

In 1923 Brook flew 91 hours as pilot and 19 hours as observer and in 1924, 121 hours as pilot and 9 hours 'dual' or as observer. There were three-month breaks in each of these years so the totals are, at least, an improvement on the hours flown with No 5 Sqn in 1922. Reliability of the DH9A was marred by broken tail skids, generator failure, engine overheating, petrol leakage, and carburettor and


*Wg Cdr Pink with one of No 27 Sqn's DH9As sporting the unit's green elephant emblem on its fin.*

airspeed indicator problems. On 4 January 1924 Brook and AC1 Ellis flew an 'altitude test with full war load – got up to 19,000 feet, petrol pressure gave out, compelled to descend.' He flew two similar sorties in November that year, the second with his friend Fg Off Hayter-Hames who, sadly, was shot down and killed three months later in 'Pink's War'.

**'Pink's War'**

The uneasy peace achieved in October 1924 was disrupted in the following January when the Abdur Rahman Khel tribe, plus supporters, raided the army Scout Posts at Gomal, Manzai and Spli Toi. These tribespeople had never accepted the settlement with the NWFP government and their raids were repeated during the first four months of 1925. The Air Officer Commanding calculated that the RAF was able to mount an effective campaign without the deployment of army reinforcements. In February 1925 Wg Cdr Pink was sent to Rawalpindi to agree a plan with the Indian Army's Northern Command; dissident villages and caves were to be bombed, patrols were to be flown at irregular intervals to deter raiding and bombing by night was to introduce 'round the clock' pressure on the rebels.

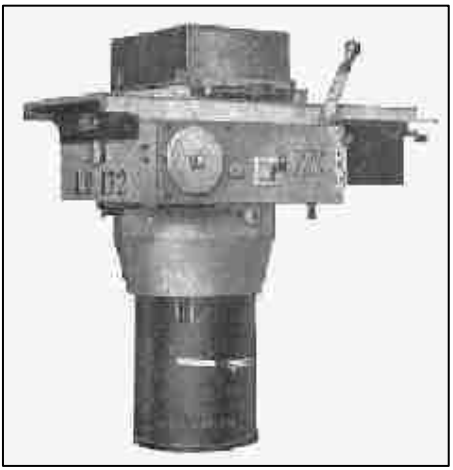
Pamphlets were dropped warning the dissident tribes of air attack unless the raids stopped. On 3 March Nos 27 and 60 Sqns each deployed eight aircraft to Fort Miranshah, which replaced Fort Dardoni as a forward operating base. From Miranshah on 7 March Brook flew as observer with his Flight Commander on 'reconnaissance of targets in the areas around Razmak, Dre Algad and Spli Toi'. Wg Cdr Pink had set up his operational Headquarters at Fort Tank from where Nos 5, 20 and 31 Sqns operated. Concentrating against the Abdur Rahman Khel tribes, the targets were plotted and numbered on a large map and were allotted respectively to the Miranshah and Tank squadrons.

Between 7 March and 9 April Brook flew twenty bombing sorties, mostly as pilot, on target Nos 5, 8, 12, 15, 17, 21, 22, 23 and 32 all in the Spli Toi/Dre Algad area. Two 230 lb bombs were carried on most of the sorties, dropped in 'salvo' on 1 and 4 April from Ninaks at 9,000feet. In addition one 20 lb bomb was usually carried and, on 7-9 April Brook and AC1 Millar dropped up to sixteen 20 lb and up to four 112 lb bombs 'on cattle [*in*] Dre area near [*target*] 17'. Seven of his twenty bombing sorties were flown with fellow officers and on 21 March he was observer with Fg Off Bradbury when they dropped bombs on 'Inzar Tangi' and, noted in the log book, is 'engine cutting out, (Hayter-Hames and Dashwood killed)' – the latter were shot down by tribesmen and crashed in flames, killing Hayter-Hames. Dashwood was badly burnt trying to rescue his pilot and, despite his enemy's extraordinarily chivalrous attempts to revive him, he died.[6] On 26 March, flying with AC1 Barley, Brook bombed target 21 and landed at Tank to attend Hayter-Hames' funeral. Brook's last three sorties in 'Pink's War' were on 7 and 9 April against cattle in the Dre Algad area, dropping up to sixteen 20 lb and four 112 lb bombs.

Later in April the rebel tribes sought relief from air attack and they finally agreed to the government's terms on 1 May 1925. Thus the first RAF 'air control' operation in India – independent of a conventional and expensive army campaign – proved successful. It was a signal achievement by the 'Junior Service' who were struggling for recognition and finance in the lean years after WW I.

**The Final Seven Months in India: June 1925 – January 1926**

After a two-month break Brook returned to flying – from



*The Type LB camera with, in this case, probably a 10½" lens cone.*

Peshawar, the squadron's temporary base until October 1925, when re-grassing at Risalpur was completed. His final seven months in India were in a relatively peaceful period but the prospect of hostility was never far away. For example, on 8 September 1925 he flew to Arawali, picked up a Captain Wilson for a 40 minute 'reconnaissance of hills north of Wachdana Post' and they 'sighted tribesmen who shot at machine'.

Flying training during the period included formation, bombing and gunnery practice and, on 27 and 28 November 1925, 'raids' on Akora which 'put 20 Squadron out of action' and 'raids on 60 Squadron […] and Risalpur in Squadron Formation'. The NWFP squadrons took advantage of the peaceful period to fly reconnaissance sorties, thereby improving the maps of their wild and mountainous region. Brook tested the 'LB' camera[7] on 8 July 1925 and used it in the Landi Kotal and Ali Musjid areas on 5, 14 and 18 September. On 11 November he was in a '3 machine' formation which flew 130 miles north of Risalpur at 11,500 feet over the mountains to Chitral and Kaldrosh where he 'dropped letters' and 'took camera – results fair'. Recorded in the log book were just two more wireless (radio) sorties before leaving India. There was a test flight on 24 August 1925 and the following day Brook and Sgt Taylor flew a 3-hour 'Demonstration flight over Tribal territory, carrying wireless'.

In his final two months in No 27 Sqn, Brook and AC1 Boggis flew the 1,330 miles from Risalpur to Calcutta in four stages – the longest being a 5-hour leg from Ambala to Cawnpore. They made a demonstration flight over Calcutta on Christmas day and returned to Risalpur via Delhi early in the New Year 1926. At the end of January Brook was posted to No 13 Sqn at Odiham having amassed by then a

total of 534 flying hours, none of them recorded as night flying.

**Afterword**

Tragically for us, his family – and for the RAF – my father was killed on 17 August 1953 flying a Meteor Mk IV at the end of a 'Jet Acquaint Course', before his posting to the Air Ministry as Vice-Chief of the Air Staff. He loved flying and was unhappy about taking up a senior appointment without personal experience of the brave new jet age.

I never heard him speak about his experience on the North West Fontier but this short study has left me deeply impressed at the courage, skill and endurance of the RAF people involved – pilots, ground crew/observers, administrators, depot engineers and those in command. They played a sterling part in retaining this (and other parts) of the British Empire, pending post WW II contraction. In India their challenges had included flying from and over remote and mountainous territory, operations against hostile tribes with their skilful marksmen, bad weather, extremes of temperature and shortage of spares and engineering back up. But they endured and succeeded – may they rest in peace!

**Notes:**

1 Later Air Vice-Marshal W A D Brook CB CBE.

2 For a description of the Popham Panel see Journal 54, p30. **Ed**

3 Later Air Vice-Marshal Sir Paul Maltby KCVO KBE DSO AFC.

4 Fg Off Edward Eric Turner and AC1 James Frederick Sly in E8468.

5 The P-series were lightweight hand-held cameras used for taking oblique 'tactical snapshots', as distinct from survey work or the creation of mosaics. **Ed**

6 Fg Off Noel Cecil Hayter-Hames and Fg Off Edward John Dashwood in E8792.

7 The LB camera of 1918 was derived from the Type L of 1917. It had a slightly improved mechanism but the major change was that it could accept interchangeable lenses of up to 20" focal length, double that of the Type L. **Ed**

## 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.**

**Truculent Tribes – Turbulent Skies. The RAF in the Near and Middle East 1919-1939** by Vic Flintham**.** Air Britain; 2015. Price £52.50.

The period of the RAF's history between the two World Wars is both fascinating and important. At a time when the RAF was fighting for its existence, much of the modest RAF front line in those days was stationed abroad. It was here, particularly in the regions we now call the Near and the Middle East, and which encompass areas of significant and on-going turmoil, that the RAF developed the method of so-called 'air control'.

At a time of austerity and when overseas areas were rarely given priority for equipment scales and supply, the RAF developed, over a period of twenty years, air and ground forces that worked in co-operation to quell disturbances throughout the region covered by this book. Furthermore, these 'small wars' and insurgencies provided unique and challenging opportunities for officers and men including future leaders such as Harris, Embry, Saundby, Coningham and others. The experience they gained was to prove invaluable in later years.

A few years ago, Vic Flintham, an experienced and highly regarded air historian, was able to obtain an invaluable and fascinating collection of photographs taken by an RAF airman. This provided a stimulus to research the area in more detail and this 304-page A4 hardback is the outcome.

In each of the fifteen chapters he traces the development of air power and its use, often in conjunction with RAF armoured car units. Whilst the title suggests the familiar areas of Iraq and Palestine, virtually every area other than the North-West Frontier of India is covered and this includes, Somaliland, South Russia, the little known Chanak crisis, Aden and the turmoil in Abyssinia. All receive the author's attention.

In a series of four very good appendices he discusses life in the Middle East, training, naval flying and hosting numerous pioneering

flights. It was good to see an author providing an insight into the living conditions and activities of service life in this harsh region when five-year tours were normal. With few home comforts and off-duty outlets, ingenuity flourished.

To cover almost twenty years of activity over this huge area is a significant task, and with so many wonderful photographs and their informative captions occupying a lot of space, it is no surprise that the author cannot dwell in great detail on any individual region and so the academic historical content gives way to a more narrative style.

This is a very handsome book, very well produced on high-quality paper, which provides a perfect medium for the superb photographs – more than 550 of them. There are numerous simple but very clear maps, which are a great help in orientating the reader and identifying many obscure places in this complex region.

A great deal of thought and care has gone into this book and into its layout. The result is a fascinating account of a unique part of the RAF's history. The price may deter some readers but it is a quality book and is recommended.

**Air Cdre Graham Pitchfork**

**Avro Manchester** by Robert Kirby. Fonthill; 2015. £50.00.

Only 200 Manchesters were built and their operational careers were short. Nevertheless, the type was important because, as the book's sub-title proclaims, it was *The Legend Behind the Lancaster*. Even so, while it was a relatively obscure aeroplane, the fact that there were so few of them makes it possible to record the history of the Manchester in fine detail. Robert Kirby first did this some twenty years ago in a lavishly illustrated, high quality, 208-page A4 hardback. Now long out of print, this had covered all aspects of the evolution of the design, including some contentious issues related to armament and the problematic Rolls-Royce Vulture. Rather oddly, this second edition, while including even more images, omits a diagram that illustrated the way in which the Manchester was broken down into components, making it particularly suited to dispersed production – surely a not inconsiderable legacy inherited by the Lancaster. The original book then went on to describe, in some detail, the operations flown by Manchesters, notable among these being the failed attempt to stop the German battlecruisers making their 'Channel dash' and the

aeroplane's swansong – its participation in the first and second 1,000 bomber raids. In many cases these events were amplified by the experiences of individual crews. The story was rounded off with an account of the aeroplane's involvement in various experimental programmes, not least catapult launching and arrested landings. There were a number of appendices providing: notes on each Manchester squadron (changes of COs and bases with dates, where known, and dates of first and last sorties flown); operational statistics, eg sorties despatched by each unit; losses incurred by unit; a 'league table' of pilots who flew ten or more Manchester sorties (top scorer was twenty-seven) and so on. Finally there were details of the careers of each airframe from delivery to eventual fate.

This second edition retains the original text, more or less intact, although there has been some minor wordsmithing along the lines of 'On the 15th 207 Squadron . . .' being re-expressed as 'On 15 May 207 Squadron . . .' (there are number of instances of this sort of refinement) and Me 110s have become Bf 110s. The author has clearly continued to exploit the dwindling community of Manchester 'old lags' and he has been able to include even more hands-on recollections of incidents. In some cases he has even been able to track down the participating *Luftwaffe* pilot, permitting him to present an account of an engagement from the opposition's point of view. A significant addition is a lengthy (32 pages) appendix that reproduces seven MI9 Interrogation Reports related to downed Manchester personnel who successfully evaded. Surprisingly, since the information is now readily accessible in published sources, the opportunity was not taken to correct and/or fill-in the several gaps in the appendix providing details of squadron COs and bases, eg OC 207 Sqn was Sqn Ldr Kydd (not Kidd) and No 50 Sqn was never commanded by a Wg Cdr Southwell.

So, to buy or not to buy? – that is, as ever, the question. Kirby's excellent original book said pretty much all there was to say about the ill-starred Manchester (and, personally, I preferred its larger pages, as they facilitated the reproduction of the many pictures). The second edition, another hardback on gloss paper, has a rather smaller format (10" × 7") but runs to no fewer than 509 pages. There is some new material and there are, perhaps forty, additional photographs, mostly of personnel rather than aeroplanes, but most of the extra page-count

is a result of the font being presented in a larger point size and more generous spacing of tables and lists. If you need a book on the Manchester, this one is certainly to be recommended, but if you already have the first edition, you would need to be a real enthusiast to consider investing £50 for what the second edition adds.
**CGJ**

**Tornado over the Tigris – Recollections of a Fast Jet Pilot by** Michael Napier**.** Pen & Sword; 2015. £25.00.

Following his recent, probably fruitless, attempts to further my education by his choice of improving titles for me to review, the Editor has rewarded my diligence by offering me Michael Napier's splendid account of life as a front line pilot in the last years of the Cold War and its immediate aftermath. *Tornado over the Tigris* is a spirited account of his experiences, written with a passion for his subject and with some very revealing marginal asides about our Service and its ways. It covers a period of about ten years from the mid-1980s and follows the author's path through training to the Brüggen Wing on which he served three tours, first on 14 Squadron, then back-to-back on 31 Squadron and later as a Flight Commander, again on 14 Squadron, after a hugely enjoyable interlude on the staff at Chivenor as a Tactical Weapons Unit instructor.

Mike Napier paints a clear picture of the pace of squadron life in RAF Germany – and at Chivenor – in the 1980s and early '90s and of the very high standards demanded and achieved. Much of the picture depends on his vivid reconstruction of sorties long since flown. In so doing, he is admirably frank about his own early difficulties in the air. He is modest about his later success and forthright about occasional failures. That he so clearly overcame these is to be seen in the verdict of Air Marshal Greg Bagwell's Foreword to the book, in which he wrote that the author was 'much more than just a great pilot and operator'.

The path to the Tornado front line in 1985 was not always an easy one and Napier makes reference to sometimes harsh and even arbitrary attitudes experienced in the RAF's training machine. He is not the first to contrast the more relaxed learning atmosphere of the tri-national TTTE at Cottesmore with that of the weapons training TWCU at Honington where 'the staff were quick to remind us that we

were back in the RAF and that we should therefore expect the usual harsh treatment'!

Much of this book reminds the reader of the concert pitch which the squadrons of RAFG attained in the days before the Berlin Wall fell; they trained intensively and played hard. As a picture of the Brüggen Wing at its peak, it cannot be faulted. For Mike Napier, his return to Brüggen in 1992 was marked by feelings of anti-climax and regret at the loss of edge that appeared to him to have resulted, following the end of the Cold War: 'Brüggen had lost its strong sense of purpose' and training had become pedestrian. However, the final chapter of Napier's book, *Doing it for Real*, perfectly illustrates the legacy of the earlier years.

Operation JURAL was the codename for operations to establish a No Fly Zone over southern Iraq and Mike Napier describes No 14 Sqn's participation in 1992, conveying the complexity, realities and pressures of coalition operations in a hostile environment. He describes how the latter included unwelcome micro-management from above, something experienced by others elsewhere! His description of a successful attack on 13 January 1993 on the air defence centre at Al Amarah, in a package involving USN and USAF aircraft – about 100 in all – perfectly illustrates the capability of Tornado and the demands placed on its crews. That these demands were exacerbated by decisions imposed to fly as scratch teams does not escape comment.

Mike Napier's 288-page book, with its 93 b/w plates, is very well written and provides a vivid impression of the processes by which a young pilot matured into a respected operator. He writes freely and honestly and offers a compelling picture of a significant decade in the operational history of our Service. A very enjoyable read.

**AVM Sandy Hunter**

**Wings of Empire** by Barry Renfrew. The History Press; 2015. £25.00.

Sub-titled, *The Forgotten wars of the Royal Air Force, 1919-1939*, this book covers ground to which the most convenient references have probably been David Omissi's *Air Power and Colonial Control* (1990) and Chaz Bowyer's *RAF Operations 1918-1938* (1988). Renfrew's *Wings of Empire* is a long overdue re-examination of the topic. The author has some thirty years' experience as a foreign

correspondent and this is evident both from the structure of this 288-page hardback (with an insert of about fifty well-chosen photographs), which is logically broken down into twenty-two easily-digested chapters, and the comfortable flow of his prose. That said, he is not 'an aviation person' *per se*, so there is some occasional unfamiliarity with personalities, eg references to Robert Goddard (which is technically correct, although he was usually known as Victor) and to Hugh Champion de Crespigny as H V C de Cresigny. There is another anomaly on p165 where, what is presented as a description of the Popham panel, is actually of a form of *panneau* signal.[1] But such anomalies are rare and these are only cited to prove that I did read every word.

One other word of caution. This is a book that focuses on policy and its implementation. It is not about 'squadrons'. Most do get a mention, but only in passing, and some not at all, so the index has no entry for such colonial stalwarts as Nos 14, 28 and 208 Sqns among others. But the nature of the narrative is such that is of no significance.

The account of offensive actions covers practically every interwar campaign fought in Somaliland, the Sudan, Aden, Palestine, Transjordan, Iraq and the NW Frontier of India. It begins in 1916 with a young John Slessor unseating the leader of a Dervish uprising in Darfur by killing his camel with a single well-aimed (or lucky) 20 lb bomb dropped from a BE2c. It ends with raids against the Fakir of Ipi in the late 1930s in the course of which several tons of bombs would be delivered at a time along with thousands of incendiaries and machine gun rounds. But the narrative is not confined to air operations and the activities of the RAF's armoured cars are well covered. Space is also devoted to descriptions of the, generally harsh, often isolated and invariably all-male living conditions, including the squalor of the troopships that transported drafts of RAF personnel to and from the Middle East.

The reader is kept adequately informed of evolving colonial policy and its impact on the conduct of air policing, along with some

[1] *Panneau* (or lathe or shutter) signalling often used a device called the British Shutter Panel. It was a substantial size, perhaps 6 feet tall, consisting of a *louvred* arrangement of moveable slats linked together, like a Venetian blind, that could be 'opened' or 'shut' to send Morse in a similar fashion to an Aldis lamp.

references to inter-Service rivalries. Another issue that is examined is the entrenched attitudes and opinions of sophisticated westerners that could make it difficult for them to understand the reactions of relatively primitive tribesmen with ingrained patterns of traditional behaviour. The attitudes of some imperial administrators were so paternalistic as to be, what would today be called, racist. But this was par for the course in an era that was closer to 19th century slavery than today's liberal society is to the 1920s – and we are not entirely free of racism even now.

What is impressive, and reassuring, is the extent to which this account is underpinned by references to primary sources. This is no recycling of what has gone before. Most of the tales reflecting the experiences and impressions of individuals (drawn from across the whole spectrum of ranks, the perceptions of the humble aircraftmen are heard as often as those of officers) have been extracted from personal papers deposited with the Imperial War Museum while hard facts and figures and descriptions of campaigns and specific actions are drawn from material held by The National Archives. That said, one or two of the latter have typos which would make them difficult to access, eg AIR1/2/15/1/01 doesn't work because the final element should have been 101. But, hey, who's counting?

The book ends with a short, but interesting, coda that considers: air policing in the post-war imperial twilight, notably in Aden; the way in which some post-colonial local administrations conducted air policing; and the way that it is still being done today to counter Islamic extremists in the (still) troubled Afghan-Pakistan border region and in Iraq and Syria. Despite the availability of advanced technology, including remotely piloted vehicles, today's air forces face similar challenges to those of the interwar years and they achieve equally mixed results.

Strongly recommended.

**CGJ**

**Striking The Hornets' Nest – Naval Aviation and the Origins of Strategic Bombing in World War 1** by Geoffrey L Rossano & Thomas Wildenberg. Annapolis: Naval Institute Press, 2015. $49.95 (£33.53 from Amazon).

This is an unusual book. Not because of the subject matter (the

development of US naval aviation on the Western Front) but because it is a story of failure. Failure to match strategic ambition with operational reality; failure to mobilise national resources to deliver military capability and failure to learn from operational experience. It is, nonetheless, an important book and one that demonstrates why logistics is the bedrock of modern warfare. It also demonstrates how much the Allied successes of 1918 were built on the investment in industrial, technical, scientific and logistic capabilities over the preceding years. Harnessing America's immense productive and economic power to create a war-winning military capability could not be achieved overnight, however much the planners in Washington might hope otherwise.

The title echoes Woodrow Wilson's phrase about striking the hornets' nest of German U-boat facilities along the Belgian coast. With America's entry into the war, the US Navy was keen to play a major operational role. So long as the German High Seas Fleet chose to remain in port, however, there was no ship-to-ship action on offer. On the other hand, German submarines continued to attack Allied shipping with some success. U-boats were elusive and anti-submarine techniques were still in their infancy. The US Navy planners proposed an intensive bombing campaign against the U-boat ports in Belgium that would not only demonstrate strategic relevance but also eliminate a major threat.

Unfortunately, none of this could be realised before the Armistice. Airfields were prepared, depots constructed and aircrew trained but the available aircraft (Caproni bombers) proved to be inadequate and unreliable. The planned large-scale US production of the Handley Page O/400 failed to materialise, although some British machines were obtained in exchange for Liberty aero-engines. The RFC and RAF provided significant support and advice, but the Northern Bombing Group could only carry out a handful of bombing raids before the retreating German armies meant that there were no facilities left to attack. A substantial number of Navy and Marine aviators did participate in the air war, but as members of RAF fighter and bomber squadrons.

The authors stress that the campaign was the first (planned) strategic air offensive. They also suggest that it shows that the senior leadership of the US Navy was not hostile to aviation. All of this may

be true, but it is also true that the US Navy saw an air campaign as the only way to play a part in the Allied victory. Given the arguments that erupted during the inter-war period with Brigadier-General Billy Mitchell, over the vulnerability of battleships to air attack, the creation of the US Navy's Northern Bombing Group was more about expediency than about conviction.

**AVM Peter Dye**

**The Quiet Australian** by Eric Grounds. Mereo Books, 2015. £12.99.

The author of this biography of Air Chief Marshal Sir Edmund 'Teddy' Hudleston has a significant interest to declare. His mother was a somewhat dissolute sister of Nan (later Lady Nancy) Hudleston who was quite unable to cope with a young child and at the age of five, he was rescued from his unfortunate circumstances and subsequently brought up by his aunt and uncle as a member of their immediate family, in effect, a son. While Grounds obviously owes the Hudlestons an immense debt, and he greatly admires his uncle's professional abilities, he is also able to acknowledge that he had his faults and that, in some respects, his personal life was less successful than his professional career.

Born in Australia in 1908, Hudleston came to England to enter Cranwell in 1927. On graduation he flew Grebes and Siskins with No 25 Sqn before becoming a QFI and returning to Cranwell to instruct. In 1932 he became an armament specialist and spent the next six years as such in the UK and India. In 1939 he joined the staff of the Turkish Air Force Academy and remained there until mid-1941 when he became an Air Planner, first in Cairo and then in Algiers before becoming SASO, North African Tactical Air Force in 1943 and AOC 84 Gp in the following year. In 1948 he was in on the ground floor of the Western Union and was Deputy Chief of Staff (Plans & Policy) at the newly-established HQ SHAPE, 1951-53. Having been AOC 1 and 3 Gps and Chief of Staff (Air) for the Suez affair, he was VCAS 1957-62, perhaps his most important/influential appointment. After a spell as AOCinC Transport Command, he spent his final years in uniform, 1963-67, back on the Continent dual-hatted as COMAAFCE and DCINCCENT, the last year as *de facto* CINCENT because the French had withdrawn from NATO in 1966 leaving the CINC post vacant.

Despite the author's generous acknowledgement of the assistance of a number of ex-RAF folk, there remains a degree of unfamiliarity with Service issues. For instance: the Westland Warspites that Hudleston encountered in India were Wapitis; there is simply no way that the Fg Off Gandy, with whom he flew at Cranwell in 1931, could really have been 40 years old (p139 – the date of birth recorded in the Air Force List is clearly in error by about 10 years) and the No 28 Sqn noted in Egypt was, of course, actually No 208 Sqn.

The book offers two rather curious, and lengthy (48 pages – 16% of the total) appendices. One presents 'league tables' listing the 15-20 or so youngest officers to achieve each of one-, two-, three and four-star rank and another listing the 16 who served the longest in air ranks – Hudleston features in four of these and, at 24 years, is equal-top in the last one. Was that the point? Another interesting table, that we are not provided with, would have shown the number of flying hours that these luminaries had accumulated. A notable feature of Hudleston's career arc is that he completed his last flying appointment when he left Cranwell in 1932, still a mere flying officer. Rather remarkably, having never commanded a station, a squadron or even a flight, his first command appointment was as an AOC in 1944. The second appendix summarises the service records of thirty-nine New Zealanders and Australians who achieved air rank within the RAF. This one is a little inconsistent in places, eg the detail relating to AVM Herbert Russell peters out in March 1918 when he was only 22 years of age; he didn't retire until 1949.

These oddities aside, Grounds also offers frequent comments on the careers of many of the individuals who crossed Hudleston's path as he moved onwards and upwards, which I found a little distracting. It also created an impression of a clique of capable young officers, each having their interests promoted by a senior mentor or two, with the most likely contenders, Boyle, Pike and Hudleston, having their eye on the ultimate goal – appointment as CAS. That is, of course, quite possibly the way it was.

The image that comes across is of a talented and resourceful officer who, at all ranks, impressed his seniors leading to occasionally accelerated, and often relatively youthful, promotions. His widely acknowledged intellect also made him suitable for international appointments calling for a degree of diplomacy. In his turn, while

Hudleston respected the capabilities of some of his air force contemporaries, he was privately critical of others and he could, during the war years at least, be frustrated by some of his army colleagues. Sadly, his marriage was not really very successful and there was infidelity on both sides, although this was handled with discretion and, since it didn't frighten the horses, it clearly had no impact on Teddy's advancement.

It is a little surprising that, considering the prominence of his subject, the author appears to have been unable to find a 'proper' publisher willing to take on this biography, obliging him to resort to self-publication. The result is a 292-page softback which is so tightly bound that, to read it, one has to use two hands to keep the book open, which becomes a little wearing after a while. That said, it is worth persevering. Edmund Hudleston was an admirable officer who made a significant contribution in both war and peace and his story did deserve to be told. Read it, and be impressed.

**CGJ**

**Short Stirling** by Pino Lombardi. Fonthill; 2015. £50.00.

Most 'biographies' dedicated to a specific aeroplane provide a relatively brief account of its design and development and then focus on its employment – the operational history – often embellished by annexes detailing production and other statistics, sometimes even notes on each individual airframe. This book takes a very different approach. While there is ample coverage of operational incidents, the chapter devoted to 'The Stirling in Service' occupies only 40 pages, less than 10%, of this 416-page hardback. Lombardi is far more interested in the less high-profile aspects of the aeroplane's career – the complex infrastructure that supported it in service and the people who worked within those organisations.

Thus, in addition to the relatively conventional details of the aeroplane's inception and a detailed examination of its construction (including many photographs of intimate details of the interior), we are presented with chapters dealing with the establishment of the factories in which nearly 3,000 Stirlings were built, a detailed explanation of the way that crews were trained, and numerous reminiscences contributed by the airmen who maintained these aeroplanes in the open in circumstances that would turn white the hair

of any ‘elf and safety inspector, eg losing your footing while sweeping the snow off the wing of a Stirling involved a drop of 15 feet. These anecdotes provide numerous insights into the complexities of this mould-breaking aircraft – the book is sub-titled *The First of the RAF Heavy Bombers*.

But there is more in this vein with a great deal of space being devoted to the methods used in the recovery of downed aeroplanes by salvage crews from Maintenance Units and to the creation and operation of the repair facilities operated by Sebro Ltd which, apart from incorporating endless modifications and converting aeroplanes from one mark to another, rebuilt and returned to service more than 1,000 damaged Stirlings. Again, these chapters are much enriched by the personal recollections of participants. Finally, in RAF terms at least, there is an account of the disposal of the remaining Stirlings after the war. One is accustomed to reading that wartime aeroplanes were often ‘repaired and salvaged’ and that after the war they ‘were broken up’ but that is usually as far as it goes and we move on without considering what these rather glib phrases actually meant. Lombardi’s book fills in the details and, as such, it provides considerable enlightenment and adds valuable texture to the annals of the air force.

But the Stirling did have a life after the RAF, albeit a short one, and we are provided with details of the aeroplane’s two post-war careers. One was with a short-lived Belgium-based civilian charter company that saw Stirlings hauling passengers and freight to destinations as remote as Shanghai. The second was as an equally short-lived bomber with the Royal Egyptian Air Force, which did fly some sorties against Israel in 1948.

The book ends with tales of efforts to salvage the remnants of Stirlings from crash sites, mostly in the UK, others in the Netherlands and one as inaccessible as the high Pyrenees. The final section provides an account of the Stirling Aircraft Project, an enterprise run by Lombardi with Peter Howell who, with the help of a handful of enthusiasts, are recreating, at least the forward fuselage section of, a Stirling. They are making steady progress, and there are photographs to prove it.

Cons? Not many. It’s a bit pricey, and there is a Saunderby, who should have been a Saundby, a ‘court marshal’, and a handful of random typos, but that’s not a bad score for 416 pages, especially

pages printed on gloss paper, providing for excellent reproduction of the close to 400 photographs in this book, many of which are being published for the first time.

Lombardi's *Short Stirling* will tell you pretty much all that you are ever likely to need to know about that aeroplane and, along the way, provides a useful insight into some unfamiliar aspects of the logistics associated with any aeroplane of the WW II-era. Recommended.
**CGJ**

**From Brooklands to Brize – A Centennial History of No 10 Squadron RAF** by Ian Macmillan with Richard King. 10 Squadron Association; 2015. £25.00.

A squadron history is in essence a memorial to, and a detailed record of, the unit's achievements over time. The content can often be repetitive in nature and dry-as-dust to read or alternatively give the appearance of a collection of line book extracts, written by dedicated enthusiasts with little or no skill in either research, selectivity or writing.

This 342-page book does not suffer from these faults – as well as being extremely thoroughly researched, it is also very readable. It is beautifully presented and bound, and with 229 B&W and 122 colour images and two maps, it is very well illustrated. It is never a good idea to judge a book by its cover but it is hard not to warm to a delightful colour painting of a VC10 with undercarriage and flaps down – you can almost hear the roar of the Rolls-Royce Conways.

The authors are former members of the squadron and are obviously steeped in RAF history as well as having the requisite amount of technical knowledge to add substance and credibility to any judgements and comments, which are conveyed with a light touch in clear, unvarnished prose. The opening chapter on WW I gives long overdue prominence to the work of a typical corps reconnaissance squadron. The text is enhanced by contemporary accounts and many telling quotes, including this from November 1916, 'Many of the Squadron Commanders have little or no experience of regimental soldiering, and there are numerous other points which they are likely to overlook.' And from 1918, 'We invariably have a four course and generally a five or six course dinner in the evenings; soup fish, meat, sweets, savoury and dessert. At lunch we get a course of at least six

dishes . . .' My only quibble would be the mysterious reference to 'two RE8 fighters' on page 34.

The inter-war period is not covered in as much depth, due to the 'sketchy in the extreme' narrative record available to the authors. However, a brief flavour of the 'best flying club in the world' is given, operating lumbering biplane 'heavy' bombers (Hyderabads, Hinaidis, Virginias and Heyfords), before the arrival of the Whitley in 1937. The meat of the book may be found in the 130 pages covering WW II, flying the Whitley and Halifax. It is obvious that the F540s have been studied with great care. A particular feature of the text is that the authors always seek to place the squadron's story within its historical context and also intersperse the account with personal reminiscences, which serve to make it much more palatable for the general reader, as every bombing raid and loss of aircraft and crew is faithfully recorded. I particularly enjoyed the description of the 'phoney war' period and the steep learning curve which the squadron's personnel had to ascend. I had never heard of the 'tea bombing' carried out in 1941 (see page 92).

The most vivid impression, however, is of the relentless effort made by the squadron from 7 September 1939 to 25 May 1945, of the cost paid in young lives, 835 KIA and more than 500 awards for gallantry, and of the progression from penny packets of only a few bombers to the massive, sustained and increasingly accurate raids of the later years. Transfer to Transport Command in 1945 brought conversion to the Dakota and extensive trooping, famine relief and the carriage of refugees in India and Burma, with a brief disbandment, before participation in the Berlin Airlift, until being disbanded again in 1950. 1953 to 1964 saw a further decade of service as a bomber squadron, flying first the Canberra, including participation in the Suez Campaign and as extras in *The Dam Busters* film, and then the Victor,

Re-forming once more in 1966, the 39 years of the VC10 era is covered with a great deal of affection and pride – particularly significant is the fact that not once in this time was there an incident resulting in injury or loss of life. The VC10s, all named for winners of the Victoria Cross, served in many roles worldwide – operating scheduled services to Bahrain, Singapore and the USA, providing crew changes for the RN, conducting aeromedical flights, participating in exercises, conveying stores to BAOR and replacement

aero engines to wherever they were needed, supporting the *Daily Mail* Transatlantic Air Race of 1969 and the long drawn out Op BANNER in Northern Ireland. I have one more minor point of issue at this stage – surely the ship depicted on page 227 is HMS *Ark Roya*l and not 'a US Navy aircraft carrier'? More events and duties all around the world required the presence of No 10 Sqn, including Belize, Nepal, Rhodesia-Zimbabwe, the Falklands, the Balkans, both Gulf Wars and Afghanistan. An additional role was added, air-to-air refuelling. In the light of all of the above, I can well understand the authors' dislike of the very tactless remark quoted on page 257. Today 'Shiny Ten' is in its fifth year flying the Voyager, on a 27-year PFI contract involving 101 Squadron and AirTanker. It is just as busy as it has ever been.

The book is rounded off by some excellent additional material with extended stories from WW I, WW II and the VC10 era, with appendices detailing Battle Honours, periods of active service, the origins of the squadron badge, the Squadron Association, an 'Art Gallery' and a Roll of Honour for both world wars. It would have been nice to have added dates of location changes to the map and a list of aircraft types and representative serials. I can understand that a listing of all honours and awards might have been too difficult. This is a model squadron history at a very reasonable price and can be safely recommended to anyone with an interest in the contribution made by the RAF in peace and war over the last century.

**Guy Warner**

**RAF in Camera – 1950s** by Keith Wilson. Pen & Sword, 2015. £35.00 and

**RAF in Camera – 1960s** by Keith Wilson. Pen & Sword, 2015. £35.00 and

**The Royal Air Force in the Cold War, 1950-1970** by Ian Proctor. Pen & Sword, 2014. £16.99.

The first pair of these books are A4-sized, 300-page hardbacks which, between them, present about 800 photographs drawn from the collection held by the Air Historical Branch (AHB). As the titles indicate, they cover the 1950s and '60s so the first book illustrates a largely black and white world, although this does begin to change towards the end of the decade and most of the second volume is in colour. Most of the images are produced two-up, many using the full

width of the page and the reproduction, on a high quality semi-matt paper, is first class. My only criticism is that, presumably in an attempt to present a larger image, the layout designer has opted to run a few photographs across two pages, which is counter-productive as it inevitably results in a Playboy-style ‘staple in the navel’ effect. Why does anyone ever think that that is a good idea? The way to present a large image is surely to rotate it through 90º and print it ‘portrait’ using the whole page.

Each book opens with a relatively short, four-to-six-page Introduction summarising the events of the decade before presenting the pictures in annual batches. There is a linking text that highlights significant events and this is often amplified by the informative captions. Both books end with some contemporary recruiting advertisements and both have indexes. The 1950s volume has a particularly useful appendix providing annual figures for authorised and actual strength in numbers of personnel and aircraft, the latter broken down by command.

Some of the pictures will probably ring a bell, as they will have appeared in, for example, contemporary editions of *Air Clues* and/or press releases. But many have not been published before, although some do seem to evoke a sense of *déjà vu*, perhaps because they are unused images from a more familiar shoot.

The ‘Cold War’ book, a softback, has a smaller format (about 7½" × 9½"), and runs to 192 pages presenting more than 150 pictures, all of them in colour. These have been drawn from a collection held by the Imperial War Museum, although since it was originally created by the Air Ministry’s Photographic Reproduction Branch (PRB), many of the images are the same as those held by AHB. For instance, although they have come from different archives, several pictures appear in both publications, eg a Meteor NF14, WS848, features in the first and third books and a Canberra B16, WT303, in the second and third.

The internal structure of the softback is different; rather than being presented chronologically, the content has been broken down into six themed chapters focusing on, eg recruitment and training, overseas activities, and aerobatic teams. Nevertheless, the same ground is amply covered, just less densely; the reproduction is still first class and the pictures are even more extensively captioned.

That said, a few inaccuracies and/or typos can be found embedded within the captions in all three books. For instance: an Argosy is captioned as belonging to No 103 Sqn (it should have been 105); it is not true to say that all of the Cyprus-based Canberra units sent to FEAF during the Confrontation with Indonesia were detached to Tengah – most operated from Kuantan; a picture, said to be of a potentially operational BLUE STEEL, is actually of an inert training round; and in the 1960s book, the above mentioned Meteor is misidentified as XS848 while the Canberra B16 is said to have belonged to No 6 Sqn in one book and No 249 Sqn in the other. So, while one does need to treat the captions with some care, these books are not really about the words; they are about the images and those are splendid, in all three cases – although the quality of the paper used makes them marginally crisper in the hardbacks.

Since the quality is much the same, the choice comes down to quantity – and cost, of course. One pays one's money and one takes one's choice. But whichever you opt for will provide you with an enjoyably nostalgic wallow in pictures of Beverleys on desert strips, Shackletons over jungle, Thor IRBMS having erections, V-bombers doing their stuff, Twin Pins doing their stuff, Whirlwinds winching, Macaws, Yellowjacks, Firebirds and so on – and on – close to 1,000 times if you can afford the lot. Ahhhh – those were the days.

**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 interwar 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, Wg Cdr Colin Cummings, October House, Yelvertoft, NN6 6LF. Tel: 01788 822124.

## 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 |
| 2012 | Wg Cdr N A Tucker-Lowe DSO MA MCMI |
| 2013 | Sqn Ldr J S Doyle MA BA |
| 2014 | Gp Capt M R Johnson BSc MA MBA |

## 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

**SECRETARY**
Gp Capt K J Dearman
1 Park Close
Middleton Stoney
Oxon
OX25 4AS
Tel: 01869 343327

**MEMBERSHIP SECRETARY**
**(who also deals with sales of publications)**
Wg Cdr Colin Cummings
October House
Yelvertoft
Northants
NN6 6LF
Tel: 01788 822124

**TREASURER**
John Boyes TD CA
70 Copse Avenue
West Wickham
Kent
BR4 9NR
Tel: 0208 776 1751

**EDITOR and PUBLICATIONS MANAGER**
Wg Cdr C G Jefford MBE BA
Walnuts
Lower Road
Postcombe
Thame
OX9 7DU
Tel: 01844 281449