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SELECTED GLOSSARY

AAR	Air-to-Air Refuelling
AC	Air Council
ACDS(Pol)	Assistant Chief of Defence Staff (Policy)
ACE	Allied Command Europe
ACSC	Air Council Standing Committee
AFB	Air Force Board
AFBSC	Air Force Board
AMP	Air Member for Personnel
AMSO	Air Member for Supply and Organisation
C2ISTAR	Command and Control, Intelligence, Surveillance, Target Acquisition and Reconnaissance
CA	Controller Aircraft
CINCSAC	Commander-in-Chief Strategic Air Command
CMB	Coastal Motor Boats
COW	Coventry Ordnance Works
DGO	Director General of Organisation
DOI	Director of Operations and Intelligence
EOKA	*Ethniki Organosis Kyprion Agoniston*
FAD	Forward Ammunition Depot
FIEZ	Falkland Islands Exclusion Zone
HA	Hostile Aircraft
IR/MRBM	Intermediate Range/Medium Range Ballistic Missile
ISF	Internal Security Forces
JATE	Joint Air Transport Establishment
MBF	Medium Bomber Force
MDAP	Mutual Defense Assistance Program
NASA	National Aeronautics and Space Administration
OOC	Out of control
PSO	Personal Staff Officer
RHAG	Rotary Hydraulic Arrestor Gear
RLC	Royal Logistic Corps
SAM	Surface-to-Air Missile
SIS	Secret Intelligence Service
TACC	Tactical Air Control Centre
TBF	Tactical Bomber Force
TNA	The National Archives

A MESSAGE FROIM THE EDITOR

Among the many well-established routines that have been disrupted by the beastly COVID pandemic has been the business of this Society. In the good old, pre-bug, days, the core of this edition of our Journal would have been the Guest Speaker's address at the 2020 AGM and the minutes of that meeting. As with much else, that event was cancelled, but it has been possible to paper over the crack with yet another *ad hoc* edition, but one in which I hope everyone will find something of interest. **Ed**

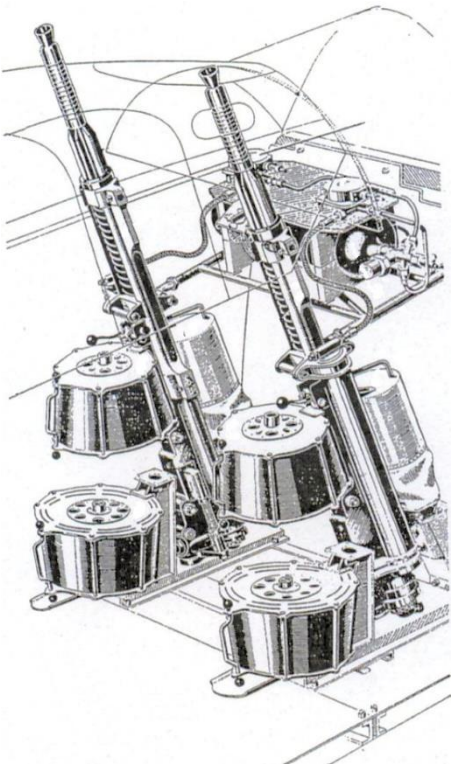
A LITTLE NIGHT MUSIC – OR HOW THE RAF INVENTED *SCHRÄGE MUSIK*

by Mark Russell

Schräge Musik (literally 'slanted music'), using fixed upward-firing cannon to attack an aircraft from below, was an effective tactic adopted by the *Luftwaffe* to counter the RAF's night bombers. This idea had first been used in Germany during WW I when Gerhard Fieseler had 'fitted two light machine guns into his aircraft in such a way that their barrels pointed forwards and upwards.'[1] While Corum describes significant post-war 'lessons learned' activity in Germany,[2,] Aders does not believe that any comprehensive post-war analysis was done.[3] That said, Aders does note a paper produced in 1928 on what 'the current tactics and organization of night-fighting units ought to be' and, in 1938, Fritz Thiede (who had been OC *Jasta* 38 in Macedonia in WW I) reminded the *Luftwaffe* of the advantages of upward-firing guns.[4] This did not appear to stimulate any immediate interest, however, and the trials conducted in 1941-42 were a response to recent combat experience rather than having been inspired by this pre-history.[5, 6] The introduction of *Schräge Musik* in the spring of 1943 caught the RAF by surprise but, as this paper will show, it was an approach to air-to-air gunnery that it had been aware of, and had occasionally worked on, ever since WW I. *S*adly, as many commentators have noted, lessons taught in WW I often had to be re-learned, at great cost, twenty years later.[7]

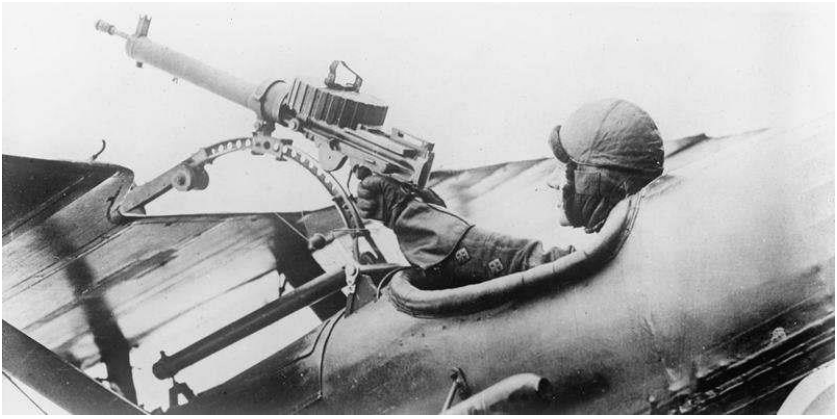
Schräge Musik allowed a night fighter to position itself beneath a bomber (which in most cases lacked ventral armament) to attack unseen against the darker ground below, while the bomber was silhouetted against the sky. One *Luftwaffe* pilot described 'the business of getting the bomber into one's sight' as 'tedious'.[8] On the other hand, the procedure is described by Williams as being 'relatively simple to operate.'[9] Few bombers survived such an attack, as the cannon were aimed 'via an optical sight mounted in the canopy'[10] at the fuel tanks in a wing which exploded with catastrophic results. Since no crews returned to report what had happened it took a long time for Bomber Command to recognise that the *Luftwaffe* was using these upward-firing cannon; Dr R V Jones, Assistant Director of Intelligence (Science) at the Air Ministry, noted after the war that, 'We may have been slow to detect upward-firing guns on German night-fighters.'[11] Wakelam notes

that it was not until late 1944 that the Operational Research Section (ORS) at Bomber Command looked at the danger posed by upward-firing guns, and its report and subsequent correspondence make no reference to the RAF's long experiments with such guns.[12] Freeman Dyson recalls how his work within ORS identified that loss rates among experienced crews were inexplicably rising in the second half of 1944, breaking the earlier pattern of crews that survived the first few missions of their tour having a significantly better chance of completing the remaining missions. He describes how ORS 'had a theory' to explain this change – 'Upward-Firing Guns.'[13]



The deadly Schräge Musik *installation in a Bf 110G-4/R8*). (ww2eagles.blogspot.com)

This was far from being a new idea. It had long been understood that, because it is travelling at an angle to the airflow, a projectile fired upwards generates 'lift' which, to a degree, counterbalances the effect of gravity. It is possible, therefore, to calculate, for a given speed, an angle at which a bullet will travel along a trajectory that is virtually a straight line for a surprisingly long distance before decaying speed, and thus 'lift', eventually permits gravity to begin to exert its influence. Nevertheless, while this 'steady state' persists, if an attacking pilot maintains station below and behind his target, he needs to make no allowance for gravity, aerodynamics or relative speed. Thus, 'a fixed sight can be used point blank up to comparatively long ranges with very small errors.'[14] This approach, which came to be known as 'no allowance' shooting, had the



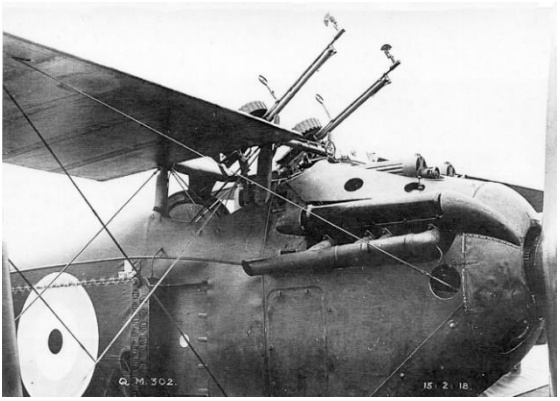
The Foster mount permitted a Lewis gun to be pulled back and down to permit the magazine to be changed, in this case on an SE5A, but it could be locked at interim positions to permit firing upwards. (IWM Q27564)

potential to inflict considerable, probably terminal, damage with little likelihood of the attacker being detected.

Fixed upward-firing guns had been used successfully in WW I, not least by Albert Ball. This had generally involved the use of a Lewis gun on a Foster mount, a curved rail on which the gun sat on the upper wing. Devised by Sgt R G Foster of No 11 Sqn, it was originally intended to allow the gun to be swung down from its normal, horizontal, position so that the pilot could change ammunition drums, but it could be locked at any intermediate position, permitting it to fire upwards. With a gun rigged in this fashion, a victim could be approached from below and behind – in his blind spot – so that he was unaware of his assailant until the latter attacked.[15] Both Franks and Bowyer describe how Ball used this tactic.[16] He first tried it, 'a method he was to make peculiarly his own,' on 2 July 1916, and he subsequently had his personal aircraft re-rigged to suit this type of attack. While Ball shared this idea with other pilots on 11 Squadron, employing it was not as easy as it sounds; it 'required steady nerves and cool courage', and was only really suited to the lone pilot who would stalk his prey.[17]

By 1917 the lone ace was being replaced by pilots operating in much larger formations, so there was less scope for 'surprise attacks' by a singleton. Nevertheless, the idea of attacking an enemy unseen remained, and indeed remains, an ideal way to engage an enemy. It was

particularly suited to the night fighter, which was bound to operate alone, stalking his victim.[18] The earliest fixed, upward-firing, installation appears to have been the fitting of a COW (Coventry Ordnance Works) gun on a DH4. Intended to counter night bombers and Zeppelins, in the event only three aircraft were ever equipped with the gun, two of which reached France in November 1918 but neither saw action before the Armistice.[19, 20]



The Dolphin came with two permanently upward-trained Lewises but, depending on personal preferences, one or both could be deleted. (J M Bruce)

There was a wider appreciation of the advantages of this type of attack; in October 1916 Ball had drafted a specification for a fighter which his father, a director of Austin Motors, endeavoured to have built. The key element of interest here is that one of its two guns, a Lewis, was mounted on the top wing and rigged to fire upwards at about 20°, although this was as much to do with avoiding damaging the propellor as upward shooting.[21] While this aeroplane was not put into production, the Sopwith Dolphin was routinely armed, in addition to a pair of conventional forward-firing Vickers guns, with a pair of Lewises fixed to fire upwards at an angle of 45º but, in service, one and sometimes both, were often deleted.

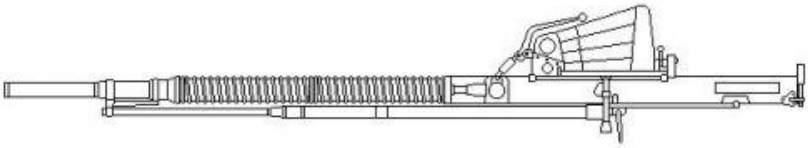
The trials conducted by the Armament Experimental Station at Orfordness, both during WW I and immediately afterwards, included work on ‘no allowance’ shooting. While reports were issued on individual experiments, a summary combining all work on sights and tactics in aerial gunnery was published in January 1920 as Confidential Document 7 (CD7).[22] These tests had demonstrated, *inter alia*, that fixed guns firing upwards at about 45º were ‘very effective under certain conditions’, notably attacking a two-seater from below, ‘the

only really blind spot of a Two-Seater.'[23]

A specific trial had been carried out in 1916 to evaluate the use of fixed upward-firing guns at night. In daylight, return fire from the victim would be just as accurate as that from the attacker; the trial sought to establish what the advantage might be at night when the attacker would be difficult to see against the dark background below, making it 'possible to open fire without being seen.'[24] The trial established that the ranges at which a target could be seen from underneath were significant. Depending on the state of the moon, the fighter saw its victim between 200 and 1,100 yards before it was sighted by the bomber. The report described the design of a simple sight and noted that if the enemy aircraft was flying straight and level, 'the simple act of holding the sight on the enemy' will result in accurate gunfire.[25] As CD7 noted in 1920, this 'straight and level' scenario had been 'growing more and more frequent towards the close of the war' and it could be expected to become even more common as, 'formations increase in size in future wars and aircraft increase in size, and are more and more used for specialised purposes.'[26]

However, the RAF soon forgot these lessons, as Air Cdre Alan Wheeler observed, 'such experience as had been gained during the War (…) was largely forgotten by 1927, certainly as far as the fighters were concerned.'[27] CD7's conclusion, that bomber formations would need to continue to maintain straight and level flight in the face of fighter opposition in order to provide mutually supporting defensive fire, meant that the use of long-range aerial gunnery, based on 'no allowance' shooting, was likely to become an increasingly significant tactic in the future. Interestingly, given the accuracy associated with 'no allowance' gunnery, CD7 did not see any necessity for introducing a heavier gun. A contributory factor here may have been the fact that the machine gun was suited to all types of aerial combat, and a fighter needed to be able to exploit that flexibility rather than being confined to attacking aircraft flying straight and level.

Nevertheless, the RAF continued to consider the potential of fixed, upward-firing guns of increased calibre. In 1924 the Air Ministry issued Specification 4/24 which called for a twin-engined fighting landplane armed with two 37mm COW guns.[28] Two prototypes of Westland's Westbury were built, with the first one flying in 1926. One of its guns, each of which was 8 ft long, weighed 200 lb and fired a

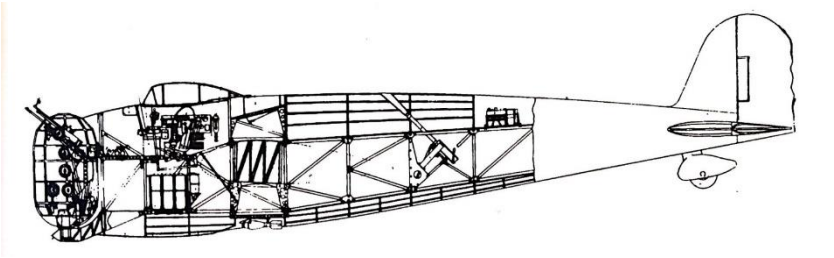


The 37mm COW gun was 8 ft long, weighed 200 lb and fired a 1½ lb shell. (www.letletlet-warplanes.com)

1½ lb shell, was installed flexibly on a ring mount in the nose, the other was fixed to fire upwards and controlled by the pilot.[29] The Air Ministry subsequently issued Specification 27/24 for a twin-engined interceptor/night fighter to which Boulton Paul responded with its Bittern. In the second of the two prototypes, a ·303″ Lewis was mounted each side of the nose on a barbette capable of being elevated from horizontal to 45° upwards, permitting a bomber to be attacked from below.[30] However, neither the Westbury nor the Bittern were developed further. Finally, the Air Ministry issued Specification F.29/27, for a single-seat fighter armed with a COW gun fixed to fire upwards at, at least, 45°.[31] Both Vickers and Westland built prototypes, the former's gun being installed at 45° and the latter's at 55°, but, again, neither option was pursued.

Despite this, consideration of a big gun fighter, including fixed upward-firing guns, continued. In November 1928, Air Cdre J A Chamier wrote a paper entitled 'Aerial Bombardment' which discussed the big gun fighter and was circulated for comments before publication.[32] Air Cdre Ludlow-Hewitt, responded that, 'I entirely agree that the big gun fighter, designed to attack from 45º below a bomber, should be developed – but not to the exclusion of single-seater fighters.'[33] AVM Sir Robert

Sporting its massive 20mm cannon, Vickers rather outré response to Specification F.29/27 was a mid-engined pusher.

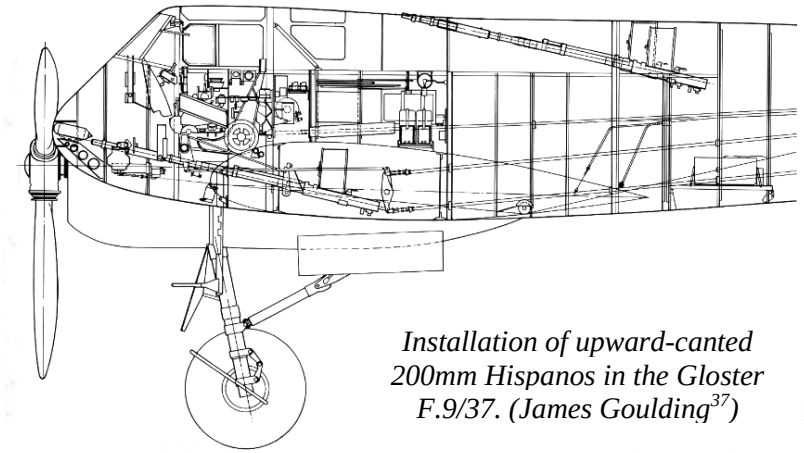


Boulton Paul's unbuilt P76 project to F.5/33. (Les Whitehouse)

Brooke-Popham's reply enclosed notes made by Sqn Ldr G W Robarts, whose views, he said, were 'worthy of consideration.' Robarts' comments noted that the time saved in an interception using an upward-firing gun was, 'very attractive (allowing, as it does, the fighter to) engage with accuracy bombers from 2,000 to 3,000 feet underneath them before they reach their objective.'[34]

RAF doctrine and training continued to recognise the effectiveness of an attack from below, the 1933 edition of the *Flying Training Manual, Part II – Applied Flying* noting that, when attacking a two-seater, an attack from below was the best approach since the fuselage masked the rear gun.[35] However, having standardised on fixed forward-firing armament, the RAF was limited in its ability to exploit this vulnerability. Even so, upward-firing guns were still of interest and the Air Ministry continued to receive suitably tailored submissions. Boulton Paul's P76 response to specification F.5/33, for example, featured two Vickers guns in the fuselage angled upwards at 45º.[36]

Four years later Specification F.9/37 invited proposals for a twin-engined, cannon-armed fighter. The second prototype of Gloster's offering had three 20mm cannon in the rear fuselage and two in the nose, all canted upwards by 12°. The arrangement of the cannon is shown in the accompanying drawing. Goulding maintains that this upward slant was an inevitable consequence of the mid-fuselage installation – the guns had to be canted upward to permit them to fire above the cockpit and the nose guns were aligned in sympathy.[37] While that was certainly the case, it was not the only reason. While Gloster's F.9/37 did not receive a production order, it was subsequently considered as the basis of a submission to meet a later requirement for a cannon-armed twin-engined night fighter. At a meeting held on



Installation of upward-canted 200mm Hispanos in the Gloster F.9/37. (James Goulding[37])

27 July 1940 to revise the initial draft of what would become Specification F.18/40, it was pointed out that the F.9/37's guns 'were inclined upwards at a small angle to represent the 'no allowance' shot at about 300 mph and that there were advantages in this arrangement from the point of view of night fighting.' In subsequent discussion, AOCinC Fighter Command, ACM Dowding, made it clear that he was definitely 'not in favour of such a scheme.'[38] As he had advocated earlier in the meeting, he wanted the guns to fire along the line of flight, harmonised to converge at a range of between 75 and 250 yards with appropriate adjustment to cater for gravity drop.[39]

The Specification for F.18/40 was duly amended to reflect the AOCinC's preference, but that was not quite the last word as the armament solution was later challenged by the Deputy Director, Operational Requirements (DDOR). He suggested that the future night fighter should have its battery of four to six 20mm cannon 'mounted in the fuselage, either parallel to the line of flight or sticking upwards at an angle of up to 45º', clearly indicating that 'no allowance' shooting was still a live issue in some quarters.[40] He went on to point out that such a concept would allow the fighter to, 'fly in to close range and (…) settle the enemy's hash' with one burst.[41]

While DDOR's intervention failed to provoke a change in policy, RAF night fighter crews clearly recognised the benefits of approaching their targets from below, Wg Cdr Bob Braham, for example, describing

such an attack as, 'the night-fighter's favourite position below the target.'[42] This perhaps begs the question of why the RAF did not pursue upward angled guns more actively. There is nothing in Braham's memoir suggesting any dissatisfaction with the armament of the Beaufighter and/or Mosquito, nor any suggestion that he considered any alternatives to the standard forward-firing guns. Following the invasion of Russia in mid-1941, the demands of the eastern front meant that the *Luftwaffe* posed a much reduced threat to the UK. This, and the success of, by now radar-equipped, night fighters flown by crews like Braham/Gregory, Burbridge/Skelton and Cunningham/Rawnsley, meant that there was little impetus to develop alternative gun installations.

Braham notes that from the summer of 1941 many raiders had started coming in lower, having apparently realised the limitations of the RAF's early metric AI radars at lower altitudes,[43] which reduced the scope for upward-firing attacks. He also observes that in most squadrons, most kills were made by a few crews; he attributes this to excellent team work between those pilots and AI operators. The same was true of single-seat day fighters, of course; whether in daylight or at night, only a relative handful of pilots became 'aces'. That said, Braham's memoir is not a succession of successful attacks; there are many instances when he opened fire too far away and failed to shoot the bomber down.[44] It is possible that upward-firing guns might have made a difference, but that option was never explored.

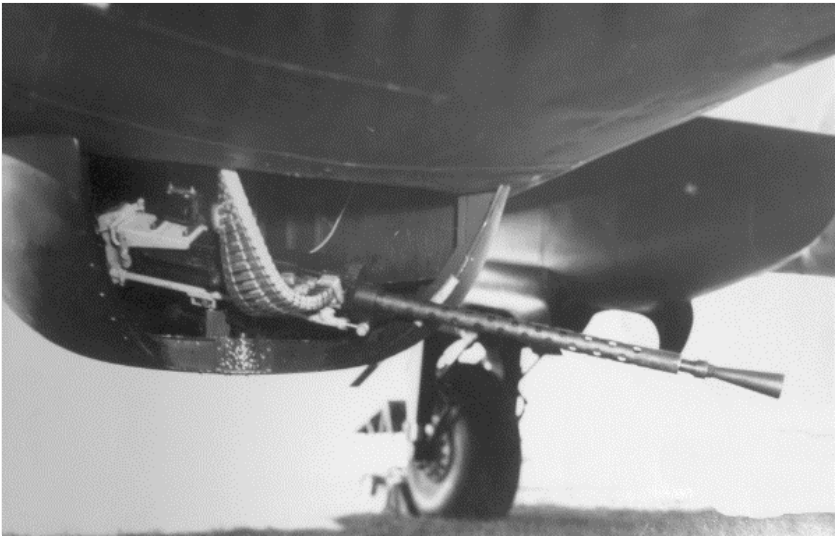
While the RAF had maintained, at least an interest in, fixed upward-firing guns throughout the inter-war period and on into WW II, it had also been considering how Bomber Command might address this risk. Inter-war RAF bombers, such as the Heyford and the early Wellington had included ventral turrets, indicating that the Air Ministry was alive to the threat of attack from below. The B.12/36 heavy bomber specification that resulted in the Stirling included a requirement for 'Two guns amidships in a semi-streamlined and retractable turret beneath the fuselage', but the P.13/36 medium bomber specification, that eventually led to the Halifax and Manchester (and thence ultimately the Lancaster), had no requirement for a ventral turret.[45]

The Air Ministry subsequently reconsidered the need for a ventral turret in the Manchester, and the second prototype had a Frazer-Nash FN21A.[46] This was short-lived, however and very few were fitted. In

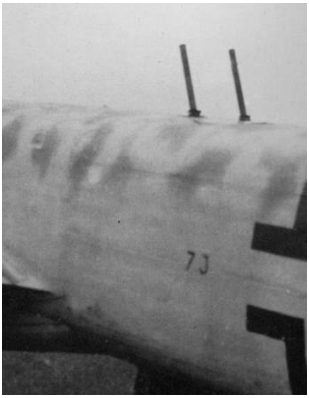
its turn, some early Lancasters were provided with the somewhat inadequate FN64,[47] but these were later removed in favour of H2S radar.[48] This illustrated a fundamental design problem – there was room under the fuselage for either H2S or a ventral turret, but not both.

As early as October 1938 it had also been decided to provide the Halifax with a ventral turret, a retractable Boulton Paul Type K, armed with a pair of 0·303″ guns and periscope-sighted.[49] However, a daylight raid on Wilhelmshaven by Wellingtons on 18 December 1939, was countered by the *Luftwaffe* employing 'high beam attacks with such success, the value of the ventral gun position was called into question.'[50] It was concluded that ventral guns were of 'limited practical value'.[51] Those already fitted to Whitleys and Wellingtons were locked 'up', and later removed to save weight, and in September 1940 the requirement for a Boulton Paul turret to be fitted to the Halifax was cancelled.[52] The Wilhelmshaven mission had conclusively demonstrated that Bomber Command could not sustain the losses it would incur if it continued to fly over Germany in daylight. In future it would have to operate under cover of darkness and, at the time, there appeared to be little likelihood of the enemy being able to devise a means of attacking from beneath – in the dark. That said, however, if he could, as Chapter V of CD7, 'Air Fighting at Night', had observed as early as 1920, a bomber would be 'absolutely at the mercy' of a fighter which could hold 'a position of invisibility' below the bomber to attack with upward firing guns.[53]

Nevertheless, work on ventral guns continued, although policy on their introduction was somewhat indecisive until mid-1943 when the Bombing Development Unit (BDU) trialled a '0·5 in gun in the aft escape hatch' of a Stirling, with Bomber Command approving a similar installation for all 'aircraft not carrying H2S, and for all future production heavies.'[54] The gun had been installed in Stirlings of six squadrons by the end of February 1944, although the aircraft had been withdrawn from Main Force operations in the previous November.[55] Ventral armament was re-introduced on the Halifax using a Preston Green mounting, fitted with a single 0·5″ gun.[56] By June 1944 207 Halifaxes had been fitted with this mounting, and 48 Lancasters and 68 Stirlings also had a ventral gun.[57] The decision to fit H2S radar in all Bomber Command Main Force aircraft, and the subsequent availability of sufficient sets, meant that most of these ventral guns were



The ·5" gun in the Preston Green ventral gun position of a Halifax.



The Schräge Musik *installation in a Ju 88G.*

subsequently removed.

In conclusion, the RAF had expended significant time and energy on the possible uses of fixed upward-firing guns as a way of attacking bombers. In 1920 it had concluded that such an attack would be particularly effective against night bombers. During the interwar period it aimed to address this risk by fitting ventral turrets, and this policy was reflected in the specifications that eventually resulted in the Stirling, Halifax and Lancaster. However, relatively few were actually installed on these aircraft because early operational experience had shown that they were 'useless.'[58] But the threat remained and eventually manifested itself in the shape of *Schräge Musik*. The Air Ministry had perhaps failed to learn from all the inter-war work, to keep this threat under review, and to continue to think about how best to address it – ACM Sir Arthur Harris, AOC-in-C Bomber Command

described the Air Ministry's work on defensive armament as showing an 'extraordinary disregard' for Bomber Command's needs.[59] Bomber Command continued to innovate in terms of defensive armament but it never solved the problem of attack from below, an attack that *Schräge Musik* made so effective.

Lancaster NG356, of No 100 Sqn, with rods indicating the trajectories of the upward-fired shells that had damaged the aircraft on 15/16 March 1944 in an attack that the aircraft had been unusually fortunate to survive. But the penny was slow to drop.

Notes:

1 Aders, G. trans. A Vanags-Baginskis; *History of the German Night Fighter Force 1917-1945* (London, Janes, 1979), pp3-4.

2 Corum, J; *The Luftwaffe: Creating the operational Air War 1918-1940* (Lawrence, University Press of Kansas, 1997, p60.

3 Aders; *op cit*, p7.

4 *Ibid*; pp3-4

5 *Ibid*; p67.

6 Corum; *The Luftwaffe*, p118.

7 For example, Terraine, J; 'World War II – The Balance Sheet' in *Proceedings of the Royal Air Force Historical Society, Vol. 2*, 1987, p29 where Terraine references a Coastal Command pilot in 1942 coming across a 1918 pamphlet setting out exactly the tactics that he and his colleagues were only just rediscovering.

8 Bowman, M W; *German Night Fighters Versus Bomber Command* (Barnsley, Pen & Sword, 2016), p21.

9 Williams, D P; *Nachtjäger Volume One: Luftwaffe Night Fighter Units 1939-1943* (Hersham, Classic, 2005), p85.

10 *Ibid*.

11 Jones, Prof R V; 'The Intelligence war and the Royal Air Force' in *Proceedings of the Royal Air Force Historical Society, Vol. 1* 1987, p26.

[12] Wakelam, R T; *The Science of Bombing: Operational Research in RAF Bomber Command*, (Toronto, University of Toronto Press, 2009), pp217-218.

[13] Dyson, F; *Disturbing the Universe* (London, Basic Books, 1979), pp21-22.

[14] AIR 1/1198/204/5/2604. Report A94 on Night Fighting by Point Blank Upward Shooting, p1 – this points to Reports A/83 and A/93 for details of how the trials were carried out.

[15] Bowyer, C; *Albert Ball VC*, (Manchester, Crecy, 2008), p69.

[16] Franks, N; *Dog-Fight: Aerial tactics of the aces of World War 1* (London, Greenhill Books, 2003), p49.

[17] Bowyer, *op cit*, p74.

[18] This continued to be true in WW II, with Wg Cdr Bob Braham describing the night fighter as a 'lone wolf' – see Braham, Wg Cdr J R D; *'Scramble!'* (London, William Kimber, 1961), p159.

[19] Williams, Anthony G and Gustin, Dr Emmanuel; *Flying Guns – World War I* (Ramsbury, Airlife, 2003), p95.

[20] Kinsey, G; *Orfordness – Secret Site: a history of the establishment, 1915-1980* (Lavenham, Terence Dalton, 1981), p28.

[21] The best reference on this aeroplane, the Austin AFB 1, is a two-part article by J M Bruce in *Aeroplane Monthly* for November and December 1978, pp603-607 and 668-673 respectively.

[22] AIR 1/2427/305/29/942. *Notes on the work of Orfordness Armament Experimental Station in connection with Sights and Tactics in Aerial Gunnery.* Initially published as CD7, it was later declassified and redesignated as AP942.

[23] AIR 1/1198/204/5/2604. Report A50 on Value of Gun Pointing Upwards on a Scout.

[24] *Ibid*. Report A94 on Night Fighting by Point Blank Upward Shooting, p1.

[25] *Ibid*.

[26] AIR 1/2427/305/29/942. AP942: Chapter III, paras a2 & a3, p12.

[27] Wheeler, A; *Flying Between the Wars* (Henley-on-Thames, Foulis, 1972), p142.

[28] AIR 2/1069, Specification No 4/24, Twin Engine Fighting Landplane dated 1 September 1924.

[29] Lewis, Peter; *The British Fighter since 1912* (London, Putnam, 1965), p175.

[30] Brew, A; *Boulton Paul Aircraft* (Stroud, Tempus, 2001), p49.

[31] Meekcoms, K J and Morgan, E B; *The British Aircraft Specifications File, British Military and Commercial Aircraft Specifications 1920-1949* (Tonbridge, Air-Britain, 1994), pp127-128.

[32] AIR 5/1132, Bombing and Bombing Tactics Part 1.

[33] *Ibid.* Letter dated March 1929, from Air Cdre E R Ludlow-Hewitt, Commandant RAF Staff College, to Air Cdre C L N Newall, Director of Operations and Intelligence (DOI).

[34] *Ibid*, Sqn Ldr Robarts' 'Remarks on the Paper on Air Bombardment', p5, covered by letter from AOC Iraq to DOI, dated 6 May 1929.

[35] Tanner, J; *Fighting in the Air: The official combat technique instructions for British*

fighter pilots, 1916-1945, (London, Arms and Armour Press, 1978), p121.

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[38] AIR 2/5170. Enclosure 9A; minutes of a meeting held on 27 July 1940 to discuss the operational requirements for a two-seat night fighter, para 38.

[39] *Ibid*, para 17.

[40] AIR 2/5170. Enclosure 39b, a paper entitled 'Future Fighter Aircraft', in which DDOR, Gp Capt H V Rowley, criticises the provision for armament in the current edition of Specification F.18/40 and discusses alternative solutions, some of them quite drastic. See, in this instance, para 11(iii).

[41] *Ibid*, para 12.

[42] Braham, *op cit*, p98.

[43] *Ibid*, p81. Until the introduction of centimetric radar, with its focussed directional beam (AI Mk VII and later from 1942 onwards) ground returns meant that the earlier equipment could not 'see' anything at a range greater than its height above the ground, ie operating range reduced as altitude decreased so it was ineffective at low level, in practical terms below about 5,000 ft.

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RAF FAULD AND THE RAF MUNITIONS SUPPLY NETWORK

by Stuart Hadaway

Note: This article was originally drafted as a talk for a commemoration event held in November 2019 at the site of the RAF Fauld explosion.

There is a tendency when looking at the RAF during the Second World War to see it in terms of aircraft and aircrew. It is easy to forget that the 'tools' needed went far beyond that. Without cooks and clerks and cleaners the aircrew would never have been able to do their jobs, and the aircraft would have been useless without fuel and oxygen and, of course, bombs. Vast and complex systems were built to ensure that the flows of these crucial materials were maintained at sufficient levels without interruption. For much of the Second World War, RAF Fauld was a vital cog in that machine.

In the mid-1930s the RAF began a process of rapid expansion and preparation for a war in Europe. Up until that time, munitions stocks in the UK were held either on RAF stations or at two small depots. In 1936 it was decided to build a system that would hold enough bombs, machine gun ammunition, and pyrotechnics (a category that mostly, at that point, included small incendiaries and flares, but which would later also include target indicators) to meet the projected requirements for six months of fighting in a full scale Continental war. This was estimated to be 82,000 tons of high explosive (HE) bombs, and 16,000 tons of incendiaries.[1]

However, throughout the war the estimated storage needed continued to rise dramatically. It was realised that the bombing campaign would be more intensive than planned, and require far, far more bombs.

Several factors fed in to what would become a constant shortage of facilities. A major issue was that the RAF kept expanding. Taking Bomber Command as an example, since it would be the main 'customer', although Coastal Command and, later, the 2nd Tactical Air Force would also use large numbers of bombs. On the outbreak of war Bomber Command could field fewer than 300 bombers. These were medium bombers – Wellingtons and Hampdens with a maximum bomb load of up to 4,500lbs, and the Whitley with a maximum load of 7,000lbs. There were five standard bombs types in use – the 20lb

fragmentation bomb, the 40lb, 250lb and 500lb high explosive bombs, and the 4lb incendiary bomb. A typical maximum effort might see a few dozen aircraft sent off towards Germany with less than maximum bomb loads, needing the extra weight for fuel.

By 1945, Bomber Command had more than 1,500 heavy bombers; Lancasters with maximum bombs loads of 22,000lbs, and Halifaxes with maximum loads of 13,000lbs. Actual bomb loads were usually well below the maximum, but a single night's work could still see well over a thousand aircraft thrown against the Third Reich. By then more than twenty different bomb types were in standard use, without accounting for special types like Bouncing Bombs, as well as a wide range of pyrotechnics. The largest bomb available had gone from the 500lb to the 22,000lb Grand Slam – a ten ton bomb.

In short, not only was the RAF constantly expanding, but the aircraft were getting bigger, with greater capacity. Likewise the bombs kept getting bigger, and coming in ever more diverse sizes and types. So, how did the RAF keep adequate stocks flowing?

Bombs originated either in factories – which they left fully filled but unfused – or through docks, where they arrived from overseas (generally the United States) as unfilled cases, which then had the explosives added at Royal Ordnance Factory filling plants. Once filled, but still unfused, they would be taken to a Main Reserve Depot, also known simply as an Ammunition Depot.

There were initially four Main Reserve Depots spread across the country. Sites were selected based on several criteria, including the need to be close to good road and rail networks (but not too close – this weighing up of convenience against safety concerns would be a running theme), and a safe distance from major towns. Existing mines and other underground works were investigated, but it was soon found that mines were unsuitable.[2] Their shafts and galleries were too small in volume to be much use without extensive development work, and they were prone to dampness. Open cast quarries and mines were found to be ideal. Their floors could be levelled, and purpose-built systems of corridors and compartments designed to provide the safest and most economical layouts. Once these structures had been built, they could be 'roofed' with some 45-60 feet (judged to be the safest minimum in case of enemy bombing) of rock and earth.[3]

By the end of 1937, four sites had been selected and work began.

Each was to be run by its own Maintenance Unit (MU), and by the start of the war in September 1939 all four were open: No 2 MU at RAF Altrincham, No 11 MU at RAF Chilmark, No 21 MU at RAF Fauld and No 28 MU at RAF Harpur Hill. A further site, which would become No 31 MU at RAF Llanberis, would be authorised in 1939, and from 1941 others would follow.

By January 1942, the projected requirements for six months of operations had more than doubled from 98,000 tons to 223,000 tons. A year later, it had more than doubled again to 505,600 tons, and by July 1943 it stood at 632,000 tons.[4] In fact, the target of maintaining six months' reserve was never met, and by the end of the war twelve such Main Reserve Depots had been built with a total capacity of just under 200,000 tons of munitions. While the new depots were being built, the older ones were being expanded. More artificial underground galleries were constructed, although much of the expansion was done on the surface, which was, of course, much easier and therefore cheaper and quicker. New compounds were built for bombs, and sheds constructed for bomb components such as tail sections, fuses, and detonators, as well as for pyrotechnics and incendiaries, all of which needed some protection from the elements.

'Satellite' sites for the Main Reserve Depots were also authorised in 1943.[5] These were to be on the surface, fairly close to the parent depot, and act as overspill for up to 20,000 tons of bombs each. Interestingly, the Director of the Works Organisation, who would oversee this work, noted when these satellites were authorised that:

> 'Safety regulations must not be allowed to preclude the efficient prosecution of war operations, and that where conformity with safety regulations would considerably affect efficiency, a greater degree of risk must necessarily be accepted.'[6]

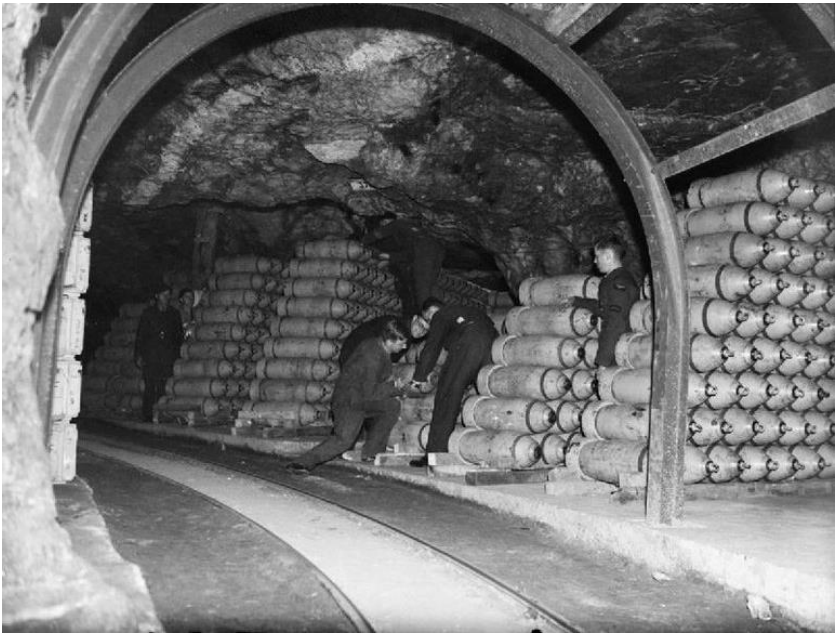
This difficult balancing act of practicality versus safety would be particularly acute further down the line at the active stations.

Each Main Reserve Depot was connected to a main railway line via a branch line. Sidings with the capacity to hold 100 trucks were constructed about a mile from each Depot. Munitions arriving from factories would be transferred in the siding from the standard gauge trucks onto those of a smaller, 2-foot gauge line that ran into the Depot, hauled by a diesel locomotive. Once in the Depot, the trucks were

Fauld's narrow-gauge railway. (IWM CH 3046)

unhitched from the diesel engines and electric storage battery locomotives took over. These would then haul the trucks down into the underground workings. The trucks would be unloaded with the aid of fixed lifting tackle at various points, and then moved into their correct storage compartments; while the 250lb and 500lb high explosive (HE) bombs were just about man-portable, although it was not recommended, any heavier bombs required mechanical assistance.[7]

Munitions leaving the facility would follow the same process in reverse, and once on the main line would be transported to an Air Ammunition Park, later redesignated a Forward Ammunition Depot (FAD). There were six of these across the country, each relatively central to one of Bomber Command's groups. Each FAD was intended to hold seven days' worth of bombs for the stations within its area. Initially designed to hold around 672 tons of munitions, this was frequently exceeded in practice during the war as demand continued to increase. It was estimated that each FAD would have to handle up to 104 railway wagons of munitions per day, coming in or going out. Material coming in would also include munitions being returned from stations, including empty containers, obsolete or damaged weapons,



Underground storage at No 21 MU Fauld (IWM CH 3043)

and transit or packing materials.[8]

The FADs were constructed above ground, with high explosive bombs being stored in compartments intended to hold around 50 tons of bombs each, although it was not uncommon later for up to 400 tons to be squeezed into this space. Compartments were clustered into groups of four to simplify the infrastructure needed to move the bombs, and each Depot consisted of three such clusters. Each compartment was surrounded by a safety wall, and each cluster of compartments was 400 ft (calculated as a safe distance) from the others. Smaller compartments were also dispersed across the sites to hold incendiaries and other munitions. Generally the main compartments were uncovered except for a tarpaulin or similar temporary measure, but small sheds were provided to hold more sensitive equipment such as fuses.[9]

In some areas, Advanced Air Parks were also established to supplement the storage of the Forward Ammunition Depots. These were meant either to supply isolated RAF stations, or as temporary

overflow storage sites during times of particularly heavy projected usage, for example in advance of the Normandy landings in mid-1944. These Parks were built on the same principles as the FADs, but varied much more in size and capacity and tended to be more basic in their infrastructure. Generally, the flow of bombs through them was expected to be less, or more sporadic, than the FADs.[10]

As an example, in 1941 No 21 MU at Fauld was supplying FADs at Swinderby, Barnham and Lord's Bridge near Cambridge.[11] There may have been more later.

From the Forward Ammunition Depots, munitions were moved to reach the operational RAF stations where they were needed. This part of the journey was largely by road, rather than rail, as many stations were a considerable distance from their nearest railway line. The use of MT was also considered safer – by moving at certain times in well-controlled convoys, the collateral damage of an accidental explosion could be managed. By contrast, a train full of high explosives on a line in a built-up area could wreak havoc if something went wrong.[12]

At the stations, the bombs would be unloaded into the bomb dumps, which were an endless source of headaches for the RAF and the Air Ministry throughout the war. Each station was required to maintain a four-day reserve of bombs, which in 1939 was considered to be 144 tons, but by 1945 this had become an average of 800 tons. At times of peak demand this could rise even more; for example, before Normandy the average bomber station held around 2,000 tons of bombs ready for immediate use. Each Bomber Command station was required to report their holdings by 11am each day.[13]

There were several complicating factors that made things especially difficult when it came to bomb supplies on stations. First, they had to hold an adequate quantity, and this could be difficult to calculate. The holdings could not be determined by simply multiplying the maximum bomb load by the number of aircraft on strength – typically 16 in the mid-years of the war – because a number of factors had to be taken into account. For instance, for distant targets, it might be necessary to trade bombs for fuel and the types of bombs multiplied as the war progressed, creating numerous options, all of which had to be catered for.

As a slight tangent, it is worth considering why the RAF's arsenal of bombs grew from just five types to more than twenty – which does not included torpedoes, sea mines, specialist weapons like Upkeep and

A late-war selection of bombs ranging from the 20,000lb Grand Slam in the background to the 40 lb GP on the shoulder of the airmen in the centre of the picture.

Highball (the bouncing bombs), the 22,000lb Grand Slam, the Buoyancy Bomb, leaflet bombs and various other niche or short-lived weapons. The General Purpose (GP) bombs of the interwar years were a compromise intended to provide the cheapest option across a range of requirements. They were jacks of all trades and, as an inevitable result, masters of none. Their explosive content was 25-30% of their weight, the rest being a thick case, intended to provide limited blast and fragmentation, but not actually producing very much of either. In the late 1930s serious development of larger and more specialist bombs began, with 1,000lb, 1,900lb, and 4,000lb bombs being designed and tested; these entered service in 1940, 1942 and 1943 respectively.

Once it had become clear that the GP bombs were not doing sufficient damage, new variations were created. Medium Capacity (MC) bombs had a higher proportion of explosives, 40-50% by weight, while High Capacity (HC) bombs were even thinner-skinned, with 70-90% of their weight being explosive filling.[14] The HC bombs were later built in 2,000lb 4,000lb, 8,000lb and finally 12,000lb versions, and were designed to create a massive blast over a large radius. Rather than

directly damaging things like machine tools, they would blast open roofs to allow incendiary bombs to fall inside buildings.[15] Incendiaries would play an increasing role; comprising about 6% of bomb loads in 1940 this rose to 25% in 1941 and 42·5% in 1942. Whereas high explosive bombs were largely inert until a detonator or other form of primer was fitted, most incendiary weapons contained highly volatile fillings that needed very careful handling.[16]

Bomb development is really a topic in its own right,[17] but the foregoing provides some idea of the issues involved, and why station bomb dumps had to hold a wide range of stocks, all in sufficient numbers, to be used against different target types.

In reality, there was no such thing as a *standard* bomb load, although a range of standard templates was devised, and these could be adapted to match the nature of a specific target. As much as anything, this helped the logisticians in their work, and certain matrices were developed.[18]

Secondly, returning to the problem considered above – how to calculate the bombs required for a notional 16-aircraft squadron – that became increasingly complicated because the number of aircraft was always in flux. By the middle of the war, most heavy bomber squadrons had 20 aircraft, and by 1945 some had 30. Naturally, this meant that stations had to constantly expand the numbers of bombs they held.

This led to a third, very major issue – space. The airfield expansion programme undertaken by the RAF during the Second World War was one of the largest engineering projects the country had ever seen; some one-third of civil engineering and construction staff in the UK were engaged on building or expanding airfields. They built more than 450 new airfields, and updated the existing ones. Typically, each one needed 50 miles of drainage ditches and 130,000 tons of concrete, adding up to some 36,000 acres, the equivalent at that time of an area between the sizes of Edinburgh and Birmingham.[19] Apart from runways, that concrete was laid, much of it at least a foot thick, to create perimeter tracks, dispersal points and taxiways capable of supporting the tremendous weights of bombs and aircraft being moved around. Building a bomb dump was not simply a case of selecting a field and putting up some blast walls, nor even of laying an area of concrete; it needed proper and extensive underpinning and foundation to take the weight, proper drainage, and, crucially, sufficient access.

At the start of the war, bomb dumps were designed to consist of two compartments each containing 72 tons of bombs.[20] They were to measure 26ft by 16ft, have access to a 9ft wide road, and be located at least 700 yards from the nearest RAF building. During the war, as stations expanded, more and more buildings went up, widely dispersed to make them less vulnerable to enemy attacks. This meant that the open space needed around a bomb store became increasingly hard to find.

By 1942, the safety distances had been reduced to 700 yards from any type of buildings, although with the proviso that natural hollows and other landscape features should be used to mask dumps as much as possible. By then, dumps were to be split into four groups, each of four compartments. Each compartment was to hold 50 tons of bombs, and the groups were to be at least 60ft apart. The roads leading to them were to be expanded to 20ft wide, to allow safer manoeuvring of long trains of bomb trolleys as they were towed around by tractors.[21] This provided a total of 400 tons of storage, which was already inadequate. A squadron of Wellingtons (bearing in mind that most stations hosted two squadrons) needed 224 tons of bombs to be on hand, while the newer Lancasters needed 634 tons of bombs per squadron.[22] Soon after this, holdings for heavy and medium bomber units were increased to 860 tons. More bombs needed bigger dumps, and thus more space. In September 1942 the safety margins were cut, so that bomb dumps only needed to be 400 yards from the nearest RAF building, although the 700 yards rule for civilian buildings was maintained.[23]

Apart from the storage of bombs, space was also needed for their movement. Bombs could not simply be jammed into every space – room was needed to manoeuvre inside the compartments in order to retrieve them and load them onto the bomb trolleys that would take them to an arming area where fuses and pistols were added, before being moved again to be loaded onto aircraft. Tidiness and order were critical, and the best use of space had to be made. For example, 500lb bombs could be stacked around the edges of a compartment two-deep and three high. However, some larger and thinner-skinned types could not be stacked so easily, for fear that the cases of the bombs on the bottom of the stack would buckle. Incendiaries could be a particular nightmare – bearing in mind that in 1942 a Wellington station was supposed to hold 19,440 of the 4lb incendiary bombs, a Lancaster

The station bomb dump at Bardney.

station 30,240 of them, and a Stirling station an incredible 51,840 individual 4lb incendiaries, as well as a couple of thousand larger ones.[24] Fortunately, incendiaries were packed into Small Bomb Containers – oblong metal boxes that came in various sizes – which at least avoided the man-handling of hundreds, or even thousands, of individual bomblets.

One way to provide more working room within bomb compartments was to remove one of the walls. By having the area open onto a roadway, it was much easier to manoeuvre weapons and trolleys, although there were, of course, obvious risks. The safety distances to the next building on that side of the compound would be doubled.

A fourth problem, closely connected to the need for space to move around inside the dumps, was equipment. Early in the war, the standard bomb trolley could only carry loads of up to 500lb. To carry larger bombs, until larger trolleys came along in 1942, trolleys had to be improvised, or the bombs had to be loaded onto trucks. Such improvised solutions were not ideal, and indeed were not always safe.[25]

Lifting the bombs on and off the trolleys was even more of a headache. At the start of the war, manual pulleys were used as

standard.[26] These were slow and had a limited weight capacity. The idea of moving bombs by rolling them was briefly considered but, understandably, this was considered to be impractical and indeed unsafe. In Depots and Parks cranes, pulleys, and gantries were built into the structures, but on airfields such equipment was generally limited to small areas. Although each station should have had a single mobile crane available, these were intended for removing aircraft wreckage from runways.[27] A range of types were in use, lifting from two to five tons, but they were barely suitable for being repurposed to move bombs. Apart from only being able to move one bomb at a time, they represented a critical single point of failure within the system for the heavier bombs. In January 1942, for example, No 61 Sqn was able to despatch only three of its intended eight Manchesters after its crane became unserviceable.[28] In February 1942 a trawl was conducted to obtain more cranes for Bomber Command. Airfields in the other Commands were relieved of their cranes where it was deemed possible, resulting in a haul of 30 new vehicles to be distributed around the bomber airfields.[29]

Gantries began to be added to bomb stores as they were built and expanded. There was some debate as to whether these should be fixed or mobile. Mobile gantries would save on materials and, potentially, be more flexible, but they would also be less sturdy. Fixed gantries would need more materials, because a lattice of girders had to be built to encompass the whole store, but they would have much greater strength. In the end, fixed gantries were adopted as the standard solution, although there remained considerable problems in obtaining the required materials and installing them.[30]

Outloading bombs from the dump was, of course, only half of the problem. At the other end of the process, they had to be winched up into the aircraft. Manual winches were used as standard early in the war, but suffered the same problems with respect to weight limitations and how many bombs a team of airmen could actually lift without rest. Once electric winches had been introduced for use with the Lancaster, the average ‘bombing up’ time fell from 40 minutes per aircraft to just seven. There will surely have been a corresponding saving in the bomb dumps.

By the end of the war the RAF had the capacity to hold approximately 632,300 tons of bombs in the UK. Apart from the

200,000 tons at the Main Reserve Depots, around 250,000 tons was held at the Forward Ammunition Depots and Advanced Air Parks, and the rest on RAF stations. It was a massive, and critical, system, the smooth running of which had been a vital factor contributing to the ultimate victory.

Type	No
Fragmentation 20lb	5,000
General Purpose 40lb	49,939
General Purpose 250lb	149,656
General Purpose 500lb	531,334
General Purpose 1,000lb	82,164
General Purpose 1,900lb	2,141
General Purpose 4,000lb	217
Medium Capacity 500lb	403,000
Medium Capacity 1,000lb	253,800
Medium Capacity 4,000lb	21,000
Medium Capacity 12,000lb	854
Medium Capacity 22,000lb	41
High Capacity 2,000lb	28,633
High Capacity 4,000lb	68,000
High Capacity 8,000lb	1,088
High Capacity 12,000lb	193
Semi-Armour Piercing 500lb	11,600
Armour Piercing 2,000lb	<10,000
Incendiary 4lb	80,000,000
Incendiary 25lb	20,000
Incendiary 30lb (phosphorous)	3,000,000
Incendiary 30lb	413,000
Incendiary 250lb	7,000
Total	**Over 85 million individual units.**
Total weight	**955,044 tons**

UK Bomb Production

Year	Weight
1939	204lb
1940	1,457lb
1941	2,324lb
1942	3,405lb
1943	6,903lb
1944	8,250lb
1945	7,835lb

Average weight of bombs per aircraft

Notes:

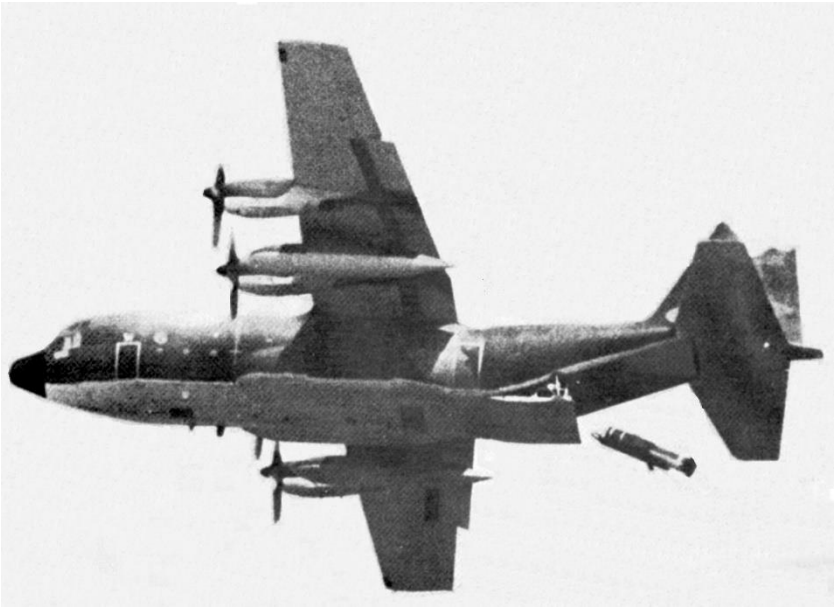
1 AHB(RAF) Narrative 'Works', 1956, p256 (also accessible at TNA as AP3236 at AIR10/5559).
2 *Ibid*, p258.
3 *Ibid*, pp259-267.
4 *Ibid*, p257.
5 *Ibid*, p259.
6 TNA AIR14/1065, Enc 104B, 8 September 1941.
7 'Works', p267
8 AHB(RAF) Narrative 'Maintenance', 1954, pp122-123 (also accessible at TNA as AP3397 at AIR10/5552).
9 'Works', pp267-269.
10 *Ibid*, p269.
11 TNA AIR10/1625, App B.
12 'Maintenance', p122.
13 *Ibid*, p124.
14 AIR41/81; SD719, Armament Vol 1: Bombs and Bombing Equipment Pt 1, Ch.10.
15 *Ibid*, Ch.11.
16 For more on the history of bomb development, see AHB(RAF) Narrative 'Armament Vol 1: Bombs and Bombing Equipment', 1952, Part 1 at TNA AIR41/81.
17 See, for example, *RAFHS Journal* No 45.
18 See, for example, TNA AIR10/1625: Bombs, Ammunition, and Pyrotechnics: Storage of, and distribution of in War, 1939.
19 TNA AIR20/4014, Air Ministry Directorate General of Works: Summary of Works Services carried out for RAF 1939-1945
20 TNA AIR10/1625, p10.
21 TNA AIR14/1065, Enc 132a.
22 *Ibid*, Enc 111a. For 1944 figures, see TNA AIR14/1066, Enc 93.
23 *Ibid*, Enc 235a.
24 *Ibid*, Enc 205a.
25 AIR41/81; SD719, Armament Vol. 1: Bombs and Bombing Equipment , p313.
26 *Ibid.* pp314-318.
27 TNA AIR14/1065, Enc 88a.
28 *Ibid*, Enc 138a.
29 *Ibid*, Enc 147a.
30 *Ibid*, Enc 138a.

THE HERCULES – AS A SEA-MINE LAYER?

by AVM Graham Skinner

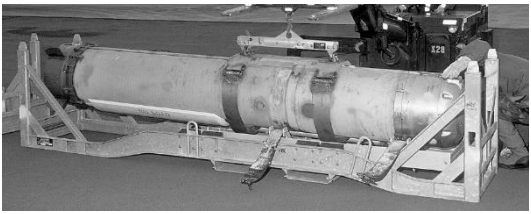
Operation CORPORATE saw many of the RAF's aircraft being adapted to perform in roles, adopt procedures and/or deploy weapons which had never previously been considered. In the case of the Hercules, for instance, and as discussed at this Society's *Hercules in the RAF* seminar in October 2019, it was given, in very short order, an AAR capability, as both tanker and receiver. It is less well known, however, that the Hercules was also given the, at least notional, capability of delivering sea-mines.

The concept of aerial sea-mining was not new, of course, and I had come across it during my tour as Wpn Eng 1a (RAF) at Lacon House in the early 1980s when I was responsible *inter alia* for air-launched torpedoes. At the time, the USN was developing a Cargo Aircraft Mine Laying System (CAMLS) which I was able to see in the course of a visit to the USA as a member of an Ops (MP) (RAF) team. It was envisaged that the system would be fitted to the C-130H, C-141A and



A Hercules dropping a Mk 60 Captor mine via its CAMLS. (US Navy)

Above, wartime British air-delivered sea-mines, stocks of which were subsequently retained on a contingency basis. Below, the broadly similar post-war American Mk 60 Captor.



C-5A and would involve, depending on the capacity of the aircraft, delivering between 20 and 40 mines similar in size to the US Mk 60 Captor.

I was still in my Wpn Eng (RAF) post in 1982 when possible responses to the increasing tension in the South Atlantic were being examined. One possibility considered was the use of a number of aerial sea-mines which were found, unexpectedly, stored at the RN Armaments Depot at Milford Haven, together with the necessary Flight-in-Air-Material (FIAM) and fuses (both magnetic and acoustic). It appeared likely that the Navy did not know that the demise of the Shackleton had meant that we no longer had valid CA releases nor an operating concept to carry these bomb-bay lugged sea-mines in our current maritime aircraft.

The sea-mines we had were some 9-10ft long, 17" in diameter, and weighed about 1,500lbs. The FIAM had a front-fairing designed to disintegrate on contact with the water. Not unlike the American Captor, the rear of the mine had a section housing the parachute, which detached

automatically on entering the water. As with air-launched torpedoes (Mk 46 and Stingray), while the RAF advised on air aspects, overall responsibility for the design, and supply, of sea-mines rested with the RN.

At the time, with thoughts of CAMLS in mind, and the lack of a dedicated launch platform, we considered whether the Hercules might be adapted to deliver these unexpected, and potentially valuable, additions to our inventory. Together with JATE, a flat-bed delivery arrangement was devised; it comprised a plywood base fitted with some semi-circular cradles in which the mine would lie, restrained from moving, both laterally and fore and aft, but allowing the parachute to function correctly. All the plywood items were designed to be frangible to permit the mine to enter the water on a known underwater trajectory to settle on the sea-bed in a predictable location, according to the instructions in the relevant RN manual. This was a critical consideration as it permitted the plotting of safe sea lanes for our own vessels. It was thought that a Hercules could accommodate six or seven dressed mines which would be delivered at low level by personnel of 47 Air Despatch Sqn RLC.

Using a Hercules from Lyneham and dummy loads, the JATE scheme was tested openly on the RN Underwater Weapons Range off the coast at Falmouth; the delivery procedures were successfully proven, and the resting locations of the inert mines were marked on the seabed by RN divers.

In the event, the mine-laying option was not pursued. There were, after all, plenty of other urgent tasks for the Hercules force and the available stock of mines was limited when compared to the size of the FIEZ. Nevertheless, the trials had demonstrated the feasibility of aerial sea-mine laying and added to the remarkable flexibility and utility of the Hercules, turning the RAF's workhorse into a potential warhorse.

A WASTING ASSET? THE RAF'S MEDIUM BOMBER FORCE IN THE AFTERMATH OF THE NASSAU AGREEMENT, 1962-1982.

by Clive Richards

On 18 December 1962 John F Kennedy flew to Nassau in the Bahamas to confer with Harold Macmillan. Macmillan was no stranger to such events, having met with Dwight D Eisenhower ten times since becoming Prime Minister in January 1957, and with Kennedy himself on five occasions following the latter's inauguration as President in January 1961. Greeting Kennedy on his arrival at Windsor Field, Nassau, Macmillan reflected, 'that these forms of meetings that I have had the privilege of having with you, sir, and your predecessors, mark a most important, indeed vital part in the close association between our two countries, who have been through so much together in the past, and who have such high hopes together for the future.' In response, Kennedy noted that while he doubted, 'that the world is so much better off after our previous five meetings, but I feel that at least as President I have been better off, and have benefitted greatly from the counsel and friendship which you have shown to me, Prime Minister, to my predecessor, your old friend General Eisenhower, and also to the American people who have a heavy claim laid on you from earliest birth.'[1]

During the following three days, discussions between the two leaders and their teams ranged over, 'a wide range of topics.'[2] Much of their time, however, was spent on the thorny question of the composition and control of the West's nuclear arsenal. According to the joint communiqué issued at the conclusion of the meeting, Macmillan and Kennedy had, 'discussed in considerable detail policy on advanced nuclear weapons systems and considered a variety of approaches,' a résumé of their discussions being issued in the form of an attached *Statement on Nuclear Defence Systems.*[3]

The deliberations at Nassau would have profound and ongoing implications for the RAF's Medium Bomber Force (MBF). This paper will begin by outlining the status of the MBF at the time of the Nassau Agreement. It will go on to consider how the agreement impacted upon the role, operation and development of the MBF, before going on to determine how, and to what degree, the functioning of the force further

evolved in response to changes in NATO strategy during the latter part of the 1960s and into the 1970s.

What was the Medium Bomber Force?

Before examining the effects of the talks at Nassau on the MBF, it is first necessary to establish what was meant by that term. At the end of 1962 the RAF's strategic strike/attack assets based in the UK and their supporting infrastructure came under the auspices of RAF Bomber Command. The latter was divided formally into two constituent Groups – Nos 1 and 3 – each of which was charged with administering sixteen operational Stations.

However, the formal guidance provided by the Air Ministry to the then AOCinC Bomber Command, Air Mshl Sir Kenneth Cross, defined the composition of the Command in functional, rather than administrative, terms. 'Bing' Cross, a highly experienced officer with a distinguished wartime record, had served as AOC 3 Gp before being appointed AOCinC on 20 May 1959.[4] During his tenure, Cross received a series of Command Directives that specified the nature and scope of his position. According to a revised version of this Directive, dated 21 May 1962, Cross was, 'responsible to the Air Ministry for the overall efficiency, training and readiness for war of all formation[s] and units allotted to your Command,' and was tasked with maintaining, 'your forces in peace to the highest standard of operational efficiency that can be achieved with the resources made available to you.'[5]

Cross's Directive went on to divide Bomber Command into six 'forces' that cut across his Command's administrative structure. Three of these – the Reconnaissance Force, the Electronic Warfare Force and the Tanker Force – were cast primarily in vital, but nevertheless supporting, roles, both to the Command's combat elements and the wider Royal Air Force. The remaining three included the Tactical Bomber Force (TBF) of three Valiant squadrons. The TBF had been established at Marham in 1960-61 to replace the Bomber Command Canberra squadrons previously assigned to NATO; according to the Command Directive, the TBF was, 'assigned to the Supreme Allied Commander Europe,' (SACEUR) and, 'operated (…) on his behalf from permanent bases in the United Kingdom.' The Directive defined this force's task as being, 'to comply, so far as available resources permit, with the Supreme Allied Commander's operations, readiness

Three Marham-based Valiant squadrons were assigned to SACEUR as the Tactical Bomber Force and, as such, were armed with US weapons supplied under Project E. Originally painted in ant-flash white, like the rest of the V-Force, the TBF later switched to low-level operations and the aircraft were camouflaged.

and training requirements.' Bomber Command also fielded a Strategic Missile Force of sixty Thor Intermediate-Range Ballistic Missiles (IRBM), operated by twenty squadrons (see Figure 1), the employment of which was, 'subject to joint decision of Her Majesty's Government in the United Kingdom and the Government of the United States of America.'[6]

The kernel of Bomber Command's offensive capability, however, was the MBF. This force was, 'under national control with permanent bases in the United Kingdom.' At the time of the Cuban Missile Crisis of 1962, it consisted of a total of fourteen squadrons, six of which (from No 3 Gp) were equipped with Handley

Oxidant being loaded into a Thor during a routine practice count-down.

HQ RAF Bomber Command (High Wycombe)			
HQ 1 Group (Bawtry)		**HQ 3 Group (Mildenhall)**	
Bardney	*Driffield*	Cottesmore	*Melton Mowbray*
Bassingbourn	Finningley	*Feltwell*	*North Luffenham*
Breighton	*Full Sutton*	*Folkingham*	*North Pickenham*
Caistor	*Hemswell*	Gaydon	*Polebrook*
Carnaby	Lindholme	*Harrington*	*Shepherds Grove*
Catfoss	*Ludford Magna*	Honington	*Tuddenham*
Coleby Grange	Scampton	Marham	Wittering
Coningsby	Waddington	*Mepal*	Wyton

Fig 1: RAF Bomber Command in April 1962.[7] *Thor sites in italic.*

Page Victors and eight (from No 1 Gp) with Avro Vulcans; a ninth Vulcan unit, No 35 Sqn, formed at Coningsby on 1 December 1962. The essential *raison d'être* of this force centred upon its ability to deter any potential aggressor by threatening credibly to deliver a devastating response. 'The aim of Western policy', MRAF Sir John Slessor contended in an address delivered at Chatham House on 10 March 1953, 'is not primarily to be ready to win a war with the world in ruins – though we must be as ready as possible to do that if it is forced upon us by accident or miscalculation. It is the prevention of war. The bomber holds out to us the greatest, perhaps the only, hope of that. It is the great deterrent.'[8] In an essay published in *The Journal of the Royal United Service Institution*, six years later, another future Marshal of the Royal Air Force – Neil Cameron, then a wing commander serving as PSO to CAS – defined: 'The Deterrent' as,

> '. . . the ability and demonstrable power to inflict an unacceptable degree of damage upon the enemy's homeland; the threat of its use and the unmistakable determination to carry out that threat if necessary being employed to dissuade the enemy from embarking upon any adventure aimed at world domination. The ability and power is supplied by a nuclear force of bombers and/or missiles backed by the political skill required to make full use of the concept, and last but not least the national will and courage to back the deterrent to the extent of authorizing its use should the international situation become so desperate as to demand it. The principles of military power, political utilization,

> and national will are completely complementary in deterrent strategy; none of them can stand without the other.'[9]

Responsibility for demonstrating this, 'power to inflict an unacceptable degree of damage upon the enemy's homeland,' fell to the MBF. An annex to the Directive issued to Cross in May 1962 stipulated that it should, 'serve as the principal national deterrent to global war by maintaining a capability to meet aggression with immediate nuclear retaliation.' Should deterrence fail, the MBF was, 'to destroy the enemy's will and ability to fight in the shortest possible time.'[10] In the event that Britain was forced to respond alone to a Soviet assault, 'the primary task,' of Bomber Command was, 'to attack such of the major centres of administration and population as are within the range and capability,' of the force. In 1958, the Air Staff noted that, of 131 cities with a population of over 100,000, 98 were within 2,100 nautical miles of the UK and that, when fully developed, the Victor 2 would have, 'a radius of action sufficient to reach the most distant of targets by direct routing [*with any*] extra distance that would have to be covered to cater for tactical routing [*being*] compensated for by flight refuelling.'[11]

However, while Bomber Command did prepare for the possibility of mounting an independent national response to a Soviet attack, it was much more likely that, in the event of a global war, the UK would act in tandem with its NATO partners – notably, the USA. Cross's predecessor as AOCinC Bomber Command, Air Mshl (later, Air Chf Mshl) Sir Harry Broadhurst, had in March 1956 been directed, 'To take all possible steps to effect the closest liaison and co-operation with the Strategic Air Command of the United States Air Force.'[12] A 'Progress Report on the Readiness of the Medium Bomber Force' prepared in June 1959 noted that, 'A co-ordinated Bomber Command/Strategic Air Command strike plan has been worked out in detail, and is now effective; crews are briefed and trained on their pre-assigned targets for both unilateral and co-ordinated plans.'[13] In his *RUSI Journal* article, Cameron quoted CINCSAC, General Thomas Power, as crediting the V-Force with, 'an important place in our joint operational plans which are now fully co-ordinated. Should the free world ever be attacked by the Soviet Union, rapid reaction would be vital and having regard to the British closer proximity we are relying on her V-bombers to provide an important part of the first wave of the allied retaliatory force.'[14] Cross's

1962 Directive stipulated that were the UK and USA to act in concert, the MBF's task was, 'to attack whatever targets had been allocate[d] to it in the Allied plans.'

> 'During the preparation of these plans the allocation of targets to the bomber force is to be determined solely by operational considerations of timing, tactics, aircraft performance and weapon availability, subject to the proviso that the combined strike plan shall include targets which must be hit in the first strike with the intention of finishing the war quickly and restricting as far as possible the damage to the UK and WESTERN EUROPE.'[15]

If the MBF was to fulfil this deterrent role effectively, it was vital that its ability to respond to any attack be seen to be credible. Two issues threatened to undermine the viability of the force. The first was its vulnerability to a ballistic missile attack whilst on the ground. The R-12 IRBM (SS-4 *Sandal*) entered service in 1959, and by the summer of the following year the 'Missile Force for Strategic Missions' – the *Raketnyye Voyska Strategicheskogo Naznacheniya* (RVSN) – could field 248 R-12 launchers operated by 31 regiments.[16] Their appearance raised the spectre of the MBF being destroyed on its airfields by a surprise Soviet first strike. 'I am to state,' wrote ACAS(Ops), AVM John Grandy, in a directed letter to Cross, dated 13 May 1960,

> 'that recent intelligence appreciations conclude that the Soviets have available a substantial number of intermediate range ballistic missiles. The tactical warning available on this missile threat could be as low as three minutes for an IRBM launched on a low trajectory from EASTERN GERMANY; but this amount of tactical warning will not be available until 1963 when BMEWS [the Ballistic Missile Early Warning System station then under construction at RAF Fylingdales] is expected to be operational.'[17]

The second issue concerned the ability of the V-Bombers to evade or defeat Soviet air defences. Although the Valiant, Victor and Vulcan had represented the cutting-edge of bomber design in the early 1950s, by the end of that decade concern was mounting as to their ability to reach their targets. 'Successful deep penetration of the Soviet defences

The Mk 1 V-bombers 'represented the cutting-edge of bomber design in the early 1950s.'

is likely to become increasingly complex,' Grandy warned, 'since more targets are being protected by the installation of short range SAGW [Surface to Air Guided Weapon] systems to supplement the existing large fighter force.'[18] The capability of these new SAGW systems was demonstrated graphically on the morning of May Day 1960, when an S-75 Desna (SA-2 *Guideline*) regiment near Sverdlovsk shot down a Lockheed U-2 flying at around 67,000ft.[19] Subsequently, during the Cuban Missile Crisis, another high-flying U-2 was shot down over the island on 27 October 1962 by three S-75 Desna missiles.[20] A US National Intelligence Estimate submitted by the Director of Central

Intelligence four days after the latter incident observed that Soviet, 'Defenses against hostile aircraft, especially against medium and high altitude bombers, have been greatly strengthened in recent years by the widespread deployment of surface-to-air missile (SAM) systems, improved interceptors with air-to-air missiles (AAM), and advanced equipment for air defense warning and control.'[21] It went on to warn that,

> 'The significant improvements in the Soviet air defense system which have been noted during recent years and which will be extended during the next few years will progressively reduce the chances of successful attacks by manned bombers. Successful penetration by manned bombers will therefore require increasingly sophisticated forms of attack.'[22]

Several initiatives were underway by the end of 1962 to maintain the relevance of the MBF into the late 1960s. One measure to mitigate against the threat posed by a Soviet attack on Bomber Command's airfields was dispersal. During any transition to war period, it was planned to scatter the MBF in detachments of two or four aircraft to dispersal airfields across the UK, increasing both the number of targets that the Soviet Union would have to strike successfully in order to destroy the force in its entirety and the chances of at least part of the force surviving to retaliate.

A second was what Humphrey Wynn would later characterise as an, 'overriding obsession with readiness.'[23] In order to guard against being surprised, every effort was made to ensure that Bomber Command – and the MBF in particular – could be quickly be brought onto a war footing. At the end of 1961, Bomber Command was required to, 'produce ready for combat' (or 'generate') 20 percent of its aircraft within two hours of an alert, rising by stages to 75 percent within 24 hours.[24] Its ability to meet these targets was tested by a regular round of exercises, culminating with the introduction of Exercise MICKEY FINN at the end of 1961. During the latter, 'readiness procedures [*were*] carried to the point of some dispersal of aircraft.' A key feature of the exercise was the intent to, 'test what the Command can do starting from its normal day-to-day state, without advance preparation,' and MICKEY FINN was therefore, 'carried out without prior announcement, either within the Service or publicly.'[25] During

A scramble take-off – typically, all four airborne within 2 minutes from cold.

MICKEY FINN II, which took place in September 1962, the Command generated 101 out of 112 available aircraft within 24 hours – 90 percent of the total.[26] However, the ultimate expression of this drive to ensure that the MBF could respond rapidly to a Soviet attack was the introduction of Quick Reaction Alert (QRA). At the end of 1961, Cross proposed that each MBF squadron should maintain one aircraft and crew at fifteen minutes readiness to scramble ('Readiness State One Five'). During a discussion of this proposal in the Air Council, CAS, Air Chf Mshl Sir Thomas Pike, argued in favour of such a step, noting that it, 'would improve the effectiveness of the medium bomber force. Its state of readiness would be brought into line with that of the Valiants under SACEUR. This would improve the morale of the operating crews and staffs throughout the Command and improve our already high standing with Strategic Air Command.'[27] The measure was duly implemented in the following year and by the time of the Cuban Missile Crisis in October 1962 fourteen MBF aircraft and three of the TBF were held on QRA.[28]

While readiness and dispersal procedures might ensure that at least a portion of the MBF would be able to take off from the UK in the face

of a Soviet attack, that did not mean that the aircraft would reach their targets. Dealing with the problem of penetrating Soviet airspace required new weapons and techniques. Up to the late 1950s both the RAF and the USAF continued to regard the ability to fly higher and faster as being key. 'We have come to recognize,' the then Assistant Chief of Staff, Intelligence at HQ USAF, Maj Gen James H Walsh, stated in the Winter 1958 issue of the Central Intelligence Agency's in-house publication *Studies in Intelligence*,

> 'that the attack force with the higher altitude capability, generally speaking, is the force with the greater penetration capability. To achieve tactical altitude advantage we are moving into speeds up to Mach 3 as a result of improved rocket fuels, higher thrust engines, aerodynamic advances, and even newer black boxes. I am talking about situations up to 100,000 feet.'[29]

In the United States, such thinking led to the North American XB-70A. Flight test results indicated that the XB-70A was capable of 1,721 kt at 75,550 ft and had a combat range of 2,969 miles.[30] This troubled programme resulted in just two XB-70As being manufactured, one of which was lost in an accident in 1966; the second was transferred to NASA in 1967 and subsequently retired. In Britain, it resulted in the Avro 730, an aircraft to replace the V-Bombers, which had a projected maximum speed of 1,650 mph between 55,000 ft and 70,000 ft and a scheduled in-service date of 1965.[31]

The development of the Avro 730 was halted in 1957 in favour of delivery systems that did not require an aircraft to overfly the target. Work on one such system was already underway. In May 1956 Avro had been contracted by the Ministry of Supply to co-ordinate the development of an air-launched stand-off missile, 'to be carried by all three V-Bombers, have a range of at least 100nm and carry a warhead weighing 4,500lb.'[32] The project suffered repeated delays; moreover, it became clear that even when BLUE STEEL did eventually enter service, it would in itself be insufficient to ensure that the MBF could strike targets in the USSR. A longer-ranged system was needed. Although the initial system of choice was the BLUE STREAK ground-launched Medium Range Ballistic Missile (MRBM), this was cancelled in 1960 in favour of adopting an Air Launched Ballistic Missile (ALBM) capable of being launched from well outside Soviet airspace.

A BLUE STEEL-armed Victor B2 of No 139 Sqn.

Just such a system was then under development in the USA – the Douglas GAM-87 Skybolt, to be launched from the MBF's Vulcan B2s. According to John Boyes,

> 'Skybolt had been unofficially on the Air Ministry's agenda since the start of the programme in 1958. The Ministry could present a very strong argument in favour of the weapon being made available to the RAF. Very considerable funds had been invested in the creation of the V-force with its trio of medium bombers; this would allow a greater return on the investment – a compelling argument from a Treasury point of view – and would allow the bombers to operate safely outside the range of ever more effective Soviet air defences. It would require comparatively little expenditure on its logistic support and America would bear the significant costs of developing the missile.'[33]

By the end of 1962, therefore, the future of the MBF, as the UK's strategic nuclear deterrent force, was tied largely to the deployment of Skybolt. These would be launched at high altitude by Bomber Command's Vulcan B2s. Skybolt was incompatible with the Victor B2 due to the latter's limited ground clearance, and it was therefore planned

that the MBF would combine Skybolt-armed Vulcan squadrons and Victor squadrons carrying BLUE STEEL. Events away from the MBF, however, were to upend these plans. The development of Skybolt proved difficult and costly; although the USAF remained committed, support in the Department of Defense waned and it became clear during the latter part of 1962 that the Kennedy administration intended to axe the programme. Matters came to a head when Macmillan and Kennedy met at Nassau in December. While a detailed account of what transpired at Nassau is beyond the scope of this paper, its implications were summarised subsequently by Air Chf Mshl Sir Ralph Cochrane in the following terms:

> 'The communiqué issued after the meeting covered one main matter of policy, the formation of a NATO nuclear force from weapons assigned to it by America and Britain, and possibly later by France, and one subsidiary matter, the type of missile to be used when the V-bomber force becomes obsolete within the next decade. It does not, however, attempt to establish the means by which these weapons are to be controlled.'[34]

The 'NATO nuclear force' referred to by Cochrane – the Inter-Allied Nuclear Force – was intended to comprise, 'those nationally-owned nuclear delivery forces (including UK V-bombers and US Polaris subs) which are assigned by member governments to NATO.'[35] Under this arrangement, the MBF would now become a NATO asset, whilst remaining available to the UK if necessary. On returning to London, Macmillan described the deal he had done in his diary:

> 'Broadly, I have agreed to make our present Bomber [*sic*] force (or part of it) and our Polaris force (when it comes) a NATO force for general purposes. But I have reserved absolutely the right of HMG to use it indefinitely 'for supreme national interest'. These phrases will be argued and counter-argued. But they represent (wh[ich] [the] Americans finally accepted) to make a proper contribution to interdependent defence, while retaining the ultimate rights of a sovereign state. This accepts the facts as they are.'[36]

While the concept of an 'Inter-Allied Nuclear Force' would fall by the wayside, the MBF would henceforth become a NATO asset. The

annual *Statement on Defence* published in February 1964, confirmed that, 'in accordance with the intentions expressed in the Nassau Agreement [the MBF had been] assigned to NATO,' in May of the previous year. 'The Supreme Allied Commander Europe', the *Statement* continued, 'described this as "an important and powerful addition to the air capability of Allied Command Europe." The V-bomber force is now fully integrated into SACEUR's war organisation and covers a substantial proportion of the co-ordinated targetting [*sic*] plan.'[37] The way in which this reassignment would be implemented in practice was hammered out in the immediate aftermath of the Nassau meeting. On 9 February 1963, the Chief of the Defence Staff, Lord Mountbatten, reported to the Cabinet Defence Committee on a meeting between him (representing the UK Chiefs of Staff) and the US Chiefs of Staff. During this exchange, Mountbatten noted that,

> 'Agreement had been reached on the definition of the word "assignment" as used in the Nassau Agreement. The effect of this definition would be to restrict the responsibility of the NATO Commander to the planning and targetting [*sic*] of the national nuclear forces assigned to him. The organisation, equipment, training and day-to-day control of national forces would remain with national commanders.'[38]

The AOCinC Bomber Command was duly issued with a Command Directive in July 1963 that reflected the MBF's revised status. In contrast to the May 1962 Directive, the new document stated explicitly that the MBF was, 'assigned to the Supreme Allied Commander Europe for targetting [*sic*] and the planning, co-ordination and execution of strikes in accordance with his Nuclear Strike Plan,' while being otherwise under national control.[39] The tasks assigned to Bomber Command had also been revised. Its first priority remained to act, 'as the principal national deterrent to global war.' However, alongside being responsible for the destruction of, 'those targets allocated to you in the National Plan' should Britain be forced to act alone, 'In the event of general war,' Bomber Command was now instructed, 'to destroy those targets allocated to you by SACEUR in accordance with his Nuclear Strike Plan.'[40]

This plan, designated SACEUR's Scheduled Strike Program (SSP), related to strikes that were, 'pre-targeted by SACEUR as opposed to

battlefield weapons systems.'[41] The nature of the SSP was outlined in a study submitted to NATO's Military Committee in April 1965. According to this source, the Supreme Headquarters Allied Powers Europe had, 'formulated a Threat List of some 650 targets arranged in order of priority.'

> 'Heading this list are the IR/MRBM sites in the Soviet Union, most of which are beyond current effective ACE strike range and capability. Second priority is given to medium and light bomber airfields housing nuclear bombers. These are also largely in the USSR. Other airfields, useable as bomber dispersal bases, or currently housing fighter aircraft are of a lower priority. These are spread throughout the Western USSR and the Satellites. Other threat components include offensive control centers, nuclear storage sites, air defenses, missile launching submarine bases (pens).'[42]

The MBF was allocated approximately 100 of the 650 strikes included in the SSP. The significance of this contribution was accentuated by the range of the Vulcan and Victor. 'Approximately 65% of the planned strikes by ACE forces are limited to satellite targets due to range capabilities,' the report noted. 'Yet the Soviet bloc nuclear delivery is very largely on USSR soil today and currently must be targetted [*sic*] by external forces, with some ACE strikes by Polaris, and the V-Force.'[43]

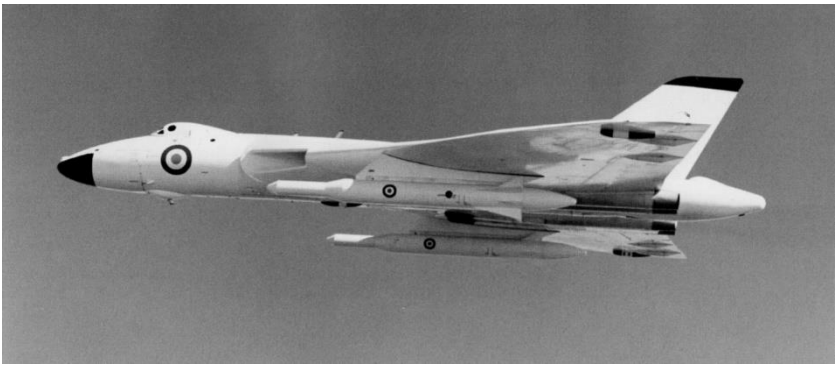
The SSP was, 'totally pre-planned for automatic execution at R-Hour,' and was aligned with the US Single Integrated Operational Plan (SIOP).[44] 'SACEUR's constant, close coordination of the US Joint Strategic Target Planning Staff [*ensured that*] SACEUR's Threat List receives programmed strike coverage of a magnitude designed to provide a very high expectancy of success.'[45] Together, the SIOP and the SSP formed a, 'highly complex strike programme [*which provided for*] multiple strikes against each key target in order to achieve a very high degree of assurance that the objective will be accomplished.' Attacks against individual targets would be, 'diversified both by type of weapon system and deployed area to enhance the probability of at least one successful strike on each key target.' For example, a Soviet airfield housing thirty medium bombers could have been targeted by at least five systems, attacking over the space of five hours – a Polaris

System	No of strikes	Target authority	Time after R-Hour/E-Hour
Polaris SLBM (US Navy)	1	SACEUR	20 minutes
Minuteman ICBM (USAF)	1	US	30 minutes
V-Bomber (RAF)	1	SACEUR	2 hours
B-47 (USAF)	1	US or SACEUR	2 hours 20 minutes
B-52 (USAF)	1	US	5 hours

Fig 2: SACEUR's SSP and the SIOP: a hypothetical strike plan against a Soviet base housing 30 medium bombers, 1965.[46]

missile fired from one of the US Navy ballistic missile submarines assigned to SACEUR on the same basis as the MBF, a USAF Minuteman ICBM, an aircraft from the MBF, and a USAF B-47 and B-52 targeted by either the US national authorities or SACEUR (Figure 2).[47] 'If the target is destroyed by the Minuteman Strike', the report went on to state, 'this would be noted (through visual, radar, or photo means) by the first bomber to arrive over the target, in this case the V-Bomber. Subsequent strikes would then be rerouted to secondary targets.'[48]

While the targets that the MBF would be called upon to strike may have altered following Nassau, this did not affect the way in which the MBF went about the task in hand. The same cannot be said for Cochrane's 'subsidiary matter' – namely, 'the type of missile to be used when the V-bomber force becomes obsolete within the next decade.' The *Statement on Nuclear Defense Systems* issued at the end of the meeting stated that the Kennedy administration, 'had decided to cancel plans for the production of SKYBOLT for the United States.' Despite this, the administration recognised that, 'the purpose of the offer of SKYBOLT to the United Kingdom in 1960 had been to assist in improving and extending the effective life of the British V-bombers.' Kennedy had therefore, 'expressed his readiness to continue the development of the missile as a joint enterprise between the United States and the United Kingdom, with each side bearing equal shares of the future cost of completing development'.[49] Alternatively, Kennedy suggested that the RAF could adopt the GAM-77 (later, AGM-28) Hound Dog stand-off missile, which had entered service with SAC in the previous year and outperformed BLUE STEEL.[50]



A 1960s might-have-been – a Skybolt-armed Vulcan B2.

Macmillan rejected both offers. Instead, the two leaders agreed that the US would, 'make available on a continuing basis Polaris missiles (less warheads) for British submarines.'[51] The decision to abandon Skybolt and procure Polaris in its stead marked the end of attempts to maintain the MBF as the cornerstone of Britain's strategic deterrent force over the longer term. Rather, the Air Ministry's new task was to maintain the credibility of the MBF with the material at hand until the Royal Navy's Polaris submarines were able to assume that role. Given the limitations of BLUE STEEL, it was clear that the V-Force would continue to be required to fly relatively close to or over the target. The answer was a change in attack profile. Rather than try to penetrate Soviet airspace at high altitude, the MBF would now do so at low level.

Such a notion was far from new. Bomber Command's Operational Research Section had looked at, 'The Effects of Low-Level Tactics on the Operational Range of the Valiant,' as early as March 1956.[52] Rather more recently, during a discussion of electronic countermeasures at a conference of Bomber Command's Group, Station and Squadron Commanders, SASO 3 Gp suggested that, 'low level penetration provided the answer,' to the challenge posed by increasing Soviet air defences. Cross ruled that, 'the discussion should be limited to the present policy of high level penetration. The switch to low level would amount to a major policy change.'[53]

Nevertheless, just such a change in policy was now undertaken. Given that, 'in the absence of SKYBOLT, the credibility of the V-force equipped solely with BLUE STEEL and free-falling weapons and

operating at high altitude at present must inevitably diminish to some extent beyond 1965,' in a paper considered by the Cabinet Defence Committee on 23 January 1963, the Minister of Defence, Peter Thorneycroft, outlined 'those measures which will improve the capability and therefore the credibility of the V-force between 1965 and the time when we expect to have POLARIS in service.'[54] The Committee approved, 'subject to the normal processes of inter-departmental consultation,' implementation of the modifications, 'necessary to enable the V-bombers to deliver their attack at low level.'[55]

The most visible of these changes was the aircraft's colour scheme, with camouflage now being applied to their topsides in place of the previous overall anti-flash white finish. Other modifications included the ability to launch BLUE STEEL at low level. This new capability was shown off to the press by the Air Minister, Hugh Fraser, and the AOCinC, Air Mshl Sir John Grandy (who had succeeded Cross in post on 1 September 1963), at Wittering in February 1964. Fraser and Grandy, according to *Flight International* journalist Robert Rodwell, 'strongly urged us to accept that we have – crewed, in service, ready – latter-day Victors and Vulcans, with attendant missiles, able to approach high, sneak in low and separate at heights well below defensive radar beams, the Blue Steel to continue to target close to the ground. It gives us, in the language of these deterrent times (and of Mr Fraser), "an expanded range of options."'[56]

The latter part of the 1960s would see the MBF continue with the annual round of exercises, overseas deployments and QRA. To facilitate low level attacks, a new lay-down nuclear weapon – the WE177B – was introduced from September 1966.[57] The strength of the MBF was drawn down gradually as first-generation Vulcan and Victors were retired or re-roled – notably, in the case of the Victor, to replace the Valiant tankers following their sudden withdrawal from service on 27 January 1965. With the disbandment of Nos 100 and 139 Squadrons on 30 September and 31 December 1968 respectively, the MBF became an all-Vulcan force. The following year ushered in further changes to the size and armament of the force. The transfer of Nos 9 and 35 Sqns to Akrotiri in January, together with the disbandment of No 83 Sqn at the end of August, would see the MBF reduced to just Nos 27, 44, 50, 101 and 617 Sqns. See Figure 3.[58] Additionally, August would also

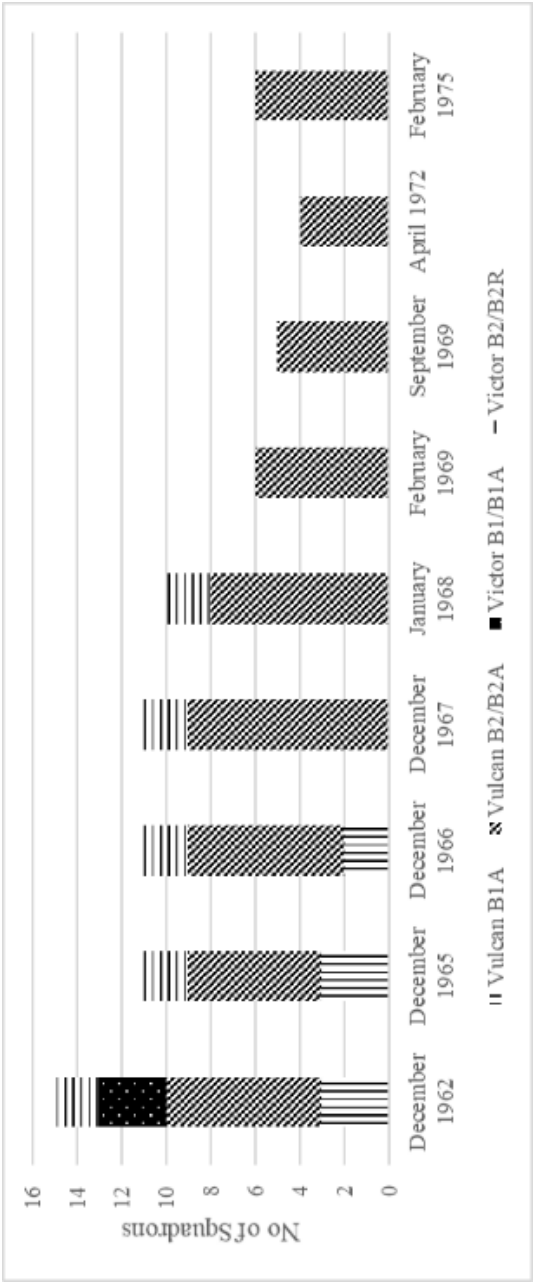


Fig 3: Composition of the Medium Bomber Force, 1962-1982.

mark the beginning of a programme to convert twenty-four Vulcans previously modified to launch BLUE STEEL, back into free-fall configuration, and by the end of 1969 the missile had been withdrawn from service.[59]

Responsibility for maintaining the UK's strategic nuclear deterrent transferred to the Royal Navy's Polaris submarine force at midnight on 30 June/1 July 1969, bringing to an end the MBF's permanent QRA commitment. This might have been expected to mark the beginning of the end for the MBF. That it did not reflects the failure of the Ministry of Defence to introduce into service a replacement for an aircraft that had been used by the RAF for even longer than the V-Bombers – the Canberra. While Bomber Command's own Canberra-equipped Light Bomber Force had rapidly given way to the MBF in the later 1950s, the Canberra had soldiered on with RAF Germany in the interdictor role, and with squadrons in the Middle and Far East. Attempts to develop or procure a new aircraft to replace the Canberra in this role, however, ended in failure. Following the cancellation of the TSR2 in 1965, it was decided to purchase just 50 General Dynamics F-111s to serve both in the UK and overseas as the 'spearhead' of the RAF's strike force, with the MBF following behind. However, the subsequent cancellation of the F-111 meant that, until a suitable aircraft was procured in numbers, the Vulcan would have to soldier on. 'Ever since the decisions of the 1965-66 Defence Review,' Sir John Grandy – now CAS – wrote pithily in a memorandum to the Secretary of State for Defence at the end of February 1968,

> 'the Air Staff had had in prospect the uncomfortable situation of depending on the Vulcan as an effective instrument of war in conventional operations until such time as the new combat aircraft came along. The decisions of last month made matters very much worse. Not only was the spearhead force excised, but as a result of this change in defence priorities we now find ourselves having to depend to a far greater extent on Vulcans for conventional operations in the much tougher operational environment of Europe.'[60]

Grandy's reference to conventional operations indicated another change to the MBF's role at the end of the 1960s. In 1967, NATO moved formally from its previous 'sword and shield' stance,

encapsulated in MC14/2 – in which its conventional forces were not intended to defeat a concerted Soviet conventional assault on Western Europe, but rather to act as a test of the enemy's intent, prior to unleashing a nuclear response – to a strategy of 'flexible response'. The latter, which was promulgated by NATO's Military Committee as MC 14/3, 'meant basing military plans on the forces that were actually available and maximising the conventional capability of those forces by deploying armies and air forces alike, so as to impose the greatest possible delay on an all-out Soviet attack short of using nuclear weapons.'[61] One aspect of the new strategy which impacted directly on the MBF was 'dual use'; the employment of nuclear delivery systems in both nuclear and conventional operations. According to a report submitted to NATO's Defence Planning Committee by the Military Committee, 'The strategic concept of MC 14/3 [*emphasised*] the requirement for adequate conventional forces and for improving capabilities for non-nuclear operations while maintaining NATO's capability. This should include achieving optimum dual capability, especially in air forces, and the flexibility to employ these forces in non-nuclear operations.'[62]

In line with this new stance, the MBF's Vulcan squadrons were declared initially as being capable of conventional as well as nuclear operations.[63] The V-Bombers were certainly capable of delivering conventional ordnance; indeed, during the 1956 Suez Crisis, Valiants operating from Malta had flown conventional bombing sorties against Egyptian airfields.[64] V-Force crews had also demonstrated the ability of their aircraft to deliver free fall, high explosive bombs during regular detachments to the Far East in the late 1950s and through the following decade – notably, as part of the UK's response to the Indonesian Confrontation between 1963 and 1966.[65] However, as Grandy suggested to Denis Healy in February 1968, the suitability of the Vulcan in the conventional role in the skies over Europe was open to question. Such doubts were not limited to the Air Staff. In 1971 SACEUR submitted to the Chairman of NATO's Military Committee his Annual Combat Effectiveness Report for the previous year, with units and formations assigned to SACEUR being divided into five categories – from Category I ('FULL capability,) to Category V ('Unit temporarily NON-OPERATIONAL'). According to an analysis of this report approved by the UK Chiefs of Staff Committee in December 1971,

A Victor B1, XH588, of the Honington Wing at low level over Malaya during the Indonesian Confrontation.

Strike Command's medium bomber squadrons were 'rated HIGH (Category II) in the strike role [*being*] classified less than FULL (Category I) solely because their survivability is judged to be no better than HIGH, primarily because although dispersed the aircraft are not physically protected on the ground.' By contrast, the, 'squadrons with an attack role are assessed as having only a LIMITED (Category IV) capability in this role. We accept this as fair and a realistic assessment, consonant with their single (free fall) delivery option which makes them suitable for a conventional attack role on the flanks of ACE only.'[66]

A similar note was sounded in a 'mind clearing paper' circulated within HQ Strike Command four years later. The author argued that, 'The Vulcan is relatively slow, somewhat ponderous in its manoeuvrability, and of a size and shape that is particularly attractive to ground fire [*and that it was*] thus too vulnerable for employment in the heavily defended central region.' If employed, 'on the flanks of the Warsaw Pact,' by contrast, it was argued that, 'the Vulcan has more to offer. It has the range, penetration ability, and all weather target acquisition capability to deliver a useful load deep into enemy territory.'[67] The use of the MBF for conventional attacks in the event of war in Europe was further complicated by the failure to establish any formal NATO tasking mechanism for such an eventuality. In March 1973, the Chiefs of Staff Committee considered a note by ACDS(Pol) on the relationship between RAF Strike Command and NATO. According to this document, the Vulcan squadrons in No 1 Gp would

Although the V-bombers were stood down from QRA in 1969, they could resume this posture and this capability was exercised from time to time. These Vulcans are on the ORP at Finningley in 1977.

be ordered into action in the nuclear role by the AOCinC Strike Command, acting under SACEUR's direction; 'AOCINC Strike is nominated as Executing Commander for nuclear strikes by SACEUR, who must use [*the*] STC Operations Centre, to which he has direct communication links from SHAPE, for AOCINC Strike Command to task the units.' These provisions, however, did not extend to conventional operations as, 'No NATO chain of command [*existed*] for conventional attacks.'[68] In practice, by 1975 Strike Command's Vulcans, 'albeit declared as dual capable,' were so in name only, being, 'roled directly in the strike configuration.'[69]

As the decade drew to a close, the imminent entry into service of Tornado meant that the writing was finally on the wall for the Vulcan. Nevertheless, events at Nellis AFB, Nevada indicated that in the right hands – and with the right tactics – the aircraft could still prove an elusive opponent. Spurred on by the USAF's experience over Vietnam, Tactical Air Command (TAC) mounted the first Exercise RED FLAG at the end of 1975. Designed, 'to provide pilots with the equivalent of their first eight or 10 combat missions in a training environment,' RED FLAG soon proved its worth. 'As early as the 1980s, many [US] air force members, especially those in TAC and later Air Combat Command, considered it the single greatest operation to come out of the ashes of the Vietnam conflict.'[70] The RAF, 'was honoured by being the first foreign air force to be invited to take part in Red Flag,' when a

detachment deployed to Nellis in August-September 1977 for RED FLAG 77-9.[71] Although Buccaneers, operated by both Strike Command and RAF Germany crews, formed the core of this detachment, they were joined by Vulcans from Scampton (crewed by members of Nos 35, 101 and 617 Sqns), and later from Waddington (flown by crews drawn from Nos 9, 44 and 50 Sqns) between 6-19 August and 20 August-3 September respectively.[72]

The Vulcan was not the first strategic bomber to enter the RED FLAG arena. 'Strategic Air Command's first appearance,' according to Laslie, 'came in April 1976, less than a year after Red Flag began. The bombers did not do well in their debut':

> 'Three B-52s took off from their home base, received the necessary aerial refueling [*sic*], and then entered the training area. The B-52 pilots followed standard SAC training methods and flew at high altitude in broad daylight. For miles behind each B-52 trailed a magnificent contrail, leading anyone within a fifty-mile radius back to the aircraft. The aggressors shot down all three. At the later debrief, the flight lead was asked why he would enter hostile territory in such a ridiculous and blatantly opposite manner. The pilot told the aggressors he was simply doing what he had been ordered to by headquarters.'[73]

In contrast to their SAC colleagues, the MBF crews flew, 'high-low-high simulated nuclear strike sorties routed through areas of high fighter activity and terminating in areas of intense ground-based threats around the targets, [*being*] vulnerable to the air and ground threats during the low level portion of the profile only.'[74] They also proved adept at adjusting their tactics to reflect lessons learned. Notably, although the Vulcans were prohibited initially from flying below 300ft agl, this was reduced to 200ft agl during the course of the exercise.[75] 'Pilots had no difficulty in adjusting to the new altitude limitation and the lower altitude appeared to improve the Vulcan's chances of penetrating to the target; certainly the fighter and ground threat claims were much lower on the three days when 200ft low level stages were flown.'[76] In his final report the Detachment Commander, Gp Capt J E Nevill, concluded that, 'the Vulcan was by no means "cannon fodder" in the high threat environment of the Nellis ranges, most particularly when flown at 200ft agl.'

Vulcans on the flight line at Nellis AFB for RED FLAG 79-2. (CGJ)

> 'The improvement in aircrew morale and enthusiasm were most noticeable on their return from successive sorties, particularly when debriefings disclosed the difficulties encountered by Aggressor pilots, in achieving 'kill' parameters during engagements with heat-seeking missiles and guns. It became apparent that even an aircraft of the Vulcan's size can, if flown skilfully and aggressively, deny 'gun-kill' parameters to a fighter following in close trail. The realisation of this fact came as a surprise to the RAF detachment, the Vulcan crews themselves and, most particularly to the Aggressors.'[77]

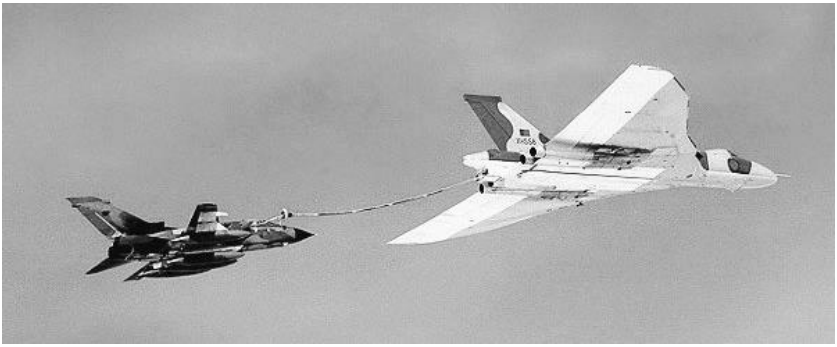
According to Nevill, the Vulcans had proven, 'surprisingly successful in evading the various ground and air threats, particularly as the excellent weather conditions and Nevada terrain made the aircraft unusually conspicuous. Their success was undoubtedly the result of skilful and aggressive flying by the crews.'[78]

Vulcans returned to Nellis two years later when crews from all the extant MBF squadrons took part in RED FLAG 79-2. This detachment was led by OC 50 Sqn, Wg Cdr Nigel Baldwin. During this exercise the Vulcan, 'broke new ground by becoming the first foreign aircraft to participate at night.'[79] 'At Red Flag' [*sic*], Baldwin would later recall,

'we flew through the mountain ranges, contour flying at night at 1,000ft agl, which was well below the B-52s and most of the more advanced F-111s.'[80] Once again, the experience was judged to have been, 'of the greatest value [*insofar as it*] reinforced the crews' confidence in their ability to operate safely, at night, lower than they had done before, and provided excellent training.'[81]

Although the MBF would participate in RED FLAG again, at the beginning of 1982, the end was now looming for the force.[82] Despite being slated to be replaced by Tornado, there were suggestions that the Vulcan might still linger on; 'The RAF (…) hoped to retain a reduced number of Vulcan squadrons equipped with an unidentified air-launched cruise missile in the long-range strike role rather than rely solely on the Tornado.'[83] These proposals came to naught, and in 1981 it was decided instead to accelerate the withdrawal of the Vulcan in order to make room in the defence budget for new equipment.[84] However, 1982 would also see an unlikely swansong to the Vulcan's illustrious career, when a detachment based on Ascension Island participated in the campaign to retake the Falklands Islands (Operation CORPORATE). Much has been written about the BLACK BUCK sorties undertaken by that detachment, and I do not therefore propose to discuss them in this paper.[85] It is clear, however, that the Vulcan force was by then, 'a wasting force, lacking the avionics and weapons,' required for such an eventuality.[86] In order to mount this operation, it was therefore necessary to resurrect much of the Vulcan's capability that had been lost in the 1970s; notably the ability to carry out air-to-air refuelling and to deliver conventional ordnance.[87] Additional long-range navigation equipment was fitted, together with the ability to carry an external ECM pod and Shrike anti-radar missiles – improvements which went some way towards enhancing the survivability of the aircraft.[88]

On 21 December 1982, two decades to the day since Macmillan and Kennedy ended their meeting at Nassau, the last of the Vulcan strike squadrons – No 44 Sqn – disbanded. Modified Vulcans would soldier on in the strategic reconnaissance role with No 27 Sqn until 1983, and as tankers with No 50 Sqn until March 1984. Nevertheless, as the late Owen Thetford lamented in his classic reference work *Aircraft of the Royal Air Force since 1918*, 'The era of the RAF's big bombers had ended.'[89] Was the MBF something of a wasting asset in the aftermath



Like the Valiant and the Victor before it, the Vulcan ended its days as a tanker.

of the Nassau Agreement? In the financial world, a wasting asset can be defined as, 'an item that has a limited life span and irreversibly declines in value over time.' It was certainly the case that, at various points, the MBF was viewed as having a finite shelf life. However, changing circumstances meant that the force continued to play a significant part in the RAF's front line for far longer than originally expected. As the Vulcan's participation in the Falklands Campaign demonstrated, in the right circumstances – and the right hands – the V-Bombers continued until the end to make a valuable contribution in their bombing role.

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Notes:

[1] John F Kennedy Presidential Library and Museum, JFKPOF-042-012 'Statement at Windsor Field, Nassau, The Bahamas, 18 December 1962', https://www.jfklibrary.org/asset-viewer/archives/JFKPOF/042/JFKPOF-042-012, accessed 18 February 2021.

[2] John F Kennedy Presidential Library and Museum, JFKPOF-042-013 'Kennedy-Macmillan joint statement, 21 December 1962', https://www.jfklibrary.org/asset-viewer/archives/JFKPOF/042/JFKPOF-042-013, accessed 18 February 2021. The subjects under discussion included: 'the state of East West relations in the aftermath of the October crisis in Cuba;' 'the present state of the negotiations for a treaty ending nuclear tests;' their shared, 'interest in arriving at a solid and enduring settlement which would insure that Berlin remains free and viable;' 'The Chinese Communist attack on India,' and the state of relations between India and Pakistan; 'the current state of affairs in the Congo;' and 'the present state of negotiations for UK membership of the Common Market' – with Kennedy reaffirming, 'the interest of the United States in an early and successful outcome.'

[3] *Ibid*.

[4] In a memoir of his wartime service, Cross recalled that he, 'had started the war as a twenty-seven year old Squadron Leader, had commanded a squadron in battle, and two operational wings and four groups all in active operations. I had a rapid promotion to fill these posts and nearly always I was the youngest occupant of the rank in the service. Wing Commander at 28; Group Captain at 29 and Air Commodore at 31.' Cross, Air Chief Marshal Sir Kenneth 'Bing', with Professor Vincent Orange, *Straight and Level* (London: Grub Street, 1993), p304.

[5] The National Archives (TNA) AIR 14/4101, enc 1A.

[6] *Ibid*.

[7] Delve, Ken. *The Source Book of The RAF* (Shrewsbury: Airlife, 1994), pp87-8.

[8] Slessor, Sir John, 'The Place of the Bomber in British Policy' in *International Affairs*, Vol 29, No 3, 1953: p304.

[9] Cameron, N, 'In Defence of a Deterrent Strategy' in *Royal United Services Institution. Journal*, Vol 104, No 616, 1959: p405. This essay had previously won the Gordon Shephard Prize Essay competition.

[10] TNA AIR 14/4101, enc 1A.

[11] TNA AIR 19/940, 'Note on the Strike Potential of the Medium Bomber Force', 19 February 1958.

[12] TNA AIR 14/4048, enc 5B, p6.

[13] TNA AIR 2/14873, enc 87B, para 16, p3.

[14] Cameron, 'In Defence of a Deterrent Strategy,' p410.

[15] TNA AIR 14/4101, enc 1B.

[16] Zaloga, Steven J, *The Kremlin's Nuclear Sword: The Rise and Fall of Russia's Strategic Nuclear Forces, 1945-2000*, ed. Dominick A Pisano and Allan A Needell, Smithsonian History of Aviation and Spaceflight (Washington, DC: Smithsonian Books, 2002), p64. For a summary of the debate within the USSR which culminated with the RVSN's establishment on 17 December 1959, see also pp 57-59. Zaloga noted that the title of this formation, 'is frequently mistranslated as Strategic Rocket Force, or SRF' (Note72, p266).

[17] TNA AIR 2/18103, enc 5B.

[18] *Ibid*.

[19] Zaloga, Steven J, *Red SAM: The SA-2 Guideline Anti-Aircraft Missile*, New

Vanguard 134 (Oxford: Osprey, 2007), p9.

[20] *Ibid*, p11.

[21] US Central Intelligence Agency Freedom of Information Act Electronic Reading Room (CIA FOIA ERR), DOC_0000201001 National Intelligence Estimate Number 11-3-62 'Soviet Bloc Air and Missile Defense Capabilities Through Mid-1967', 31 October 1962 (https://www.cia.gov/readingroom/document/0000201001, accessed 9 June 2021), para B, p1.

[22] *Ibid*, para J, p4-5.

[23] Wynn, Humphrey, *RAF Nuclear Deterrent Forces: their origins, roles and deployment 1946-1969: A documentary history* (London: HMSO, 1994), p305.

[24] TNA AIR 8/2369, draft Air Staff note 'Quick Reaction Alert – Medium Bomber Force', December 1961.

[25] *Ibid*, minute, 1 December 1961.

[26] *Ibid*, letter from Cross to MRAF Sir Thomas Pike, CAS, 21 September 1962. Cross noted that he was, 'charged with producing 75% of available aircraft in 24 hours,' and that the results were an improvement upon the previous year's Mickey Finn, when, '88 out of 105 aircraft available were generated in 24 hours, representing 84% of the available aircraft.' He went on to comment upon the 'reliability' of the Thor IRBM force, given that, '59 of the 60 weapons available were ready for launch at the 1st count down 5½ hours after the alert was called.' Cross concluded, somewhat tersely, that he found, 'the results of Mickey Finn 2 … satisfactory;' Pike was somewhat more effusive in his reply, dated 24 September, writing, 'The results achieved were first-class, and reflect great credit on you and the whole of your Command. Please convey my congratulations to those concerned.'

[27] *Ibid*, Conclusions of Air Council Meeting 23(61), 7 December 1961.

[28] Richards, Clive, 'RAF Bomber Command and the Cuban Missile Crisis, October 1962' in *Royal Air Force Historical Society Journal No 42*, 2008: p33.

[29] Walsh, Major General James H, 'Strategic Thinking and Air Intelligence' in *Studies in Intelligence*, Vol 2, No 1, 1958: p11. Walsh served in HQ USAF as Deputy Assistant Chief of Staff for Intelligence and later Assistant Chief of Staff between 1957 and 1961.

[30] Knaack, Marcelle Size, *Encyclopedia of US Air Force Aircraft and Missile Systems, Volume II: Post-World War II Bombers 1945-1973* (Washington, DC: Office of Air Force History, United States Air Force, 1988), p574.

[31] Buttler, Tony, *British Secret Projects 2: Jet Bombers since 1949*, 2nd Edn. (Manchester: Crécy, 2018), p136; p138.

[32] Gibson, Chris, *Vulcan's Hammer: V-Force Projects and Weapons Since 1945* (Manchester: Hikoki, 2011), p77.

[33] Boyes, John, *Blue Streak: Britain's Medium Range Ballistic Missile* (Stroud: Fonthill, 2019), p125-6.

[34] Cochrane, Air Chief Marshal Sir Ralph, 'The British Nuclear Deterrent after the Bahamas Agreemen' in *The Journal of the Royal United Services Institution*, Vol 108, No 629, 1963: p31.

[35] Office of The Historian, US Department of State, *Foreign Relations of the United States, 1961–1963, Volume XIII: Western Europe and Canada*, Document 190,

'Circular Telegram From the Department of State to Missions in the NATO Capitals', Washington, 15 April 1963 (https://history.state.gov/historicaldocuments/frus1961-63v13/d190, accessed 9 June 2021).

[36] Catterall, Peter, ed. *The Macmillan Diaries, Volume II: Prime Minister and After, 1957-1966* (London: Pan, 2012), p528. Emphasis as in original.

[37] Cmnd 2270, *Statement on Defence: 1964*, London: HMSO, February 1964, para 174, p40.

[38] TNA CAB 131/28, D(63) 4th Cabinet Meeting of 1963, 9 February 1963, p6.

[39] TNA AIR 14/4101, para 4, p1-2.

[40] *Ibid*, para 4, p2.

[41] *Foreign Relations of the United States, 1961–1963, Volume XIII: Western Europe and Canada*, Document 190, *op cit*.

[42] NATO Archives Online, MCM-68-1965, North Atlantic Military Committee: Memorandum for the Members of the Military Committee, 'Ballistic Missiles and V/STOL for NATO', 22 April 1965, paras 4-5, p6., https://archives.nato.int/uploads/r/nato-archives-online/c/a/f/caff44701e0b3b72dc10e482d137fc64898b46e16219c95ca56ea71131101c79/MCM-0068-1965_ENG_PDP.pdf, accessed 15 June 2021.

[43] NATO Archives Online, MCM-68-1965, 'Ballistic Missiles and V/STOL for NATO', para 7-8, p7.

[44] *Ibid*, para 6, p7.

[45] *Ibid*, para 8, p7. According to Fred Kaplan, the Joint Strategic Target Planning Staff (JSTPS) was the 'SIOP incarnation' of SAC; *The Wizards of Armageddon*, ed. Martin Sherwin, Stanford Nuclear Age Series (Stanford, CA: Stanford University Press, 1991), p269.

[46] *Ibid*, para 3, p28.

[47] NATO Archives Online, MCM-0068-1965 Ballistic Missiles and V/STOL for NATO, Appendix L, 'General Nuclear War Targetting Methodology', para 3, p27.

[48] NATO Archives Online, MCM-68-1965 Ballistic Missiles and V/STOL for NATO, Appendix L, para 3, p28.

[49] John F Kennedy Presidential Library and Museum, JFKPOF-042-013 'Statement on Nuclear Defense Systems', 21 December 1962, para 2, p1, https://www.jfklibrary.org/asset-viewer/archives/JFKPOF/042/JFKPOF-042-013, accessed 18 February 2021.

[50] *Ibid*, para 4, p1. 'The first Hound Dog,' according to Polmar, 'was delivered to SAC in late 1959, with an initial operating capability being achieved in early 1961.' He went on to note that this turbojet-powered missile was guided by, 'an inertial navigation system, updated before launching,' and was capable of speeds of up to, 'Mach 2·1 with an altitude spectrum ranging from 55,000 feet down to tree-top height.' The missile's rage exceeded 500 miles, 'on most flight profiles [*and up to*] '700 miles on hi-hi flight profile.' Polmar, Norman, ed. *Strategic Air Command: People, Aircraft, and Missiles* (Cambridge: Patrick Stephens, 1979), p.206. Whilst acknowledging that Hound Dog, 'was more versatile than Blue Steel, in that it could be interconnected with the parent bomber to boost take-off thrust, and its inertial guidance system was monitored by star

trackers to help to transport a 4-megaton weapon over twice the Blue Steel range,' Brookes nevertheless contended that, in other respects, the US missile, 'was no great advance,' over its British counterpart and, 'was not in the same league as the ballistic Skybolt.' Brookes, Andrew, *V Force: The History of Britain's Airborne Deterrent* (London: Janes, 1982), p123.

[51] 'Statement on Nuclear Defense Systems', para 8, p2.

[52] TNA AIR 14/4202, cited in Godwin, Matthew, and Maurice Kirby, 'V is for Vulnerable: Operational Research and the V-Bombers' in *Defence Studies*, Vol 9, No 1, 2009: p167.

[53] TNA AIR 24/2689, Appendix 435 to F540, HQ Bomber Command, November 1962, 'Minutes of the Commander-in-Chief's Conference of Group, Station and Squadron Commanders held at RAF North Luffenham, on 14th and 15th November 1962', para 46, p9.

[54] TNA CAB 131/28, memoranda D(63)2 'The Deterrent in the Pre-Polaris Period: Memorandum by the Minister of Defence', 15 January 1963, paras 1 and 2, p1.

[55] TNA CAB 131/28, D(63)1st Meeting, 23 January 1963, p4.

[56] *Flight International*, 13 February 1964, p241.

[57] Walker, Dr John R, *A History of the United Kingdom's WE 177 Nuclear Weapons Programme: From Conception to Entry into Service 1959-1980* (London: The British American Security Information Council (BASIC), 2018), p12.

[58] Jefford, Wing Commander C G, *RAF Squadrons: A Comprehensive Record of the Movement and Equipment of All RAF Squadrons and Their Antecedents Since 1912*, 2nd Edn. (Shrewsbury: Airlife, 2001), p*assim*.

[59] Wynn, *RAF Nuclear Deterrent Forces*, p630-1.

[60] TNA DEFE 13/655, enc 16.

[61] Nailor, Peter, 'Denis Healey and rational decision-making in defence,' in *Politicians and Defence: Studies in the Formulation of British Defence Policy 1845-1970*, ed. Ian Beckett, and John Gooch (Manchester: Manchester University Press, 1981), p173.

[62] MC 48/3 'Enclosure 1: Report by the Military Committee to the Defence Planning Committee on Measures to Implement the Strategic Concept for the Defence of the NATO Area', para 5bp p3.

[63] Following the creation of Strike Command and the entry of the Buccaneer into RAF service, from the early 1970s the MBF was subsumed into No 1 Gp's 'Strike Force'.

[64] For accounts of Valiant operations during Operation MUSKETEER, see Wynn, *RAF Nuclear Deterrent Forces*, p129-34; Cull, Brian, with David Nicolle and Shlomo Aloni, *Wings over Suez*, amended edn. (London: Grub Street, 2006), p*assim*.

[65] See Wynn, *RAF Nuclear Deterrent Forces*, p442-48; Brookes, *V Force: The History of Britain's Airborne Deterrent*, p137-39.

[66] TNA DEFE 5/191/33, COS 93/71 'SACEUR's Combat Effectiveness Report 1970: Note by the Secretary', 2 December 1971, Annex A, para 27, pA-7.

[67] TNA DEFE 58/102, enc 120, attachment 2 'The Vulcan Strike Force and the Policy of Flexible Response', para 11, p4.

[68] TNA DEFE 4/276/6, attachment COS 1130/400C 'Strike Command and NATO',

12 March 1973, para 8d, pA-5.

[69] TNA DEFE 58/102, enc 120, attachment 1 'Strike Aircraft Dispersal – Interim arrangements', para 4, p2.

[70] Slife, Lieutenant Colonel James C, *Creech Blue: Gen Bill Creech and the Reformation of the Tactical Air Forces, 1978-1984* (Maxwell AFB, AL: Air University Press in collaboration with the College of Aerospace Doctrine, Research and Education (CADRE), 2004), p19; Laslie, Brian D, *The Air Force Way of War: U.S. Tactics and Training after Vietnam* (Lexington, KY: University Press of Kentucky, 2015), p56.

[71] Jefford, Squadron Leader C G, 'RED FLAG at Night – Vulcans Delight' in *Air Clues* 33, No 4 (1979), pp124-28.

[72] TNA AIR 20/12698, 'Report on RAF Participation in Exercise RED FLAG 77-9', RAF Honington, 30 September 1977, paras 1-2, p1. For an account of the Buccaneer participation in RED FLAG 77-9, see Pitchfork, Air Commodore Graham, 'Low-Level Operational Training: The Impact of the RED FLAG Exercises' in *Royal Air Force Historical Society Journal No 20* (1999).

[73] Laslie, *op cit*. 'In SAC,' Laslie went on to observe, 'obedience was preferred to independent thinking. The next time SAC returned to Red Flag [*sic*], the same thing occurred. It took several attempts before the bomber pilots realized that flying all the way to the Nellis ranges only to be immediately shot down was to waste an opportunity to train and learn something. Eventually, the bomber pilots learned that, to survive, they needed to brief with friendly blue air and adjust their own tactics. TAC was suddenly enlightening SAC-trained airmen how to do their job. Traditional air power theory was being turned upside down.' (p66).

[74] TNA AIR 20/12698, Appendix G, 'Vulcan Operations', para 2, pG1.

[75] *Ibid*, para 106, p19.

[76] *Ibid*, Appendix G, para 10, pG3.

[77] *Ibid*, paras 60 and 62, p12.

[78] *Ibid*, para 106, p19.

[79] Jefford, 'RED FLAG at Night', p124.

[80] Baldwin, Air Vice-Marshal Nigel, 'The Post-QRA Era, 1969-1984,' in *The Vulcan* (Royal Air Force Historical Society, 2014), p76.

[81] Jefford, 'RED FLAG at Night', p128.

[82] For an account of this detachment by one of the participants, see Anthony Wright, 'The Last of the Vulcans and Exercise Red Flag 1982', in Blackman, Tony, ed. *Vulcan Boys From the Cold War to the Falklands: True Tales of the Iconic Delta V Bomber* (London: Grub Street, 2014), p.110-14.

[83] Dorman, Andrew M, *Defence under Thatcher*, ed. Dilys M Hill, Southampton Studies in International Policy (Basingstoke: Palgrave, 2002), p26.

[84] Following, 'a major reappraisal of the defence programme,' on 15 June 1981 Secretary of State for Defence John Nott submitted a memorandum outlining three possible 'resource options' for consideration by the Cabinet (CAB 129/213/6, C(81)31). As part of the revised defence programme it was proposed that, 'The remaining Vulcans would be disbanded early, before Tornado replaces them,' (Appendix C, 'Royal Air Force', para 5, pC-2). A 'List of the major measures which have been identified for

inclusion in the major statement in July,' (Appendix G) included, 'Disband remaining Vulcan squadrons on 1st April 1982,' (point 10, pG-4). After some discussion the Cabinet, 'Authorised the Secretary of State for Defence to enter into consultations with Allies on the basis of the broad thrust of his proposals as set out in C(81)31,' on 18 June 1981 (CAB 128/71/4, CC(81)24, 18 June 1981, p6)

[85] For official accounts, see Chapter 6, 'Vulcan Operations', in TNA 41/95 *Narrative of RAF Operations During the Falklands Conflict, 1982* (London: Ministry of Defence Air Historical Branch (RAF)), 1988); Freedman, Sir Lawrence, *The Official History of the Falklands Campaign, Volume II: War and Diplomacy* (Abingdon: Routledge, 2005), p274-81.

[86] TNA AIR 41/95, para 6.1, p6-2.

[87] In a paper delivered at an RAF Historical Society seminar devoted to the Vulcan held at the BAWA, Filton, on 22 October 2013, the captain of the aircraft that carried out the first Vulcan attack upon Port Stanley airfield (BLACK BUCK 1) recalled how RAF, 'engineers managed to find parts to reactivate the AAR systems on the aircraft, and overcame problems of leaking probes and jammed fuel valves,' prior to the deployment of the aircraft to Ascension Island. 'The bomb racks and control systems,' required to deliver conventional ordnance, he continued, 'including the bomb selection mechanism (the '90-Way'), were miraculously found – they were meant to have been thrown away years previously [*with items*] even found in a scrapyard in Newark!' Withers, Squadron Leader Martin, 'The Vulcan Bomber in Action – Operation BLACK BUCK,' in *The Vulcan* (Royal Air Force Historical Society, 2014), p105.

[88] The modifications made to the aircraft are described in TNA AIR 41/95, Chapter 6, 'Vulcan Operations'.

[89] Thetford, Owen. *Aircraft of the Royal Air Force since 1918*, 9th Edn. (London: Putnam, 1995), p53.

THE LINCOLN ON OPERATIONS

by Air Cdre Graham Pitchfork

The Lincoln was earmarked for 'Tiger Force' in 1945 when it was destined to deploy to the Pacific region to participate in the Allied bomber offensive against Japan.* The requirement for the force was cancelled with the abrupt ending of the Second World War in the Far East following the atom bomb attacks against Hiroshima and Nagasaki. However, within a few years the aircraft was to play a large part in another campaign in the Far East – the Malayan Emergency.

Operation FIREDOG

Communist infiltration into South-East Asia had begun in the early 1920s and by the outbreak of the Second World War it had achieved a foothold in the region. Following the Japanese invasion of Malaya in December 1941, the Malayan Communist Party (MCP) became the nucleus of the Malayan People's Anti-Japanese Army (MPAJA), the only effective local 'resistance' force in the area and by the end of the war it was highly organised and effective. When it was disbanded, the MCP re-emerged with the aim of overthrowing the political establishment of Malaya and taking control of the country.

In June 1948 the MCP began a programme of labour unrest and violent demonstrations, and this soon escalated into an insurrection throughout the Federation of Malaya. The military were called upon to assist the civil powers and a State of Emergency was proclaimed.

Initially the RAF's resident squadrons were tasked to carry out reconnaissance sorties, but it was soon necessary to mount attack operations against the Communist Terrorist Organisation (CTO) using the Beaufighter and Spitfire squadrons. The transport squadrons carried out the largest element of RAF support, initially with Dakotas and then the Valetta.

By the beginning of 1950 it had become clear that the harassing tactics of the security forces were keeping the CTs on the move, but it was not winning the wider battle against communism. As the air campaign against the CTO camps and supply routes intensified, Brigands replaced the Beaufighters, and the Tempest arrived to take over from the Spitfires. This was a welcome increase in capability, but

* See Journal 44.

A Lincoln of No 57 Sqn at Tengah.

it was recognised that a larger force was required.

A request was made for a force of heavy bombers but the staffs at Bomber Command, who were concerned about the increasing Russian threat, expressed doubts about the effectiveness of saturation bombing over the jungle terrain but agreed reluctantly to send a small force.

Eight Lincolns of No 57 Sqn arrived at RAF Tengah on 20 March 1950 and this was to be the first of a series of detachments (Operation MUSGRAVE) by Bomber Command Lincoln squadrons. Their arrival allowed a new phase in offensive air operations to be launched.

The squadrons left their UK bases and headed first for RAF Idris, near Tripoli, before transiting to Habbaniya in Iraq. The next phase was via Karachi and then Colombo in Ceylon (Sri Lanka) before arriving at Tengah in Singapore. The ground crew travelled out on York transports. Soon after No 57 Sqn's arrival, six more Lincolns from No 1 Sqn of the Royal Australian Air Force arrived to bolster the heavy bombing capability in June. They went into action for the first time on 26 July when they attacked a target in southern Johore. The Australian Lincolns were to make a contribution to the offensive air support operations for the next eight years.

The bombers flew pre-planned sorties, mainly in north Malaya, dropping 500lb and 1,000lb bombs during daylight hours. The aim was to drive the CTs from their jungle camps into the more open terrain where ground forces would engage them. In July 100 Squadron relieved No 57 Sqn and a few months later 61 Squadron took over the detachment.

The use of Lincoln squadrons, and the heavy expenditure of 1,000lb bombs, caused increasing concern at the Air Ministry. There were conflicting views over the effectiveness of the Lincoln force, and with mounting pressure from Bomber Command for the aircraft to be returned, Operation MUSGRAVE came to an end on 29 March 1951 when No 61 Sqn returned after a four-month tour during which they had flown 97 strikes. To offset this reduction, the RAAF increased its Lincoln force from six to eight aircraft.

During the latter months of 1951 and throughout 1952, apart from the considerable efforts of the RAAF Lincolns, other aircraft types flew most of the air strikes.

In an attempt to end the Emergency, reinforcements were requested in July 1953 and 83 Squadron flew to Tengah in September to resume the RAF Lincoln detachment. This doubled the medium bomber force and large-scale harassing operations were re-introduced into areas where terrorists were known to be active. The tonnage of bombs dropped increased considerably during 1954 by which time more selective targeting had become essential.

Operating over the huge expanse of the jungle canopy, and with very few geographic features, new target marking techniques were needed. Aircraft, sometimes in a formation of three, flew on a fixed bearing for a specific time from a known datum point. When possible, Austers marked the target with a phosphorous smoke bomb or grenades. Whilst accurate, this technique required the Lincolns to follow the Auster closely otherwise the CTs had time to evacuate the area. One of the most effective methods was to use small radio transmitters as a ground marker placed close to the target area. They emitted a continuous signal for twenty-four hours allowing the bombers to home to the point before setting off on a timed run. The variety of methods indicates how difficult it was to mark individual targets.

To offset these difficulties, it was sometimes necessary to drop bombs over a large area, an obviously wasteful expenditure of bombs. Aircraft also had to attack in quick succession if the CTs were to be prevented from escaping. The RAAF's No 1 Sqn developed a tactic of flying five aircraft in vic formation on moonlit nights. This created a very heavy, widespread and simultaneous attack but it was wasteful of precious bombs.

At the end of January 1954, aircraft of No 7 Sqn replaced No 83 Sqn.

An RAAF Lincoln of No 1 Sqn delivering 1,000 pounders.
(RAAF)

New tactics were constantly being developed and included co-ordinated attacks with Hornets supporting a main attack by Lincolns. The middle of 1954 saw the first glimmer that the security forces were gaining the upper hand. Nevertheless, intensive operations continued, and strike operations reached a peak in early 1955 with 458 sorties flown on sixty-five strikes in January. It was at this time that Canberras began to replace the aging Lincolns.

With the increasing success of the air campaign, the remaining CT gangs became more widely dispersed, creating fewer targets, so offensive air support operation were reduced significantly. Bomber Command's involvement in the campaign was gradually reduced and the last RAF Lincoln detachment left Tengah on 1 March 1955.

There was still work for the RAAF Lincolns. They had a major success in February 1956 when seven aircraft, in conjunction with Canberras of No 12 Sqn, attacked a camp in Central Johore. Austers marked the target and one of the most notorious gangs was eliminated, which dealt a serious blow to the terrorist organisation.

Over the next two years the number of targets steadily declined, and

the Australian Lincolns were finally withdrawn in July 1958 after eight year's continuous service in Malaya.

Throughout the Malayan Emergency, Lincolns flew more than 3,000 sorties and dropped half a million tons of bombs, some eighty-five per cent of the total dropped throughout the campaign.

The Mau Mau Campaign

In the early years of 1950 unrest in Kenya increased. For many years the Kikuyu tribe of farmers had fought to recover their land from European settlers. Under the leadership of Jomo Kenyatta, the Kenya African Union (KAU) increased its reign of terror and by 1952, the Mau Mau campaign began in earnest. A State of Emergency was declared in October.

The RAF in East Africa had been run down during the post-war years with RAF Eastleigh, near Nairobi, the only active airfield. With just a small communications flight and a very efficient Kenya Police Reserve Air Wing, there was limited opportunity to support the reinforced army force in its operations against the rebel gangs.

The hard core of the Mau Mau organisation operated in two main areas, all to the north of Nairobi; around Mount Kenya and in the heavily forested region of the Aberdare Range. These covered an area of some 17,000 square miles at heights between 5,000 and 15,000 feet.

Following the establishment of the State of Emergency, British troop reinforcements were flown in and a small flight of armed Harvards was created to conduct ground attack sorties. As the campaign developed, and more ground troops arrived, a single RAF command was established in June 1953 at Eastleigh when the Harvard flight was expanded. The aircraft's small 20lb bombs were useful as an anti-personnel weapon but were ineffective in the heavily forested areas. It was decided to increase the air action against the terrorists and two Lincolns were sent to Eastleigh.

For a number of years, Bomber Command's Lincoln squadrons had spent one month each year on detachment to the Middle East (Operation SUNRAY) to practice reinforcement. Based at Shallufa in the Canal Zone, the squadrons practiced bombing techniques and provided a permanent presence. It was two of these aircraft that were sent to Kenya for a trial period and the bombing they carried out was so successful, it was decided to provide a permanent detachment. In November, six

One of No 49 Sqn's Lincolns, RF444, at Eastleigh in 1953. (A E Newitt)

Lincolns of No 49 Sqn arrived at Eastleigh to begin a bombing campaign.

Their first raid was mounted on 18 November when Piper Pacers of the Kenya Police Reserve Air Wing marked the Mau Mau's forest hideouts with phosphorous smoke grenades. Lincolns then bombed the smoke marker with the aim of driving the gangs into the open where they would be engaged and dealt with by the ground forces, in much the same way as was being practised in Operation FIREDOG in Malaya.

Targets were bombed from 2,500 feet by individual aircraft or in multiples, depending on the degree of accuracy required or the ambiguity of the target position. Bombs were dropped in sticks varying in length depending on the saturation required. A normal bomb load was nine 500lb and five 1,000lb bombs and most targets were strafed from the front and rear turrets. Great care had to be taken in planning an attack since the majority of sorties were carried out below safety height. On a few occasions, supplies were also dropped to the security forces on the upper slopes of Mount Kenya.

The Lincolns were detached for two months at a time, to avoid the need for major servicing while away from their parent base. Early in 1954 100 Squadron arrived and two months later No 61 Sqn replaced them. An aircraft of No 61 Sqn, and its crew, were lost when it flew into high ground at night.

In August 1954, by which time No 214 Sqn had arrived, a mobile radar was positioned close to the Aberdare Range. This allowed a

An Eastleigh-based Lincoln, RF507, of No 100 Sqn.
(RAF Museum P016808)

ground controller to accurately position the Lincolns. Under his direction the aircraft could bomb from 20,000 feet with reasonable accuracy. Using ground control also allowed night sorties to be flown when aircraft dropped a bomb every twenty minutes to disrupt the groups of terrorists in the forests and to keep them moving with little sleep.

September 1954 was the heaviest month of bombing during the campaign with the aim of driving the Mau Mau out of the Aberdare forests. During the month, 214 Squadron carried out 159 daylight and seventeen night sorties dropping over 2,000 500lb bombs.

The following month, attacks were switched to the Mount Kenya region when the same intensity was maintained. By the time No 49 Sqn arrived for a second tour at the end of November, the bombing offensive was paying dividends. The gangs could not retaliate, their hideouts were being destroyed and troops had encircled the area waiting for them to leave the forests. They were also running out of food and many gangs gave up the fight.

When General Erskine, the Commander-in-Chief, departed in April 1955 he told RAF personnel of the great success of the bombing campaign. He declared that had the air action not taken place, he would have needed a much larger ground force.

The bombing campaign began to decline and in June 1955 the

Lincoln detachment was reduced. Finally, on 28 July, the last of No 49 Sqn's aircraft left Eastleigh, some to return to the UK, with four others positioning at Khormaksar in case of any resurgence of operations against the Mau Mau.

The operational life of the Lincoln is almost always associated with its participation in the conflicts in Malaya and Kenya, but the aircraft and its crews also saw action in some less well-known operations.

Egypt

The RAF had maintained a presence in Egypt for decades and in the post-war years there was increasing unrest in the region. The establishment of the state of Israel caused many problems and for a few weeks at the end of 1948, twenty-four Lincolns were sent to Shallufa for possible operations. They were not required and returned to the UK a few weeks later.

In the meantime, Bomber Command had maintained Operation SUNRAY, the regular detachments to Shallufa and their presence illustrated the British interest and intent.

The political situation in Egypt deteriorated dramatically at the beginning of 1952 and on 30 January, at very short notice, eight Lincolns of No 148 Sqn were ordered to Shallufa. In July, the Egyptian 'colonel's revolt' took place, and all RAF units were brought to readiness. This was followed by a temporary improvement in Anglo/Egyptian relations allowing the regular SUNRAY detachments to recommence with No 214 Sqn's Lincolns arriving in October 1953.

With the arrival of Colonel Nasser as head of state in April 1954, it was not long before the British presence in Egypt was brought to a close.

Aden Protectorate

The Arabian Peninsula had for many years been a hotbed of unrest and disturbances by dissident tribes. From 1947 the main area of trouble was the Western Aden Protectorate. Until then, the Aden Protectorate Levies and the Tempest squadron based at Khormaksar had controlled the sporadic incidents.

In November the Quteibi tribe were terrorising and looting caravans on the Aden-Dhala road. It was decided that air action against them was required. Six Lincolns on a SUNRAY detachment at Shallufa were tasked to provide support and they arrived at Khormaksar on

25 November each carrying a supply of 1,000lb bombs.

The Quteibis refused to comply with a government ultimatum and were given forty-eight hours' notice of a bombing attack. This warning was repeated twenty-four hours later. The Lincoln pilots and bomb aimers were flown over the villages in an Anson to be familiar with the area.

Tempests of No 8 Sqn attacked specific buildings in the villages and armed forts with rockets and bombs. The Lincolns flew in pairs and maintained a constant patrol over the villages throughout daylight hours. Their targets were minute, so single bombs were dropped at regular intervals. Inevitably, achieving accuracy was a problem but it was recognised that the Lincoln attacks had a major impact on morale. Over the next three days the Lincolns attacked the two most troublesome villages and flew over other recalcitrant villages at low level. On 29 November a truce was declared. In all, the bombers had dropped 66 tons of bombs on the villages after the residents had been warned. No deaths were caused, making this an excellent example of 'air control'.

Two months later trouble broke out further north in the Aden Protectorate when the nomadic Bal Harithis tribe refused to comply with the terms of a government judgement in favour of the local Sharif of Beihan. After numerous failed negotiations, operations similar to those against the Qutebeis, were mounted. The aim was to create maximum disruption to the tribesman's normal life without causing casualties. Lincolns dropped delayed-action bombs and maintained a daylight presence over the villages to act as a deterrent and create doubt in the minds of the tribal elders. Before each village was bombed, leaflets were dropped to warn of an attack. Operations finished on 4 March 1948 and two days later the Bir Harithis submitted to a final settlement.

Lincolns made their next contribution to air policing in Aden at the end of the Mau Mau campaign. The four aircraft of No 49 Sqn, which had left Kenya in July 1955, were used to fly armed reconnaissance sorties over the Western Aden Protectorate in support of the resident squadrons still conducting operations against numerous dissident tribes. For the next two years, Bomber Command Lincolns continued to be detached to Aden before the recently formed No 1426 Flight arrived from the Persian Gulf. The flight was established with four aircraft and

A Lincoln, RE345, of No 1426 Flt. (J B Stephens)

remained in Aden until replaced by Shackletons in August 1957.

Muscat and Oman

Disputes in Muscat and Oman and the sheikhdoms of the Trucial Coast had simmered for decades. In January 1955 the Sultan of Muscat sought the assistance of the British following a major incursion into central Oman from Saudi Arabia. Two Lincolns were sent to Salalah to be on standby, but they were not required. However, by the end of the year the ill-defined border between Oman and Saudi Arabia at the Buraimi Oasis – an area of constant dispute – was the cause of more disturbances. In October, two Lincolns of No 7 Sqn were sent to Sharjah to provide support for local ground forces and patrols by the British Army.

The detachment was increased to four aircraft and on 1 January 1956 it was given its own identity as No 1426 Flt and based at Bahrain, using Sharjah when necessary for refuelling and overnight stays. For the next six months its Lincolns flew many tedious reconnaissance sorties before being replaced by Pembrokes when they moved to Aden.

The Lincoln, the RAF's last piston-engine heavy bomber, was the

Meanwhile – back in the UK – although bolstered by MDAP-supplied Washingtons from 1950, Bomber Command's increasingly inadequate Lincolns soldiered on until the last of them were withdrawn in 1954. This one belonged to No 207 Sqn.

mainstay of Bomber Command for a number of years. The possibility of achieving a notable reputation probably disappeared with the disbandment of Tiger Force. Nevertheless, the aircraft played a key role in providing a deterrent force but, perversely, its role in the RAF's 'little wars' and on air policing operations is probably how it will best be remembered.

THE RAF AND THE RAIL STRIKE OF 1919 AND THE GENERAL STRIKE OF 1926

by Vic Flintham

The 1919 Rail Strike

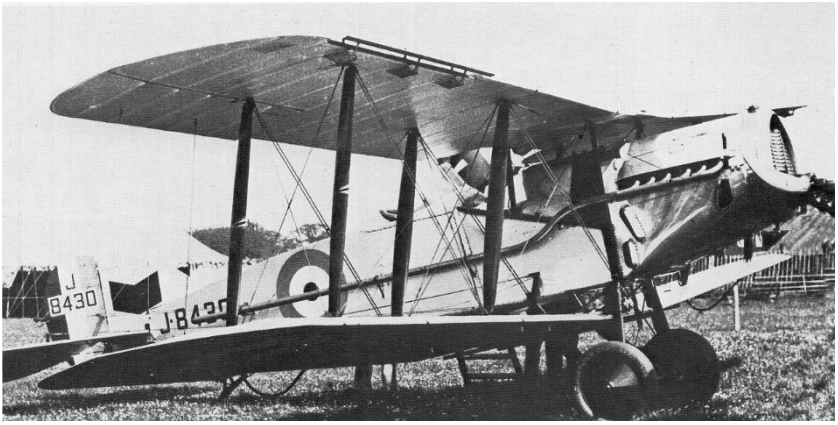
There was an event in 1919 that may have helped to remind politicians of the value of the Royal Air Force: on 27 September there was a national rail strike. A hundred years ago mail, newspapers, people and freight were all conveyed in large volumes and the rail system was heavily relied upon to keep the country running. On the eve of the strike the Cabinet convened a special strike committee to manage the government's emergency measures. It was chaired by Sir Eric Geddes, the Minister of Transport, and significantly it included Winston Churchill, Secretary of State for War *and* Secretary of State for Air.

The requirement for the RAF, supplemented by civil aviation if necessary, was threefold: carriage of government papers; delivery of newspapers and general mail; carriage of people on critical business.[1] No 86 Wing at Kenley, with the O/400s and DH4s of Nos 1, and latterly 2, Communications Squadrons, provided a mail delivery service from the outset to aerodromes at Stonehenge, Birmingham, Tadcaster, Newcastle and Edinburgh. From these bases, mails were flown on to a wider network of towns and cities, numbering in total 76. In all 62 RAF aircraft are reported as having been involved plus a smaller number of civilian-operated machines.[2] The strike ended on 5 October.

The 1926 General Strike

There was one short-lived period of intense action for most RAF squadrons, but especially No 24 Sqn, when in May 1926 they were called upon to deliver government mails and the government's provisional newspaper during the General Strike. No 24 Sqn was based at Kenley with a mix of aircraft types including Bristol F2Bs and DH9As. The strike had been called by the Trades Union Congress (TUC) after talks to resolve a pay and production crisis in the coal industry had failed; the detailed background to the situation is beyond the scope of this brief account.

The strike was called for 3 May and received a high level of support from transport unions and print workers. The latter prevented the



No 24 Sqn's Bristol Fighters were involved in the 1926 strike.
(Chaz Bowyer)

printing of newspapers which, in the days before widespread ownership of radios, were key for the government to get across its position. As a result the presses of *Morning Post* were commandeered and used to print the government's own short-lived newspaper, the *British Gazette*. It was now the task of No 24 Sqn at Kenley and other squadrons there and at Biggin Hill to arrange for delivery of the mails and the *Gazette* by road and air.

Three London airfields – Biggin Hill, Kenley and Northolt – were to play a major part in distributing mail and newspapers on radial routes from the capital to a number of airfields at 100 to 200 miles distant, from where they were taken on to the rest of the country. Air Cdre Charles Samson, AOC 6 Group, addressed all airmen at Kenley, reminding them of their duty during a period of national emergency and on 4 May transport of mails began in earnest with four air routes to Spittlegate (1 – East Midlands), Castle Bromwich (3 – West Midlands), Filton (4 – South-West) and Norwich (7 – East Anglia): the air routes were replicated by road. Mails were collected at 2359hrs each day from the Home Office and flights were off by 0600hrs.[3]

Fawns of No 100 Sqn based at Spittlegate carried mail on to Newcastle and with a Hyderabad of No 99 Sqn brought return mails and 40,000 copies of the *Sunday Times* (printed in Newcastle) from Catterick to Northolt. On 5 May the weather interrupted proceedings

with forced landings and diversions, but the flights continued without further ado, bring mail back on the return flight. On 8 May, No 24 Sqn was ordered to recover five Vimys from storage and the following day these were rigged and air-tested.

This picture of a mail bag being loaded into an Avro 504K looks suspiciously posed, but it conveys the idea.

No 9 Sqn transferred aircraft from Manston to Biggin Hill and conducted 71 flights to Catt-erick carrying 17 tons of mail and newspapers over 12,220 miles in 362hrs 45mins flying time. The Vimys of the Night Flying Flight at Biggin Hill were also employed as transports as were the co-located Grebe fighters of No 56 Sqn.[4] The latter squadron also sent 24 airmen to guard stores at No 4 Stores Depot at Ickenham in Middlesex.

Virginia bombers, and a sole Victoria of No 58 Sqn, were detached to Northolt from where, in collaboration with a Vimy and several F2Bs of the Inland Area Communications Flight, the Virginias conducted observation flights over London, also carrying mails and newspapers to Sealand from where they were distributed by F2Bs of No 5 FTS. Another onward distribution was managed by Southampton flying boats of No 480 Coastal Reconnaissance Flight flying from Calshot down to Plymouth.

The RAF was involved in other protective action during the strike including providing guards at storage depots and in the case of No 4 Sqn patrolling rail lines against sabotage. This prospect was not an idle threat: on 10 May the *Flying Scotsman* was de-railed. F2Bs of Nos 4 and 13 Sqns and Fawns of No 12 Sqn at Andover conducted patrols and supported the Army by transporting supplies and spare parts.

In answer to a House of Commons question, the Secretary of State for Air advised that in total the RAF had flown some 80,000 miles in

thirteen days transporting 45 tons of mail and goods.[5] Surprisingly he stated that an average of just eight aircraft a day, eighteen officers and 70 airmen were involved. Civil aviation played its part. Imperial Airways conveyed 944 passengers and 70 tons of freight over 41,500 miles, but this included scheduled flights. The Royal Aero Club encouraged members to help break the strike, members flying some 30 aircraft over 50,000 miles and carrying 2,611lbs of mail.

The strike was called off on 12 May, but the mail flights continued until the 17th. Lt-Cdr H E Perrin, in an article on civil aviation involvement had this to say:[6]

> 'There was no greater menace of the general strike than the attempt to suppress the newspapers, and there is no finer story than the way in which those papers (…) succeeded in defeating the strikers, and in printing and distributing emergency sheets which (…) did more than anything to steady the public nerve, and to encourage the community in its fight against anarchy.
>
> The part aviation played in breaking the strike forms one of the finest pages in British aerial history, and it should have a lasting influence for good upon the development of flying in this country.'

The bluster does not convey the divisive nature of the industrial action. In the class-ridden society of the 1920s many other ranks in the military would have had relatives who were miners, and some officers connections with mine owners. It might be wise to end with the words of King George V, given that in the United Kingdom the monarch does not interfere in politics. He urged caution with the words, 'Try living on their wages before you judge them.'[7]

Notes:

1 TNA CAB 27/60. Summary of Report by the Air Ministry on the rail strike.

2 Cole, Christopher and Grant, Roderick; *But Not In Anger* (Ian Allen, 1979) p84.

3 TNA AIR 27/292. No 24 Sqn Operations Record Book, April 1926 – December 1939.

4 TNA AIR 27/527. No 56 Sqn Operations Record Book, June 1916 –December 1939.

5 Reported in *Flight* 10 June 1926, p338.

6 *Flight* 20 May 1926, p295.

7 Sinclair, D; *Two Georges: The Making of the Modern Monarchy* (Hodder and Stoughton, 1988) p105.

OPERATION THWART

by Andrew Thomas

Following the withdrawal from the Suez Canal Zone during the mid-1950s, the island of Cyprus in the eastern Mediterranean, then a British colony, was developed as a major base for British Forces. However, in Cyprus, as elsewhere, there was a growing desire for self-determination, that was further complicated by the desire of the majority Greek Cypriot community for *enosis* – a union with Greece, something that the minority Turkish Cypriot community vehemently opposed. In early 1955, following the United Nations refusal to consider a formal Greek request for *enosis*, there emerged a shadowy underground Greek Cypriot guerrilla organisation known as EOKA (***Ethniki Organosis Kyprion Agoniston*** – National Organisation of Cypriot Fighters). EOKA was led by the self-styled General George Grivas, a retired Greek Army colonel who was a focal point of anti-British activities and who had for some time been organising the smuggling of arms into Cyprus for use by EOKA. The insurgency was heralded during the early hours of 1 April by a number of bomb explosions at police stations, military posts and government offices across the island. And so began a long and difficult counter-insurgency campaign, that was to last until an independence agreement was signed in 1959.

There was considerable RAF strength on the island, but it was largely focused and equipped for more conventional intervention roles and to counter the burgeoning Soviet influence in the area. Despite considerable strike power, it quickly became apparent that the most useful contribution that could be provided by air power was maritime patrolling, to stop the flow of arms, and photo reconnaissance to update maps. However, for direct support to troops on the ground light aircraft such as Austers and helicopters like the Sycamore quickly proved their worth. The Austers of No 1910 (AOP) Flt and No 1915 (Light Liaison) Flt at Nicosia, and later Lakatamia, were used successfully in the spotting, road recce and propaganda roles and gave great flexibility to the supported Army units, with helicopters providing the main ‘offensive’ capability.

While Austers had demonstrated the usefulness of light aircraft as the campaign continued through 1956 and 1957, the internal security

situation continued to deteriorate and a spike in EOKA-inspired violence during 1958 indicated that additional air assets were required to support ground forces in the difficult wooded and mountainous terrain of the Troodos Mountains and the Kyrenia Range. On assuming the post of Director of Operations in October 1958, Maj Gen Kenneth Darling requested further light aircraft to support the security forces. The first to be ordered to move to support Operation THWART was a detachment of six Pioneer CC 1s from No 230 Sqn based at Dishforth in Yorkshire under command of Sqn Ldr W J Simpson DFC, a former Pathfinder pilot originally from New Zealand.

No 230 Sqn's diarist noted that it, 'was preparing itself to face the rigours of a Yorkshire winter when news of a move overseas broke on 18 November.' During the following week preparations were completed and the aircraft were broken down. The first Pioneer was loaded into the cavernous hold of a Beverley of No 30 Sqn that left Dishforth on the 26th bound for Nicosia with Flt Lt John Wallace and the advance party. The CO left on a second Beverley, with Flt Lts Roy Burgess and Ted Douglas, that arrived at Nicosia a little after 1700 hrs on the 27th and unloading began under floodlights. A third Beverley arrived the next day and at 1230 hrs the CO conducted the first air test in Pioneer XL557. It was, he noted, 'quite a historic moment.' Further air tests of re-assembled aircraft were flown on the 29th. By dint of much hard work, by the end of November No 230 Sqn had four aircraft serviceable, eight pilots and 14 groundcrew in theatre and was declared ready for operations. However, despite having been rushed out for operations the squadron found that the station working routine was from 7.00 am to 1.00 pm and the domestic site it had been allocated was in a dilapidated state. This created many problems but No 230 Sqn's airmen, 'quickly found out all the useful tricks,' and soon the ops site and tent lines were set up and made comfortable, although knocking the tent pegs and aircraft piquet stakes into the Cypriot rock led to many an oath! As a frustrated Derek Smith said – 'They curl!' The squadron soon had its 'patch' established and identified its squatter's rights by a splendid sign and No 230 Sqn badge painted – from memory – by Cpl A E Butcher.

Operations commence

At Nicosia Sqn Ldr Simpson was informed that his squadron was to

fly in the light transport role under tasking directed by the Tactical Air Control Centre (TACC) that was within the HQ of the Internal Security Forces (ISF) in Cyprus. The Pioneers would also be used for communications tasks flying a scheduled service for staff officers and VIPs between Nicosia and the HQ MEAF at Episkopi. In addition, flights would be made into a variety of small strips all over the island for which the Pioneer's short landing capability would be exploited to the full.

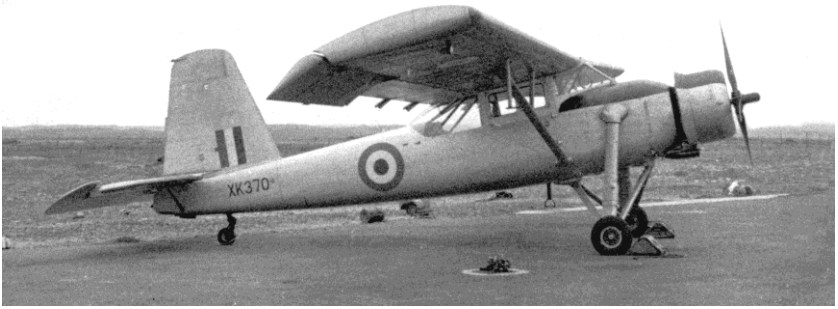
Cpl Butcher's rendering of the squadron badge – not a bad effort from memory.

No 230 Sqn's first operational sortie in Cyprus was flown on 1 December 1958 when Ted Douglas flew some casualties from Nicosia for treatment at the RAF Hospital at Akrotiri. Initially, however, there were a number of familiarisation trips to permit all the pilots to become acquainted with their 'patch', which was described by the pilots variously as 'beautiful' and 'a horrible desert'. The build up to full strength was hampered, however, when XK370 developed a slow running engine, and a major snag was found in the acceptance check on XL558, the last aircraft to arrive. Nonetheless, on the 3rd the squadron put up five aircraft for the benefit of the Press, although, in his eagerness to get his 'snap', the photographer for the *Cyprus Mail* almost fell out of the open door of the aircraft he was flying in! It was later surmised that the publicity might just have put the CO on EOKA's hit list! Scheduled services began on the 8th and from then on all personnel were on duty daily, a period that increased with night flying trials. In addition the Director of Operations had requested that the squadron be proficient in the supply-dropping role, so formal free-drop training onto the Nicosia DZ was begun using packs provided by the RASC.

No 230 Sqn was accommodated under canvas at Nicosia. Flt Lt A H Chantler with cup, Flt Lt E Douglas with hammer.

Working conditions also gradually improved, not least thanks to FS Gillatt's sterling efforts in constructing a coffee bar in the duty tent. Coincident with the squadron's arrival came an outbreak of EOKA-inspired arson against private vehicles in the Nicosia suburbs that gave rise to much concern to the ISF. Thus, on 20 December, a Pioneer flew over the affected area carrying observers from the Royal Berkshire Regt during the afternoon period when the curfew was lifted. Direct support was also given to the ISF in the form of visual reconnaissance and road convoy escort.

With the initial rush over and a routine established it was decided to reorganise the detachment into two flights under Flt Lts Mick Lloyd and Roy Burgess and begin a system of shifts. This, it was thought, would allow an equal spread of tasking amongst the pilots and, the diarist quipped, 'prevent the CO from 'hogging' the bulk of the flying!' Towards the end of the month the pace slackened significantly as Christmas approached but mainly because of the announcement of a truce by the EOKA leadership. In all, during December No 230 Sqn's Pioneers flew just over 190 hours on operations and carried over 350 passengers, although training was not ignored, notably the conversion of the newly arrived Fg Off Derek Smith who had joined the squadron just three days before deployment!



Pioneer CC 1, XK370, of No 230 Sqn at Nicosia in January 1959.
(Andrew Thomas)

Although New Year 1959 saw a continuation in the marked decline in EOKA-inspired trouble, compared with the ferocity of the previous year that had resulted in the squadron's deployment, it continued to support Op THWART. Despite the EOKA-announced truce holding through January, the squadron's tasking remained hectic as the directive, to keep road movement to a minimum through certain areas, remained in force. Things began with some interesting trips on 2 January at the villages of Agros and Alona in the rugged Troodos Mountains where 1 PARA was based in areas that could become inaccessible to road transport in periods of bad weather. Some trial drops were flown by the CO onto a difficult DZ behind the Agros Police Station. Flt Lt Hampton, however, had no luck finding a suitable DZ so it was eventually decided that only drops could be made into Agros and into the courtyard of the Kykko Monastery which was the Battalion HQ.

Op MARE'S NEST, a major ISF operation by 3 Brigade in the mountains to the south of Xeros in the Troodos Mountains to clean out EOKA pockets, began on the 6th. Before the Operation began the CO had flown the participating unit commanders (the Royal Horse Guards, Grenadier Guards, Lancashire Fusiliers, Welch Regt, Black Watch and the Parachute Regt) over the area on an extensive reconnaissance of the rugged terrain. The cloud, rain and snow then arrived. The *Cyprus Mail*'s account of the start of MARE'S NEST gave a vivid description of the conditions: 'In thick mud, with teeming incessant rain and a

temperature not much above freezing point, British troops pressed on yesterday with their large scale operation in the northern Troodos region. In the mid-morning downpour patrols of soldiers searched the wooded slopes. Horses and trucks entering the cordon area were stopped and questioned by Greek speaking soldiers.'

With the heavy rain washing away many of the mountain roads, after the Army had lost a driver over the edge of one road in the slippery conditions, No 230 Sqn's Pioneers were, for the first time, requested to conduct supply drops to troops engaged on the ground. Flt Lt Len Sandbach therefore flew a Ground Liaison Officer (GLO) to locate suitable DZs and the CO landed at Xeros to confirm the details with the Brigade HQ. After overcoming some initial resistance from the Air HQ, Len Sandbach made the first live drop on the 9th. Each load comprised ten 45 lb packs and in all 114 drops were made onto DZs over the next ten days in difficult country and very poor weather that tested the pilots' skill to the full. Despite the difficulties, some very good results were achieved and almost 3 tons of supplies were dropped. The CO wrote at the time: 'Supply dropping was considered the highlight of the Cyprus detachment. Working directly with the Army in the field gave the Squadron a sense of direct participation in operations. The only dissatisfied customer was a Grenadier Guardsman who foolishly strayed into the undershoot of a DZ and received a personal ration delivery in the shape of a 45lb pack. He was a sad and sorry Guardsman for a few days.'

Speaking at a press conference at his HQ at Xeros, the Brigade Commander, Brig Tony Read said: 'The operation, which involves about one thousand troops, covers an indefinite area over about 600 square miles and is always moving. New techniques are in the process of being tried out [*referring to No 230 Sqn's resupply task*] and old ones refined. We are patrolling very wide and in difficult country. The chief transport is feet, vehicles, helicopters and fixed wing aircraft and a great deal of progress has been made in ground to air co-operation in the Cyprus hills.' When asked, the brigadier refused to give the Operation's code-name, but reflecting on the weather said, '*Mudlark* will do!' and a journalist noted that, even as he spoke, 'a Pioneer aircraft roared overhead on its way to drop supplies to isolated troops.' MARE'S NEST was concluded on the 19th with a number of significant arrests.

No 230 Sqn's Pioneer, XL555, on start up at Nicosia under the watchful eye of SAC Cornwall – Flt Lt P W Goad in the cockpit. (Andrew Thomas)

Also on the 9th, the CO and Flt Lt Hampton supported Op BRIDGEMARKER between Episkopi and Akrotiri in connection with the visit of the Secretary of State for War. Ten days after the conclusion of MARE'S NEST, Op GREY DAWN began in the rugged Kyrenia Range on the Cyprus 'panhandle'. This involved the Pioneers conducting a further 28 supply drops to the troops engaged during the two-day operation. Having built up to full strength of six aircraft, the squadron flew over 200 hours in January, carrying almost 550 passengers. In addition, some parachute trials were conducted during half a dozen sorties flown by the CO in concert with 138 Supply Platoon of the RASC, who also provided the air despatchers, resulting in clearance being given on the 19th. With the intensity of operations and the sometime poor weather there was real pressure on the groundcrew to whom the CO gave unstinting praise: 'The greatest strain was placed on Warrant Officer C P Gilbert, the SNCOs and airmen who worked very hard indeed under often unpleasant conditions in the open. Despite

this, they remained unfailingly cheerful and diligent and cannot be too highly praised.'

Peace

With peace talks taking place, initially in Zurich, no military operations were undertaken in February so the bulk of the squadron's tasking from the TACC was in the comms role, mainly a thrice daily service shuttling passengers, light freight and official mail between Nicosia, Kermia on the south east coast, Episkopi, and Limassol. Some VIP flights were also flown. In addition, to gather intelligence on the movement of some civilians and vehicles, some visual reconnaissance sorties, code-named SEARCHLIGHT, were flown over the Kyrenia Range. The pilot was carefully briefed before each trip, each of which carried a trained observer, usually an Army officer, who did the spotting. The pilot concentrated on flying the aircraft at just above its stalling speed of about 45 knots and keeping clear of the rugged ground – which could be quite challenging in the often turbulent conditions. As a result a number of previously unknown EOKA 'hides' were discovered. One of the pilots involved said: 'Two hours of this flying at low level in the valleys was exhausting and frequently hazardous.'

A few photographic sorties were also flown and although the weather conditions were often clear, frequent storms brought snow, high winds and turbulence to the mountains. During a resupply to an isolated outpost manned by men of 25 Field Regt, RA on 14 February, one of the pilots said, with some feeling: 'Very turbulent conditions were experienced on all drops and the air currents in the Kyrenia Range caused the parachutes to drift in all directions and in one instance a parachute was actually seen to climb up the hillside, half circled and finally descended more or less on the DZ!'

On 17 February a conference of all the interested parties was held at Lancaster House in London and a draft peace agreement was initialled on the 19th by leaders of both the Greek and Turkish communities, paving the way for the establishment of the Republic of Cyprus. Although the detail took many months to finalise, the campaign was effectively over. Some of the air reinforcements were stood down almost immediately, but Sqn Ldr Simpson was informed that No 230 Sqn would remain *in situ* until the political situation clarified. The squadron's Pioneers continued to be much in demand for

communications work in early March, but after just one more Op SEACHLIGHT sortie, these were stopped. Nevertheless, although formal Security Force operations had ceased on 1 March, a few more sorties were mounted to fly battalion commanders over their operational areas. It was during a flight into Limassol on 6 March that the squadron suffered the only major incident of the detachment when XL702's brakes failed when landing and it hit an obstruction which caused significant damage. Then, on 19 March, the CO was instructed to prepare to return to the UK and the last flying in Cyprus was on the 25th after which the detachment was airlifted back to Dishforth.

Although the anti-EOKA campaign largely ended shortly after its arrival, No 230 Sqn's contribution had been impressive, its six aircraft having flown almost 1,600 sorties in nearly 800 flying hours. In addition to dropping a considerable amount of supplies, it had carried more than 1,500 passengers – not bad for a five seat aircraft!

Sqn Ldr Simpson summed it up thus: 'A book could have been written about the 4 months the Sqn spent in Cyprus. There were many happy and amusing incidents, and there were many frustrating and annoying moments, but on the whole, the detachment was voted an 'experience' and something not to have been missed.'

Pioneer, XL558. of No 230 Sqn at Nicosia. (Andrew Thomas)

CLASH OF THE INFANTS: BOMBING THE BOLSHEVIKS IN THE BALTIC, 1919[1]

by Alastair Noble

The Royal Air Force's involvement in the Russian Civil War pitted the world's first independent air force against the world's first communist state. As has been detailed previously in the *Journal*, the RAF's participation in the conflict saw squadrons active across the extremities of Russia.[2] Operations in Russia[3] marked the start of non-stop operational activity for the RAF during the so-called 'peace years'.[4] This paper does not attempt to cover the wider British intervention. It concentrates on the RAF in the eastern Baltic from July to December 1919.[5]

At the outset, it is worthwhile considering briefly how the RAF came to be in the Baltic and noting the political sensitivities surrounding intervention in revolutionary Russia. General Poole arrived at Murmansk to organise the North Russian Expeditionary Force in May 1918, initially to safeguard supplies sent to the Tsarist and Provisional governments. The Bolsheviks had signed the Treaty of Brest-Litovsk in March 1918 with the Germans. The British feared for the stockpiled supplies, the possible establishment of German submarine bases at Archangel and Murmansk, German access to rich Russian resources and, most importantly, the release of significant German forces to reinforce the Western Front.[6] RAF elements arrived from June 1918. The mixed expeditionary force included a flight of DH4 day bombers aboard HMS *Elope*; in July five Fairey Campanias, two Sopwith Babies and a Camel arrived on the carrier *Nairana*. The RAF units participated in the Expeditionary Force's successful operation to capture Archangel on 2 August 1918.[7] With the German defeat and growing tensions with Moscow from the summer of 1918,[8] subsequent British actions against the Bolsheviks led one prominent historian to conclude: 'Essentially, the story of Allied Intervention in the Russian Civil War is one of Britain's involvement, for it was she who bore virtually the entire cost of assistance to the (anti-Bolshevik) Whites.'[9]

In the context of the air element of British intervention, the emphasis in published literature has been on the RAF's role in north Russia – at Murmansk and Archangel – and in south Russia, supporting General Denikin's White armies. From an RAF resources standpoint, the Baltic

was the runt of the intervention litter. More modern seaplanes went to north Russia;[10] much greater resources and supplies were directed to the south.[11] Moreover, RAF personnel served in a voluntary capacity, which led to questions over the role of units deployed in a country no longer at war, so they operated under the guise of advisory groups or White Russian training missions.[12]

Admiral Sir Rosslyn Wemyss, First Sea Lord and Chief of the Naval Staff, told the Imperial War Cabinet on 20 November 1918 that the Admiralty was prepared to send a fleet into the Baltic, providing the mines were swept up before the fleet proceeded and this did not include going to Petrograd and Finland. He added, 'If the fleet were to go to Petrograd, it would be contrary to the policy of the Cabinet not to fight Bolshevism.[13] No concrete policy was formulated for more than six months.[14] The objective seemed to be to get German forces to leave the Baltic but ensure the Bolsheviks did not immediately take their place. In late June 1919, the Admiralty still bemoaned the lack of a coherent policy as Bolshevik naval forces endeavoured to attack Estonia and had fired on British ships. It told the War Cabinet that its ability to control the situation had been 'overrated from the beginning' but sought its authorisation to suppress Bolshevik naval forces as, 'It is not fair to the Navy to employ it in the present fettered fashion.'[15] Eventually, on 4 July, the War Cabinet decided,

> '(a) In fact a state of war did exist as between Great Britain and the Bolshevist Government of Russia:
>
> (b) In consequence of (a), our naval forces in Russian waters should be authorised to engage enemy forces by land and sea, when necessary.'[16]

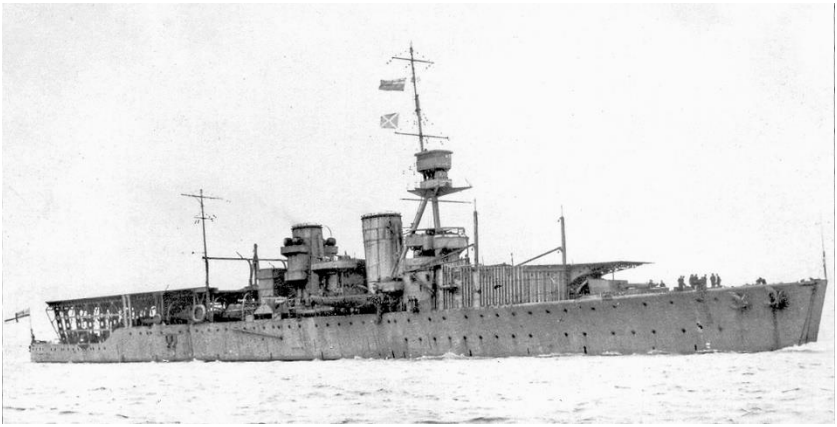
The British involvement in the Baltic was a tri-Service affair, alongside the Secret Intelligence Service's operations in Petrograd. In addition to the absence of clear policy, British intervention in revolutionary Russia lacked committed political support. Politicians feared the impact of further conflict on a war-weary population; the financial situation was 'desperate'[17] and they were anxious about corrosive Bolshevik propaganda, affecting military personnel in theatre and the British working class. A further factor was London's lack of confidence that any White leader deployed enough manpower, or enjoyed a degree of popularity, sufficient to remove the Bolsheviks. Intervention would be costly, dangerous and ultimately unlikely to

produce regime change beneficial for Britain.

The Coalition Government faced Parliamentary criticism for taking sides in a foreign civil war. The Liberal Prime Minister, David Lloyd George was sceptical. He believed Bolshevik Russia and international communism posed less of a threat to Britain and its interests than the old Russian Empire or a renewed national Russia.[18] At the Imperial War Cabinet on 31 December 1918, Lloyd George had said that he, 'was opposed to military intervention in any shape.'[19] The Chancellor of the Exchequer, Sir Austen Chamberlain, called for agreement with the Bolsheviks and the withdrawal of British forces. In addition to being expensive, he argued that intervention had no long-term benefit, as immediately British support was withdrawn, anti-Bolshevik forces would collapse.[20] Lloyd George concurred, warning in February that an expensive war against Russia was, 'a way to strengthen Bolshevism in Russia and create it at home.'[21]

Others disagreed. *The Times* considered, 'the present Russian Government is the most Imperialistically minded in Europe.'[22] This line hardened during 1919. In May, it called for intervention and observed, 'Our vacillation and inaction have helped the Bolshevists, but none of our friends.' It was Britain's 'duty' to intervene.[23] The Liberal Minister of Munitions, Winston Churchill, was the Government's most vociferous anti-Bolshevik. The ink had barely dried on the Armistice, but Churchill had Bolshevism in his sights. Churchill told his constituents in Dundee on 26 November 1918: 'Civilisation is being completely extinguished over gigantic areas, while Bolsheviks hop and caper like troupes of ferocious baboons amid the ruins of cities and the corpses of their victims.'[24] His appointment as Secretary of State for War and the Royal Air Force on 9 January 1919 (from March, Air) gave him a leading role in British policy towards Russia.

At the same time, the RAF's very existence as an independent service seemed under threat, typified by Lloyd George's appointment of Churchill to the joint War and Air Ministerial portfolio. The post-war reorganisation and severe slimming down of the RAF was already in motion.[25] However, in 1919, while the infant Service's future was still in the balance, its permanent foundations were being laid.[26] *The Times* still thundered against the RAF's 'notorious wastefulness' adding, 'We know of no more humiliating spectacle than that of young officers of the Royal Air Force in basket chairs and being propelled



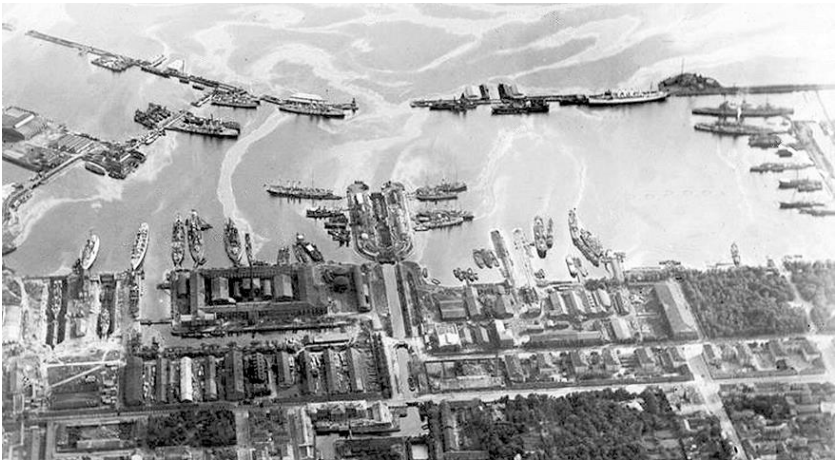
HMS Vindictive, *the Hawkins-class cruiser 'Cavendish', launched on 17 January 1918; renamed in July 1918.* (Public Domain)

through London by young women mounted on motor-bicycles, long after the conclusion of peace.'[27] Nevertheless, *Flight* reported on 6 November 1919:

> 'Undoubtedly, the question of scrapping the Air Ministry, and with it the RAF as a separate Service, has been recently discussed, but it is now definitely stated that the idea has been completely dropped, and that the RAF is to continue along the lines of its present organisation.'[28]

A White Paper of December 1919, often referred to as 'The Trenchard Memorandum', set out the plans for the RAF's post-war development and was of prime importance in this regard.[29] The air estimates were reduced by £12·5M to £54M, although throughout 1919 the RAF had been involved in active operations in India, Egypt and across Russia.[30] It is to operations in the Baltic which we now turn.

The *Vindictive*,[31] a converted light cruiser of 9,964 tons, able to launch aircraft from her forward flight deck, left Rosyth on 2 July 1919, heading for the Baltic, via Copenhagen. The *Vindictive's* major advantage was its speed of nearly 30 knots and it was said to have a 'better gun armament than any ship now in the Baltic'. In addition to having great value in the Baltic as a fighting ship, the reconnaissance capabilities of seaplanes and aeroplanes were expected to relieve the 'great strain (…) being borne by destroyers'.[32]



Aerial view of Kronstadt harbour, 26 July 1919, showing the positions of Bolshevik warships before the attack by Royal Navy Coastal Motor-Boats, 17-18 August 1919. (IWM Q107944)

Although some accounts indicate it could carry 6-12 aircraft,[33] it was claimed, by one observer, that the *Vindictive* conveyed a mixed squadron comprised of eight Short 184 seaplanes stowed on the landing deck, four Sopwith 1½ Strutter two-seaters, three Sopwith Camels and two Isle of Grain Griffins stowed in the forward hanger.[34] The Griffin was a rare bird indeed; a two-seater reconnaissance aircraft, developed at the Isle of Grain, Medway by the Naval Aircraft Experimental Constructive Depot. Only seven were built.[35]

The seaplanes and aeroplanes were to provide air support to the Navy's light cruisers and destroyers as they attempted to prevent the stronger Bolshevik fleet stationed in the renowned island fortress of Kronstadt from undertaking operations against Finland and the Baltic states.[36] Due to numerous minefields, reconnaissance of Kronstadt could only be done by aircraft.

The RAF unit detached for duty in the Baltic on *Vindictive* came under No 29 (Fleet) Group, headquartered in Edinburgh – a Command which comprised certain units in Scotland directly under the CinC Atlantic and Home Fleets, for operations.[37] As the RAF unit was held on *Vindictive's* books, Rear Admiral Walter Cowan, Senior Naval Officer (SNO) Baltic, was effectively its commander. At this point

Left, RAdm Walter Cowan, Senior Naval Officer, Baltic, 1919; right, Maj Grahame Donald. (both Public Domain)

offensive action against Kronstadt by, 'monitors, coastal motor boats or bombing aeroplanes' was precluded. Furthermore, torpedo carrying aircraft could not be used against ships at Kronstadt as the torpedoes could not be dropped in less than 10 fathoms although they could be used against Bolshevik ships eight miles or more to the west of Kronstadt where the water was deeper.[38]

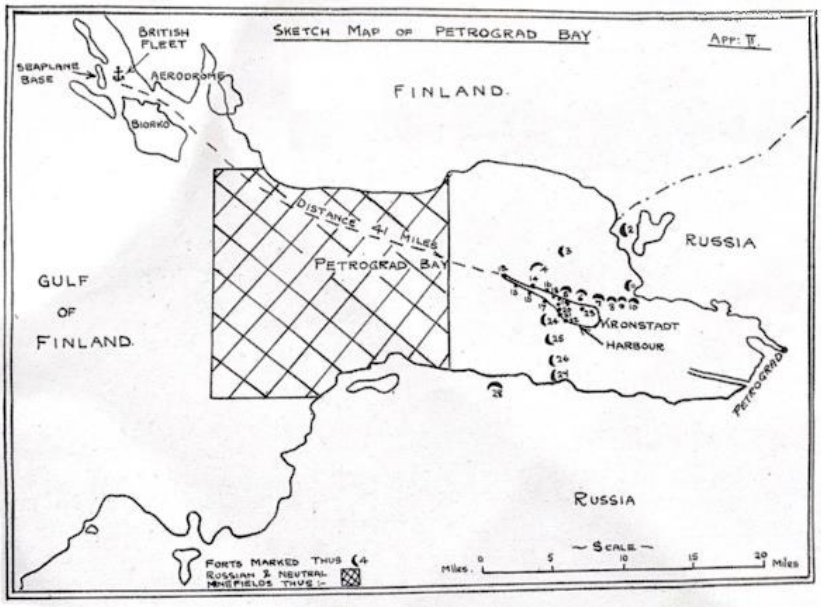
The RAF contingent in the Baltic was led by Major Grahame Donald, a former Royal Naval Air Service airman who had flown from *Repulse*, *Furious* and *Vindictive*. He would later rise to the rank of air marshal, commanding Maintenance Command from October 1942 until his retirement in 1947.[39] Donald earned fame for a miraculous escape from death in 1917. As a naval pilot he fell from his Sopwith Camel at 6,000 feet. In a 1972 interview, Donald recalled, trying a new manoeuvre; he flew the Camel up and over, but when he reached the top of his loop, his safety belt snapped, and he fell out. 'The first 2,000 feet passed very quickly, and terra firma looked damnably "firma". As I fell, I began to hear my faithful little Camel somewhere nearby. Suddenly, I fell back into her.' Incredibly, the aircraft had continued

its loop and Donald landed on its top wing. He grabbed it with both hands, hooked one foot into the cockpit and wrestled himself back in, struggling to regain control, before executing, 'an unusually good landing'.[40] Similarly hazardous was Donald's sporting career – he made two appearances at Prop for Scotland at Rugby Union in 1914 but both matches were lost.[41] Donald's Baltic experiences were outlined in an RAF Staff College paper in 1923-24. It is an invaluable account.[42]

The *Vindictive's* arrival in the Baltic was not auspicious. On 6 July, she ran aground on a mud bank outside Reval (Tallinn) harbour. There she remained for eight days, in three feet less water than her draught, in a tideless sea. The ship's log noted that hands were employed getting out stores and ammunition[43] and *Vindictive* was 2,000 tons lighter once her guns and ammunition had been unloaded, although two attempts to tow her off were unsuccessful. At this point the aeroplanes and seaplanes were hoisted out and temporarily based in Estonia.[44] On 14 July, taking advantage of a rise of water of six inches due to a westerly wind, the lighter, but damaged, *Vindictive* was pulled clear of the bank and into Reval for repairs. For the young pilots Reval proved an interesting interlude. The 19-year-old Eric Brewerton recalled that a lunch of kidney soup and donkey's ears was 'not nice', but there were 'well dressed and lovely ladies.' Moreover, it was 'rather hot' and 'everyone bathes without a costume.'[45]

The *Vindictive* arrived at Björkö Sound on the southern Finnish coast on 20 July. Donald recalled 'an aerodrome was established out of a wilderness of trees and rocks on the mainland about one mile east of the ship. At first it was not so level as one would wish, and it was very small, initially about 80 yards broad and 200 yards long; but after a few weeks aeroplanes were ready to take-off and land, fully loaded with bombs.'[46] Alongside the aerodrome at Koivisto (Primorsk), a seaplane base was established on one of the Beryozovye Islands at Sudensaari (now Krasniy Ostrov), about a mile to the south-west of the ship and all seaplanes were landed. This had been an Imperial Russian Navy coaling depot with two wooden piers, between which a slipway was now built.[47]

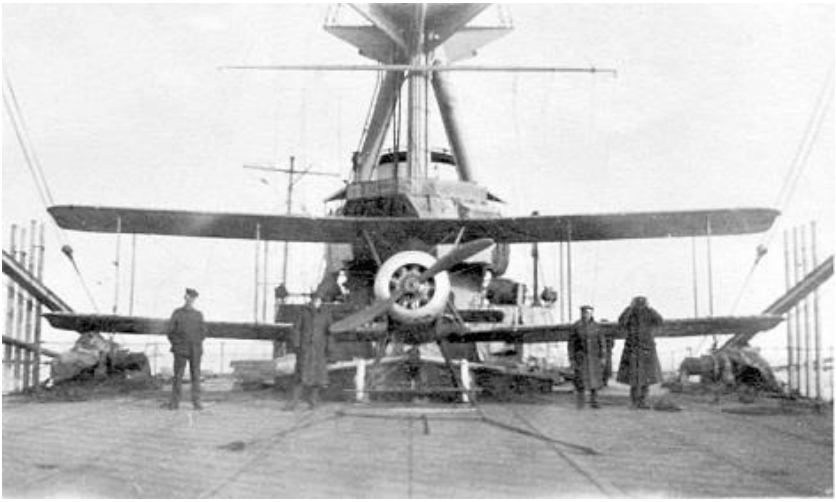
In glorious weather, the machines were readied for bombing the 'Bolshies' at Kronstadt, about 40 miles to the south east. As noted, the aircraft constituted a decidedly mixed bunch. Operations were governed by the fact there were only 11 pilots in the unit, five of them



Maj Donald's sketch map of Petrograd Bay. (AP 1097, p40)

seaplane pilots. Within a week of their arrival, the RAF element commenced effective operational co-operation with the Navy. Initially, this took the form of reconnaissance and photographic flights – with two or three seaplane patrols daily. These were principally anti-submarine patrols but if enemy craft were seen, they were bombed. Movements or changes of disposition of ships in Kronstadt were reported by wireless telegraph. Cowan told London that with six flying boats and requisite bombs they, 'might incapacitate (*the*) whole of (*the*) Bolshevik fleet within one month.'[48]

The first bombing raid on Kronstadt was mounted by 11 aircraft on 30 July; it comprised five seaplanes, three Camels, two 1½ Strutters and a Griffin. One Strutter pilot recalled dropping his bombs at 5,000 feet. While there was a lot of anti-aircraft fire it was mostly 'pompoms' and nowhere near.[49] In this first raid, two-seater aeroplanes were flown from the *Vindictive* as the aerodrome was still being levelled and was not considered safe for two-seaters when loaded with bombs. The force dropped ten 112lb bombs and 65lb bombs, with five direct hits and two large fires being started, the attack centred on the destroyer depot ship

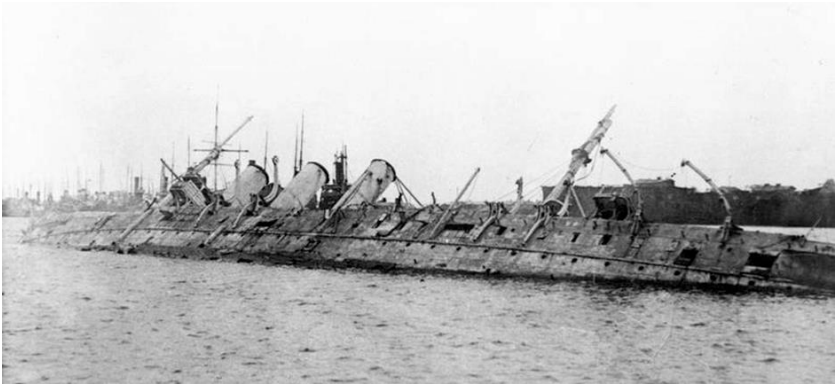


A Grain Griffin on board HMS Vindictive*, 1919.* (Public Domain)

and a dry dock. Two bombs reportedly fell on a sailors and soldiers meeting, killing or wounding over 100 of them.[50]

In addition to the strains on the small number of pilots, Donald noted that, 'inadequate aerodrome arrangements hampered operations' and that the aircraft were all, 'old and unsuitable for the duties they were required to carry out.' Moreover, Bolshevik anti-aircraft fire steadily improved, a particularly unpleasant experience as the seaplanes could not get above 4,000 feet.[51] Promises of more pilots and aircraft raised spirits and Brewerton noted in early September: 'Very glad as too much to do for three or four pilots. Apt to effect one's nerves flying over water in an aeroplane with unreliable engines and knowing the sort of reception the Reds would give one if you had to land amongst them.'[52] Cowan continued to chase the Admiralty for aeroplanes, seaplanes and pilots, telling them he was 'short handed'.[53]

Donald counted eight daylight and two night bombing attacks on Kronstadt in August 1919, as well as daily routine seaplane patrols and attacks on enemy kite balloons observing British ships. This successful co-operation of air and naval forces was geared to removing as far as possible the threat posed by ships in Kronstadt to British ships and to the left flank of the Estonian front. The highlight of Baltic operations was the joint Navy-RAF attack on the Red Fleet at Kronstadt on the



Pamiat Azova – *the Bolshevik submarine depot ship sunk by CMB 79, 17-18 August 1919.* (IWM Q69746)

night of 17-18 August 1919. RAF aircraft and the Navy's Coastal Motor Boats (CMBs) combined to devastating effect.[54]

Aircraft were to suppress the defenders so the CMBs would be neither heard nor seen approaching the harbour entrance. The bombing attack was thus timed to start before the boats arrived within earshot of Kronstadt and to continue until they reached the harbour entrance. Individual aircraft were assigned specific tasks such as attacking the guardship anchored at the harbour entrance, attacking gun crews and searchlights on the breakwater and covering the retreat of the CMBs. Pilots were to attract anti-aircraft fire and searchlight beams. Eight aircraft participated – four seaplanes, two 1½ Strutters, one Griffin and one Camel, alongside eight torpedo-armed CMBs – 55 personnel in total. The presence of the RAF aircraft diverted Bolshevik attention from the surface craft.

The CMBs navigated around island forts and batteries, sandbanks, shoals, moles and buoys. As they approached the harbour entrance all firing was anti-aircraft and no searchlights were trained on the water. The first three entered the harbour with barely a shot being fired. Some batteries only realised that surface craft were present when the CMBs turned for home. Two Bolshevik battleships were torpedoed, a submarine depot ship sunk, and a destroyer torpedoed. Three CMBs were lost.[55]

The pilots displayed great fortitude. Even after they had dropped their bombs and expended their ammunition, they circled above

Kronstadt, drawing attention away from the boats. One seaplane put out a searchlight by machine gun fire while an aeroplane diverted a searchlight trained on a CMB, saving it from further fire. Capt A C Randall's Camel's engine stopped halfway to Kronstadt and although he managed to re-start it, he knew it was liable to fail again at any moment. Nevertheless, he still proceeded to Kronstadt and played an active part in the operation, machine-gunning searchlights and gun crews. Randall's engine failed completely on the way back, but he was picked up after crash-landing on a Finnish beach.[56] Brewerton was in the air for three hours 15 minutes and as a result was, 'Dead tired when I landed and fell asleep on aerodrome in a drizzle of rain after reporting.'[57] There was an unconfirmed report that the bombs dropped by the RAF had caused a fire in the woodstore and that this had spread to the suburbs, destroying, according to rumour, oil and coal depots.[58]

Genuine Royal Navy-RAF mutual appreciation is evident in the Baltic. Both services saluted the valour of the other. RAdm Cowan considered the operation to have been, 'as brilliant and completely successful a combined enterprise by sea and air forces as the last five years of war can show'. He underlined: 'This action was a very complete example of gallant, unselfish and perfectly disciplined co-operation between air and sea.'[59] The Admiralty acknowledged great credit belonged to the NCOs and airmen of the seaplane base and aerodrome: 'Their zealous and untiring work on machines no longer modern is most commendable.'[60] Cowan also praised the efforts involved:

> 'Though all their arrangements for bombing were makeshift, and the aerodrome from which five machines had to rise in the dark was a month before a wilderness of trees and rocks and in size quite inadequate, not one of the nine [*sic* eight] machines – sea and land – failed to keep to its timetable or to lend the utmost and most effective support during and after the attack to the coastal motor-boats.'[61]

The CMBs were led by Commander Claude C Dobson, who was most grateful: 'The aircraft were simply splendid. Every time the forts got their searchlights on to us and warmed us up, one of them would dive at it and distract their attention. Without them, I don't think any of us would have got back.'[62]

A generic Sopwith 1½ Strutter as used by Cowan's force. (IWM Q66793)

In the meantime, wear and tear set in among the motley collection of machines and the arrival of a fresh batch of six Camels at the end of August was welcomed.[63] Cowan still appealed for more aeroplanes, seaplanes, queried bomb frames on Camels and seaplanes, requested stocks of various types of bombs and said he needed 10 fitters, 10 riggers and four armourers, being prepared to send *Vindictive* to Copenhagen to collect them.[64] Meanwhile, Bolshevik anti-aircraft opposition improved daily, the presence of German gunners being suspected although never proved, to the extent that the RAF's Camels were forced to fly at 14,000-15,000 feet for safety, although some were still being hit. Brewerton soon experienced boils, necessitating the bandaging of his head, and haemorrhoids. The latter had arisen from sitting on a cushion saturated with petrol that had been spilled while refuelling and which had then frozen at altitude.[65]

A host of new pilots and aircraft were conveyed by *Furious* to Copenhagen and transferred to *Vindictive* which left Björkö on 5 September and returned on 11 September. The thirteen pilots and four observers proved of greater value than the additional machines – six seaplanes, two Strutters and twelve Camels. Donald described nearly all the aeroplanes as having been in bad condition and, 'hardly one was fit for active service flying.'[66] During September over 70 bombs were dropped on Kronstadt while seaplane patrols continued and there were

engagements with Bolshevik ships and attacks on enemy kite balloons.

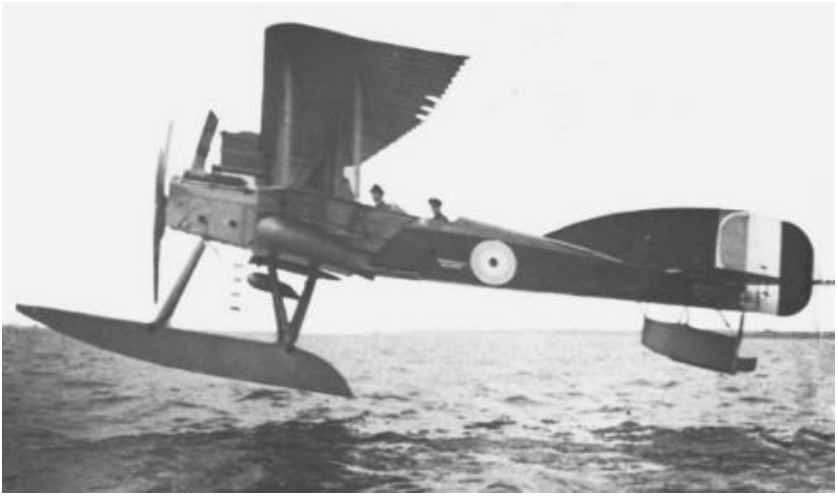
What of the opposition? Apparently, the Red Air Fleet had 87 aircraft to defend Petrograd in 1919 but the RAF rarely encountered opposition. Two Bolshevik aircraft dropped bombs on the Finnish village of Terrioki (Zelenogorsk) on 20 and 26 August, as its yacht club was base to the CMBs which had attacked Kronstadt.[67] On 4 September, three out of five Bolshevik flying boats which flew over Kronstadt were reportedly shot down by Red gunners, who believed them to be British.[68]

The weather deteriorated in October. Although patrols continued, it became increasingly unfavourable for seaplane flying. The operational emphasis also shifted in mid-October – from Kronstadt to the Bolshevik coastal fortresses which hindered the White General Yudenitch's advance on Petrograd with his North-West Army.[69] Indeed, the British armed this army, and the Estonian Army, and had long been keen on improving relations between the two, particularly raising the morale of the former force.[70] Over 300 bombs were dropped in the five days from 14 October and the Krasnaya Gorka forts were bombarded by the *Erebus*, a Royal Navy monitor, with the RAF helping with spotting.[71]

On 14 October, a railway station was bombed near Petrograd.[72] On 30 October, four bombs were dropped on the Putilov works by an aircraft which flew over Petrograd.[73] Mark V tanks from the Tank Corps detachment helped Yudenitch's forces reach Petrograd's outskirts.[74] Lenin wanted to abandon Petrograd as a lost cause. Trotsky, supported by Stalin, successfully argued that retaining the cradle of the revolution was imperative.[75] Finnish reports incorrectly suggested the Kronstadt garrison had hoisted the white flag on 17 October.[76] A lack of numbers and determined Red defence proved to be the White's undoing at the gates of Petrograd. Simultaneously, Denikin's White armies crumbled south of Moscow.[77]

By the end of October, great difficulties were encountered in the eastern Baltic starting the water-cooled seaplane engines. It got even colder in November when daytime temperatures at the seaplane base were rarely above 25°F and more often about 16°F. Donald described the challenges:

> 'Hot water poured into the radiator appeared in the form of icicles at the drain-cock, in spite of the use of glycerine. Warm oil



A Short 184 as operated by Cowan's force.
(Public Domain)

> poured into the tanks soon attained the consistency of grease. Ice between the points of the sparking plugs was another great source of trouble, and even when the seaplanes were eventually got into the air it was found extremely hard to keep the water temperature sufficiently high to enable the engines to develop full revolutions.'[78]

The conditions at the seaplane base were severe, with no cover, a frozen slipway and 16 degrees of frost. In addition, when seaplanes took-off, the spray immediately froze, covering the control surfaces with ice, which eventually caused them to jam.[79]

Brewerton's last flight was in the Griffin on 7 November for a wireless test.[80] On 11 November the situation was illustrated when a seaplane attempted to attack a Bolshevik destroyer off Krasnaya Gorka, but its bombs failed to release – the bombs, dropping gear and controls were all frozen. With ice gripping the Gulf of Finland, the seaplane base and aerodrome were rapidly evacuated on 25 November. Björkö Sound started to freeze up. Large blocks of ice floated past from Petrograd.[81] Kronstadt was frozen-in. Ironically, a few days later, the weather became warmer and seaplane patrols were flown from *Vindictive*. In the interim, RAdm Cowan had appealed for more aircraft

Sopwith Camel with aircrew from HMS Vindictive, *Koivisto, Autumn 1919.* (Public Domain)

and supplies[82] but underlined that the Camels 'must be in better order than last ones sent' and advised that the seaplanes were non-effective in frost.[83] *Vindictive* left Björkö for Copenhagen on 7 November to rendezvous with *Argus* on 9 November. In challenging weather conditions, aircraft and provisions were transferred.[84] *Vindictive* arrived at Reval on 14 November, then left for Björkö on 17 November, arriving there the following day. Cowan, still in Björkö Sound in early December, reported that *Vindictive* was 'now of little use up here – her Seaplanes are too unreliable to trust over Enemy waters, and the snow prevents Land Machines being used'. The ice now stopped Bolshevik warships from entering the Gulf of Finland. He viewed a German thrust towards Libau (Liepaja) in Latvia as more likely and recommended that *Vindictive* should head there, because 'Libau has a good aerodrome, and the knowledge of her arrival may be of some moral effect down there.' Cowan was prepared to hand over the remaining Land Machines to the Latvians.[85]

Meanwhile, on 12 November, Ministers had decided that only a small force of ships, consisting of two light cruisers and five destroyers should remain in the Baltic over the winter months.[86] On 8 December, *Vindictive* left for Reval and then proceeded to Libau on 10 December, arriving the next day. According to the ship's log, an RAF working party and the 1½ Strutters were landed at Libau. But the Air Ministry was anxious to get the aircraft and personnel back, so *Vindictive* left

Libau on 20 December and returned to Britain via Copenhagen, reaching Portsmouth on 23 December.[87]

The balance sheet shows that the RAF had carried out 547 operational flights in the course of which it had logged 837 flying hours. Some 22,895 lbs of bombs had been dropped, just over 10 tons.[88] Nearly all the airmen involved were serving on a 'duration-of-war' engagement and should have been demobilised in October. The Short seaplanes were all over four years old; the Camels and the 1½ Strutters had served at sea during the war. In total, 55 aircraft were deployed and 33 were lost. Three were shot down by the Reds, nine force landed in the sea, seven crashed because of the aerodrome's uneven surface and 14 deteriorated due to the weather conditions. The human cost was four pilots killed and two wounded and one airman drowned.[89]

While the RAF and the Bolshevik regime both survived infancy, only the RAF would see its centenary. Nevertheless, the Bolsheviks knew too well the threat posed to Petrograd (from 1924, Leningrad) and Kronstadt. After the Winter War (1939-1940), re-affirmed following the Second World War, Finland was forced to give up most of the frontier province of Karelia, including the land around Björkö Sound to its much larger neighbour.[90]

The RAF fought valiantly in the Baltic in 1919, despite the lack of political direction and support and the burden of meagre and outmoded equipment. It played a key role supporting naval operations and in the ill-fated White advance on Petrograd. Although the intervention was attacked and ridiculed, in the Baltic it helped ensure the survival of the infant Baltic States for two decades.

Notes:

[1] I would like to acknowledge my Air Historical Branch (RAF) colleague Stuart Hadaway and Ian M. Burns in Canada for providing me with valuable material for this article. It originally took the form of an RAF Museum Lunchtime Lecture, delivered on 8 November 2019.

[2] TNA, AIR 10/1849, *A Short History of the Royal Air Force*, Air Publication 125, Second revised edition, July 1936, pp439-440.

[3] For recent accounts see Wright, Damien, *Churchill's Secret War with Lenin: British and Commonwealth Intervention in the Russian Civil War, 1918-20* (Helion and Company, Solihull, 2018); Wilkinson, Philip, 'Guns in the Sun and Snow: The RAF in Southern Russia, 1918-1920', *RAF Historical Society Journal* 60, 2015, pp76-108; Wilkinson, Philip, 'The RAF in Northern Russia 1918-1919', *Cross & Cockade*

International, Summer 2017; Holmes, Benjamin D, 'Aviation and the Anglo-American Intervention at Archangel', 1918-1919', *Aerospace Historian*, Volume 33, No 3 Fall 1986, pp183-189; Wilkinson, Philip, 'Guns in the Sun and Snow (Rather More Snow) – the RAF in Northern Russia 1918-19', *RAF Historical Society Journal* 63, 2016, pp93-129; Wilkinson, Philip, *Red Star and Roundel: A Shared Century* (Fonthill Media, 2019).

[4] Philpott, Ian M, *The Royal Air Force: An Encyclopaedia of the Inter-war Years, Volume I, The Trenchard Years 1918 to 1929* (Pen and Sword Aviation, Barnsley, 2005), p37. The period 1918-1924 was one of non-stop operational activity for the RAF. This included helping to police Germany pending a peace settlement, the intervention in Russia, maintaining internal security in Ireland, intervening during the Chanak crisis against Turkish aggression and implementing a policy of 'air control' in British Somaliland, Mesopotamia, India and other disputes.

[5] Petrograd was the former Imperial capital and central to the February and October revolutions of 1917. Kronstadt was the Baltic naval fortress, whose sailors were viewed as the vanguard of Bolshevism. The Bolsheviks moved the capital to Moscow in March 1918.

[6] Newbolt, Henry, *Naval Operations: History of the Great War Based on Official Documents, Volume Five* (The Naval & Military Press in association with The Imperial War Museum Department of Printed Books, Uckfield, East Sussex, 2003), pp301-333.

[7] 'The RAF in Russia', *The Aeroplane*, 27 June 1919.

[8] On attempts by British intelligence operatives to overthrow the Bolsheviks in August 1918 following the landing by Poole's force see Schneer, Jonathan, *The Lockhart Plot: Love, Betrayal, Assassination and Counter-Revolution in Lenin's Russia* (Oxford University Press, Oxford, 2020).

[9] Pipes, Richard, *Russia under the Bolshevik Regime 1919-1924* (Harvill Press edition, London, 1997), pp67-68. Lloyd George complained to his Cabinet, 'We alone had supplied troops, munitions and money, while the French had only contributed promises.' TNA, CAB 23/11, War Cabinet 598, 23 July 1919.

[10] TNA, AIR 1/2836/228/11/7 RAF Staff College, 'War Experiences July – December 1919', Flight Lieutenant Wilfrid R D Acland, Andover, November 1922, p7. The more modern seaplanes in North Russia included Fairey Campanias and IIICs.

[11] An RAF training mission was established at Novorossisk in April-May 1919 and was subsequently reinforced by No 47 Sqn. Although ostensibly in south Russia to provide training to General Denikin's forces, the squadron undertook operational sorties, bombing and strafing Red forces and targets in Bolshevik-occupied territory, including bombing Tsaritsin and the railway bridge over the Volga. 'Parliamentary Affairs, Russia – General Denikin', *Flight*, 4 December 1919. Captain Guest, Joint Parliamentary Secretary to the Treasury, said 277 aeroplanes had been sent to Denikin's forces. He advised, 'There are at present 101 Royal Air Force Officers and 300 airmen serving with these armies (...) these troops, all of whom volunteered for this service, are to be maintained up to March 31, 1920, but the actual date of their withdrawal has not yet been settled.'

No 47 Sqn was obliged to strike the RAF Ensign in October 1919, nominally becoming Nos 11, 12 and 13 Sqns of the Russian 7th Division. But it actually continued to fly operationally under its own tri-coloured flag, which represented the blue of the

RAF, interposed between the yellow of the White Russians and the red of the Bolsheviks, until the ultimate withdrawal of British personnel in March 1920.

[12] In addition, No 221 Sqn (DH9) served on the Black and Caspian seas and the seaplane-equipped No 266 Sqn also served on the Caspian Sea in 1919. Although infantry battalions and a Royal Marine detachment fought with White forces in Siberia, no RAF units were sent there.

[13] TNA, CAB 23/42 Imperial War Cabinet, 20 November 1918. The 6th Light Cruiser Squadron sailed from the Firth of Forth to the Baltic on 22 November, comprised of the *Cardiff*, *Cassandra*, *Caradoc*, *Ceres* and *Calypso*, escorted by nine destroyers and seven minesweepers. *Cassandra* hit a mine and sank although only 10 of her crew perished and *Calypso* was damaged when she struck a submerged wreck near the entrance to Libau harbour. Jackson, Robert, *At War with The Bolsheviks* (Tandem, London, 1972), pp246-247.

[14] Although British ships were sent to the Baltic in December 1918 on the instruction of the War Cabinet, 'no definite policy was then formulated'. TNA, ADM 116/1864, folios 19-21, 'The Necessity for a Policy in the Baltic Provinces', Admiralty Memorandum for the War Cabinet [Sydney R. Fremantle], 11 March 1919. The Admiralty feared the melting of the ice would free Bolshevik naval forces at Kronstadt from the end of April. If operations did then take place, the Admiralty predicted losses of ships and men. It concluded: 'These losses would be incurred against an enemy with whom we are not even formally at war, and against whom we cannot at present exercise even such fundamental belligerent rights as blockade and capture of naval vessels. They would be incurred in pursuit of no definite British interest, and in defence of a cause which is not even being supported by the resources of the State, other than the Naval forces. It is essential that if our Naval forces are to be required to undertake operations of war, they should do so in pursuance of a definite and coherent policy.' Gilbert, Martin, *Churchill – A Life* (Minerva, London, 1991), pp407-412.

[15] TNA, ADM 116/1864, folios 167-168, 'Trend of Events in the Baltic', Admiralty Memorandum for the War Cabinet (R E Wemyss), 27 June 1919. The Admiralty worried that the Germans, with plentiful boots in the Baltic States, would seize control of the whole country 'from East Prussia to Petrograd'.

[16] TNA, CAB 23/15, War Cabinet 588A, 4 July 1919. However, it was also repeated that British troops would be withdrawn from North Russia before the ice set in. Lloyd George wanted Churchill to understand that British troops were not to get 'inextricably involved'.

[17] Dutton, David, *Austen Chamberlain: Gentleman in Politics* (Ross Anderson Publications, Bolton, 1985), p158. The Chancellor of the Exchequer, Austen Chamberlain, confided in August 1919 that the overall financial position was 'desperate' as Government spending exceeded all estimates. From January 1919, Chamberlain had proposed, on economic grounds, a cut in the size of the Army of Occupation for Germany compared to what had been requested by Winston Churchill, Secretary of State for War and Air. In February he insisted on his right to examine spending in Churchill's department and in April 1919 he tried to impose an upper limit on British military spending for the first post-war year of £110M, to which Churchill objected.

[18] TNA, CAB 23/42, Imperial War Cabinet, 12 and 31 December 1918; Pipes, *Russia*

under the Bolshevik Regime, p68.

[19] *Ibid*, Imperial War Cabinet, 31 December 1918.

[20] Dutton, *Austen Chamberlain*, p159. Chamberlain asserted that some of the material being sent to Russia was urgently required at home. When asked about Britain providing flour for the civilian population of Russia, the Cabinet minutes recorded Chamberlain remarking that, 'he felt very strongly about passing money in this way into the Russian sieve'. TNA, CAB 23/11, War Cabinet 592, 14 July 1919.

[21] Gilbert, *Churchill - A Life*, p410.

[22] 'The New Bolshevist Imperialism', *The Times*, 4 January 1919. It rejected the Bolshevik charge of 'encirclement' which, it said, resembled German pleadings before the war. The borderlands between Russia and Germany were in 'very serious danger'. It backed an independent Polish state, the 13th of President Wilson's 14 points, and called for British organisational and material assistance to Warsaw.

[23] Editorial, 'British Policy in the Baltic', *The Times*, 19 May 1919. 'Indeed, it is not dignified for a nation that has emerged triumphantly from the real terrors of the war to be seen startling at all these tales of Russian hobgoblins and refusing to go one way or other lest it meet them.' See also Macintyre, Ben, 'Britain is public enemy No 1 in Russia', *The Times*, 25 July 2020.

[24] Gilbert, *Churchill - A Life*, p403. Churchill was not a member of the War Cabinet until November 1919 when Lloyd George wound up the wartime arrangement of a small War Cabinet and returned to the previous peacetime arrangements. Rhodes James, Robert, *Churchill: A Study in Failure 1900-1939* (Pelican Books: Harmondsworth, Middlesex, 1973), p129.

[25] Flintham, Vic, 'The Royal Air Force at the Beginning of 1919', *Air-Britain Aeromilitaria*, Volume 43, Issue 169, Spring 2017 (March 2017), pp30-42. On 11 November 1918, the RAF had 188 squadrons, 22,647 aircraft and 291,170 personnel. During the war the UK had produced over 55,000 aircraft. By early 1920 most of these squadrons had disbanded.

[26] *Ibid*., Churchill had sought Trenchard's views on the shape of the post-war Air Force. He kept his suggestions on squadron strength to a bare minimum but ensured the foundations of an independent service – a staff college, a cadet college and an apprentice school were all provided for, as Trenchard replaced Sykes as CAS from 31 March 1919. Survival of the fledgling force was based on a strong infrastructure in the UK and an increase of units in the Middle East and India to meet the requirements of colonial policing. There was also a consolidation of the training units.

[27] Editorial, 'More Examples of Extravagance', *The Times*, 14 August 1919.

[28] *Flight*, 6 November 1919, p1442. The report added: 'Although, as we have said, we never seriously believed that anything would come of the discussions, it is a relief to be assured that there is an end of them, and we trust most sincerely that they will never be revived again.'

[29] RAF Museum, 'British Military Aviation in 1919', https://www.rafmuseum.org.uk/research/history-of-aviation-timeline/interactive-aviation-timeline/british-military-aviation/1919.aspx; Armitage, Sir Michael, *The Royal Air Force Second Edition* (Cassell and Co Second Edition, London, 1999), p33.

[30] 'Reductions in air force estimates: twelve millions saved', *Manchester Guardian*, 13 December 1919.

[31] Chesneau, Roger, *Aircraft Carriers of the World, 1914 to the Present: An Illustrated Encyclopaedia* (Arms and Armour Press, London, 1984), pp90-91; *Jane's Fighting Ships 1919*, p125.

[32] TNA, ADM 137/2490, Commander-in-Chief, Atlantic and Home Fleet to the Admiralty, 11 June 1919; Commander-in-Chief, Atlantic and Home Fleet to the Admiralty, 26 June 1919, informed that the *Vindictive* 'can now be spared for service',

[33] Burns, Ian M., 'With the RAF in the Baltic 1919: Flight Lieutenant W R D Acland, DFC, AFC', unpublished article. This notes the ship had 'a flying off deck forward and a landing deck aft of the bridge and funnels. There was just a single hangar below the forward deck, access from the landing deck being via a long gangway on the port side of the ship. She could carry six to twelve aircraft.' Various flying trials and exercises were held on the ship in late 1918 and early 1919.

[34] TNA, AIR 1/2836/228/11/7 RAF Staff College, 'War Experiences July – December 1919', Flight Lieutenant Wilfrid R D Acland, Andover, November 1922.

[35] Griffin N105 was certainly in the Baltic with *Vindictive*, making a forced landing in the sea on 13 August 1919 and being recovered by the tug *St Ann*. Both this Griffin, flown by Brewerton with Walne, and a Camel flown by Lt W S Taylor were affected by engine failure, with sabotage suspected. However, both may have resulted from water finding its way into the petrol. Lt Taylor was killed in the crash, the RAF's first fighting fatality in the Baltic. Brewerton, Walne and Griffin N105 suffered no ill effects. Brewerton claimed to fly a Griffin on his last flight in theatre on 7 November – this could have been N105 or may have been N101, N103 or N104, which were with *Vindictive* on 30 January 1919. See TNA, ADM 53/67607, 13 July 1919. See also Thetford, Owen, *British Naval Aircraft since 1912* Putnam, (London, 1991), p433; Sturtivant, Ray and Page, Gordon eds., *Royal Navy Aircraft Serials and Units 1911 to 1919* (Air-Britain, Tonbridge, 1992), p186; 'The mythical Griffin – a forgotten naval aircraft of WW1', 22 January 2013, https://navalairhistory.com/2013/01/22/the-mythical-griffin/

[36] TNA, AIR 10/1849, *A Short History of the Royal Air Force*, Air Publication 125, Second revised edition, July 1936, p440.

[37] AHB, Air Ministry, *List of Units of the Royal Air Force, 1st September 1919*, p24.

[38] TNA, ADM 137/2490, Admiralty to Senior Naval Officer (SNO) Baltic, 27 June 1919; CinC Atlantic and Home Fleets to Admiralty, 28 June 1919.

[39] Air Historical Branch (RAF), Biographies, Sir Grahame Donald, G M Franklin (S4c (Air)) to PSO/CAS, 'Death of Air Marshal Sir Grahame Donald', 31 December 1976; 'Air Marshal Sir Grahame Donald', *The Times*, 29 December 1976. Donald had joined the Navy as a Surgeon Probationer in August 1914, learned how to fly and transferred to the RNAS in February 1916. One of the No 141 Sqn Defiant pilots killed during the 'Slaughter of the Innocents' on 19 July 1940 was his son Flight Lieutenant Ian Donald. Ramsey, Winston G, ed., *The Battle of Britain Then and Now Mk V* (Battle of Britain Prints International, London, 1989), pp326-327.

[40] Levine, Joshua, *On a Wing and a Prayer* (Collins, London, 2008), pp79-80.

[41] Donald made his debut for Scotland on 7 February 1914 against Wales in Cardiff in a 24-5 defeat. Scotland did not win a match in that year's Five Nations Championship.

[42] TNA, AIR 10/1109, Squadron Leader D G Donald DFC, AFC, 'Paper III RAF

Operations in the Baltic, 1919', in Air Ministry, *Air Publication 1097 A Selection of Lectures and Essays from the work of the Officers attending the Second Course at the Royal Air Force Staff College, 1923-1924* (August 1924), pp36-41.

[43] TNA, ADM 53/67607, 6-19 July 1919.

[44] IWM, Documents 8535, Private Papers of Squadron Leader E Brewerton DFC and Bar, *Diary*, p2. The seaplane base was 'an old German hangar with dome that echoed.' The three domed hangers had been built from July 1916. Following renovation in 2009, they opened in 2012 as the Estonian Maritime Museum. Burns, 'With the RAF in the Baltic', footnote 7. Brewerton, born 5 March 1900, joined the Air Service on 10 March 1918, being recommended by his Headmaster at Oundle School, see TNA, ADM 273/26/192.

[45] Brewerton, *Diary*, p2.

[46] Donald, 'RAF Operations', p37. The officers and men at both shore stations lived in nearby wooden huts or houses, with a few RAF officers and men staying on the *Vindictive*. Ship to shore communication was by visual signalling and wireless telegraph.

[47] The Björkö Sound, between the Beryozovye Islands and the mainland, takes its name from the days when the region was Swedish. Sovereignty subsequently passed to Russia in 1721, Finland [within Russian Empire until 1917] in 1812 and to the Soviet Union in 1940, re-affirmed in 1947. Along the way most places changed their names, the mainland settlement being known as Björkö in Swedish, Koivisto in Finnish and today it is Primorsk (Приморск) in Russian. The small port to the south west in the Beryozovye Islands (current name!), referred to in the narrative as Sudensaari, was also rendered as Saarenpää and today is (probably) Krasniy Ostrov.

[48] TNA, ADM 137/2490, SNO Baltic to CinC Atlantic and Home Fleets, 23 July 1919.

[49] Brewerton, *Diary*, p3.

[50] Donald, 'RAF Operations', p38;'Kronstadt bombed', *The Times*, 4 August 1919.

[51] Donald, 'RAF Operations', p38.

[52] Brewerton, *Diary*, pp5-6.

[53] TNA, ADM 137/2490, Admiralty to SNO Baltic, 5 August 1919; SNO Baltic to Admiralty and CinC Atlantic and Home Fleets, 6 August 1919; SNO Baltic to Admiralty and CinC Atlantic and Home Fleets, 23 August 1919; SNO Baltic to Admiralty, Captain (Air), CinC Atlantic and Home Fleets, 24 August 1919; Admiralty to CinC Atlantic and Home Fleets, 26 August 1919. Cowan was told in early August that six Camels were available at Rosyth in case he could spare *Vindictive* to go and collect them. Cowan said he could not spare *Vindictive* and continued to press for seaplanes, pilots, fleet observers and flying officers.

[54] The CMBs, built by Thorneycroft, had been used for coastal operations during the war and were used for covert operations in Russia – notably Lieutenant Augustus Agar's attempts to extract the SIS agent Paul Dukes from Petrograd. Agar had earned a VC when his CMB4 had sunk the Bolshevik cruiser *Oleg* on 17 June 1919.

[55] Four Royal Navy officers and four men were killed, and three officers and six men were taken prisoner by the Bolsheviks. Jackson, *At War with the Bolsheviks*, p266.

[56] 'The Raid on Kronstadt', *Flight*, 16 October 1919; 'The Kronstadt Raid', *The Times*, 11 October 1919; Wright, *Churchill's Secret War with Lenin*, p370. Randall had attracted a searchlight, attacked it and then machine-gunned the breakwater from

500 feet.

[57] Brewerton, *Diary*, p5.

[58] 'The British Attack on Kronstadt: Bolshevik Panic', *Manchester Guardian*, 26 August 1919.

[59] 'The Kronstadt Raid', *The Times*, 11 October 1919.

[60] *Flight*, 16 October 1919, p1361.

[61] 'The Motor-Boat Attack on Kronstadt: Admiral Cowan's report', *Manchester Guardian*, 11 October 1919.

[62] Letter from Commander Claude C Dobson to Captain Wilfred F French, August 1919 from the Bremner Papers, quoted by Burns, 'With the RAF in the Baltic', p10. Dobson and Lieutenant Gordon Steele both received VCs for their role in the operation. Wright, *Churchill's Secret War with Lenin*, p371.

[63] TNA, AIR 1/2836/228/11/7 RAF Staff College, 'War Experiences July – December 1919', Flight Lieutenant Wilfrid R D Acland, Andover, November 1922, Annex III.

[64] TNA, ADM 137/2490, SNO Baltic to Admiralty, Captain (Air) and CinC Atlantic and Home Fleets, 29 August 1919.

[65] Brewerton, *Diary*, p6.

[66] Donald, 'RAF Operations', p40; TNA, AIR 1/2836/228/11/7 RAF Staff College, 'War Experiences July – December 1919', Flt Lt Wilfrid R D Acland, Andover, November 1922, p7 recalled, 'Unfortunately nearly all these machines were in a bad condition and hardly one was fit for active service flying.' See also TNA, ADM 137/2490, Captain (A), Flying Squadron to the Commander-in-Chief, Atlantic and Home Fleets, 'Proceedings of "Furious" to Copenhagen', 10 September 1919. This contemporary source said that two 1½ Strutters, six Camels and six Short Seaplanes were transferred to the *Vindictive* at Copenhagen along with stores, spares and 500 Cooper bombs. The *Furious* was delayed by the Admiralty at Rosyth between 1 and 4 September 1919, pending the arrival of 100, 112lb bombs.

[67] Wright, *Churchill's Secret War with Lenin*, pp371, 373.

[68] In contrast, 17 flights, totalling about 100 aircraft, were committed by the Red Air Fleet in 1919 against Admiral Kolchak's White forces in the east. In the autumn of 1919, nearly 200 aircraft were deployed in support of the Red Army's successful counter-attacks against Deniken's forces which had advanced towards Moscow from the south. Boyd, Alexander, *The Soviet Air Force since 1918* (Macdonald and Jane's, London, 1977), p4. See Kulikov, Viktor P, 'British Aircraft in Russia', *Air Power History*, Spring 2004, pp4-15.

[69] Yudenitch's North-West Army's peak strength was around 40,000. On 10 October, the Foreign Office instructed the Admiralty to formally authorise Cowan to blockade Petrograd from the Gulf of Finland, a belligerent act, tantamount to a declaration of war. Wright, *Churchill's Secret War with Lenin*, p376.

[70] TNA, ADM 116/1864, General Staff, War Office, 'Memorandum giving a Narrative of Events in the Baltic States from the time of the Armistice, November 1918, up to August 1919', 26 August 1919. The objective was to act in the interests of the Allies and the Baltic States.

[71] TNA, CAB 23/18, Cabinet 1(19), 4 November 1919. It was later noted by the Cabinet that only limited British forces had been employed in the Baltic and 'it could not be said that the Navy had been used to its fullest extent to assist in the advance of

General Yudenitch'.

[72] Burns, 'With the RAF in the Baltic 1919: Flight Lieutenant W R D Acland, DFC, AFC', Stuart Culley's account.

[73] *Flight,* 6 November 1919, p1442.

[74] Six tanks were sent in total. Petrograd was no longer the prestigious Tsarist capital it had been for two centuries. Despite its distance from its sources of foodstuffs and fuel, thriving war industries led the population to reach 2·5 million by late 1916. By the summer of 1919, it was less than one-third of this figure. It was no longer a capital city and its workers had returned to their home provinces. Petrograd was decidedly down on its luck, and it personified the rapid de-industrialisation occurring across Russia.

[75] Pipes, *Russia under the Bolshevik Regime,* p58. The dispute over the defence of Petrograd in autumn 1919 was one of many among the Bolshevik leadership over major strategic decisions during the Civil War. Trotsky and Stalin persuaded the Politburo, the policy-making body of the Bolshevik Central Committee, of the importance of defending Petrograd.

[76] 'White flag at Kronstadt', *Observer*, 19 October 1919.

[77] In late September 1919 Churchill hoped for a negotiated settlement between Denikin and the Bolsheviks. On 20 September he telegraphed General Holman, the senior British officer with Denikin's forces, 'I think it inadvisable that British airmen should be used in present circumstances to bomb Moscow.' Gilbert, *Churchill – A Life*, p415.

[78] Donald, 'RAF Operations', p41. SNO Baltic asked the Admiralty for 50 gallons of glycerine but was initially told this was an 'abnormal amount' and asked to confirm the necessity for this demand. TNA, ADM 137/2490, SNO Baltic to Admiralty, Telegram No 313, 1 November 1919; Admiralty to SNO Baltic, Telegram No. 304, 3 November 1919.

[79] Donald, 'RAF Operations', p41.

[80] Brewerton, *Diary*, p9.

[81] *Ibid*, p9.

[82] TNA, ADM 137/2490, Telegram No 270 from Admiralty to SNO Baltic, 31 October 1919; Telegram No 313 from SNO Baltic to Admiralty, 1 November 1919; Admiralty to SNO Baltic, 1 November 1919.

[83] *Ibid*, SNO Baltic to Admiralty and Cin-C, Atlantic and Home Fleets, 2 November 1919; SNO Baltic to Admiralty and CinC Atlantic and Home Fleets, 5 November 1919. Cowan advised that six Camels and two two-seaters would be 'sufficient'.

[84] *Ibid*, Captain, *Argus* to CinC, Atlantic and Home Fleets, 16 November 1919. It was reported that *Vindictive* was very short of canteen stores, clothing and mess traps (articles of mess service such as crockery, bowls and spoons) and *Argus* turned over all articles of this nature it could spare.

[85] TNA, ADM 137/1668, Rear Admiral Cowan to Secretary of the Admiralty and the Commander-in-Chief, Atlantic and Home Fleets, 2 and 9 December 1919. The Baltic Fleet spent a freezing Christmas at Björkö but following the successful Estonian-Bolshevik peace talks, Cowan and most of his ships departed on 28 December. Only HMS *Dunedin* and a few destroyers of the 4th Flotilla were left behind over the winter in the Gulf of Finland. On 20 November 1919, the Cabinet had decided not to renew

the naval blockade in the Baltic in the following spring. Rhodes James, *Churchill: A Study in Failure*, p157; Wright, *Churchill's Secret War with Lenin*, pp384-385.

[86] TNA, CAB 23/18, Conclusion of a Conference, 11-12 November 1919.

[87] TNA, ADM 53/67607, 7-23 December 1919; ADM 137/1668, Air Commodore Steel, Director of Operations and Intelligence, Air Ministry, to Air Officer Commanding, Coastal Area Headquarters, 23 December 1919. Steel cited the War Cabinet's decision of 24 September 1919 which stated, 'the British Government cannot undertake to furnish military supplies to the Baltic Province.' The Air Ministry wanted the Admiralty to issue instructions for 'the withdrawal of the three Camel aeroplanes and the two Officer Instructors and the rigger, who have been lent to the Lettish Government.' See also CAB 23/12, War Cabinet 623, 24 September 1919.

[88] TNA, AIR 1/2836/228/11/7 RAF Staff College, 'War Experiences July – December 1919', Flight Lieutenant Wilfrid R D Acland, Andover, November 1922, Appendix I.

[89] Lt Taylor was killed on 13 August, Lt Samuel Dawson DFC and Lt Francis John Unwin were killed in 1½ Strutters on 17 September and Plt Off Fred Cardwell's seaplane was shot down on 25 October. One RAF Aircraftsman, LAC Charles Henry England, died in an accidental drowning accident on 22 July 1919. See TNA, AIR 53/67607. The Royal Navy lost 133 personnel in the eastern Baltic. Wright, *Churchill's Secret War with Lenin*, p387.

[90] The land lost by Finland to the Soviets also included Terrioki and its yacht club. Wright, *Churchill's Secret War with Lenin*, p387.

THE SELECTION AND PRESERVATION OF SQUADRON NUMBERS 1918-2018 – PART II

by Wg Cdr Jeff Jefford

The 1957 Numbering Policy

In total, the 1957 White Paper would eventually cost the RAF more than seventy squadrons and, however this was handled, it was clear that this time hard choices would have to be made. The ball was brought into play by CinC 2TAF, who was expecting to have to lose a large number of squadrons, ten of which had Standards. He suggested a number of options, including renumbering and variations on the 'linking' theme, and he tentatively suggested the establishment of a working party to study the problem.[1] This served to provoke a flurry of correspondence among a variety of desks at the Air Ministry, AMSO eventually concluding, at least initially, that a working party would not be necessary, because the 'priority list' that had been produced in 1946 would provide an adequate basis for decision making.[2] Head of AHB was consulted and he responded that he, 'should be very glad to see the end of the "linking" system,' and recommended, 'straightforward renumbering to retain all Squadron Numberplates which have been awarded Standards and thereafter by seniority.'[3]

'Seniority' was based on the points formula that had been devised in 1948.[4] This was dusted off and refined to provide the basis on which to decide which squadrons would stay and which would have to go.[5] Before being implemented, however, the Air Council Standing Committee (ACSC) considered it politic to notify the AOCinCs and CinCs in advance over its proposed changes and to invite their views.[6] Having made a minor reapportionment within the points system, the final version of the rules was eventually issued to a Working Party on Squadron Number Plates.[7] Compared to the 1948 scheme, the new rules may be summarised as follows:

a. Longevity was to be recognised by the award of one point per year for peacetime service and three per year in wartime.

b. Up to thirty points could be awarded for a unit's operational record, eg participation in specified campaigns (essentially those which earned a Battle Honour) and an inevitably, and admittedly, subjective attempt was made to weight these to reflect their relative importance.

c. Up to ten points could be awarded for 'other distinctions', such as the winning of a VC by a squadron member or participation in campaigns, in peace and war, that had not been recognised by a Battle Honour.

But the ACSC had imposed three further constraints:

d. The number plate of any squadron which had been awarded a Standard was sacrosanct; there were, at the time, sixty-three such squadrons.

e. Selection of number plates for retention was to be made on a Service-wide basis, ie there was no longer sufficient flexibility to recognise traditional affiliations to particular Commands (and/or, by implication, roles).

f. The practice of linking was ruled out as an option.

The working party reported in October 1957.[8] Although no specific reference ever seems to have been made to the principle established in 1919, that seniority, based on length of service, should be the main reason for sustaining a number plate (see Note 5 to Part I), an examination of the way in which the 1957 formula actually worked, makes it clear that Trenchard's longevity principle was now the primary determinant. Consider, for example, a notional squadron which had been formed in 1915 and which had been one of those selected to serve between the wars, which would, in turn, have more or less ensured that it would have remained in the line since 1945. On this record alone, it would have accumulated about 60 points. By comparison, a squadron which had had a brief existence during 1918 but which did not re-form until the mid-1930s, would have accumulated less than 40 points for longevity, and even that assumes that it had managed to have served continuously since 1945, which was not always the case. Statistically, both squadrons would have had equal opportunities to gain additional points for distinctions earned during WW II, but the longer-serving unit was bound to have accumulated more because it would have earned Battle Honours, and possibly a VC, during the Great War and may well have participated in inter-war colonial peace-keeping actions. In practice, this sort of mathematics was of significance only to relatively junior squadrons, as all of the long-serving units, including most of the number plates approved by Trenchard in 1919-20, would have qualified for their Standards which automatically guaranteed their preservation.

The 1957 system was used to establish a 'pecking order' which was

Command	Number Plates to be Preserved
Bomber	7, 9, 10, 12, 15, 18, 21, 27, 35, 40, 44, 49, 50, 55, 57, 58, 61, 76, 83, 90, 100, 101, 105, 139, 149, 207, 214, 617 (plus, as Thor units: 77, 97, 98, 144; more would be needed)
Fighter	1, 19, 23, 25, 29, 33, 41, 43, 46, 54, 56, 64, 65, 66, 72, 74, 85, 92, 111, 151 (plus, as Bloodhound units: 62, 107, 141, 220, 222, 263, 264, 266 with more to follow)
Coastal	22, 120, 201, 202, 203, 204, 206, 210, 220, 224
Transport	24, 30, 36, 47, 53, 99, 216, 230
MEAF	6, 13, 32, 70, 73, 103, 114, 208
FEAF	28, 34, 42, 45, 48, 60, 110, 205, 209
2nd TAF	2, 3, 4, 5, 11, 14, 16, 17, 20, 26, 31, 59, 80, 82, 87, 88, 102, 213
BFAP	8, 37, 78, 84, 152
Malta	38, 39
No 90 Gp	51, 115, 245
Number Plates to be lost	52, 63, 68, 69, 79, 81, 89, 93, 96, 116, 138, 147, 148, 153, 155, 167, 192, 194, 199, 215, 217, 228, 240, 249, 256, 267, 269, 275, 284, 511, 527, 542, 543, 50/40 & 205/209

Fig 1. Number Plates earmarked for preservation (or not) in the wake of the 1957 White Paper on Defence.

fair, reasonable and paid due regard to the length and nature of each unit's service. A little over a year after the AOCinCs had been notified of the forthcoming cull, and reflecting, to the greatest practical extent, their various inputs and preferences, they were advised of the eventual outcome which is summarised at Figure 1.[9]

Subsequent amendments meant that a handful of units escaped their planned fate, eg No 42 Sqn never did migrate to FEAF, Nos 107 and 220 Sqns became Thor, rather than Bloodhound, units and Nos 52, 81, 148, 205, 249 and 543 Sqns all survived the cull. Nevertheless, the table does reflect the general outcome of the Working Party's deliberations and its implementation governed a wave of disbandments and renumberings, mostly in 1958-59. While this had achieved the aim of sustaining the longest-lived units, it was later concluded that it had been ill-advised to do this by renumbering – as had been pointed out in 1948. If the essence of each squadron's 'personality' was to be preserved, this implied a measure of continuity, as well as longevity.

No 89 Sqn only managed a little over a year with Javelins, like this FAW2, XA804, before it was peremptorily re-numbered as No 85 Sqn. (D Welch)

This continuity was lost when, for instance, No 85 Sqn was disbanded only to be re-formed on the same day at the expense of No 89 Sqn. What this had meant in practice was that the personnel of the erstwhile No 89 Sqn had been obliged to paint out the markings on their Javelins, throw away their ties and blazer badges and sever their links with the 'old boys' association (surely the heart of the matter), while packing up the squadron silver and memorabilia and sending it off to be stored by No 7 MU at Quedgeley. Overnight they were expected to transfer their allegiance to a quite different unit and adopt its heraldry, traditions and ethos. While people did what they were told, of course, it seems unlikely that they would have participated in such an unrealistic exercise with much enthusiasm.

There were many instances of these apparently random (but actually carefully considered) renumberings during this period. For example, No 256 Sqn became No 11 Sqn, No 542 Sqn became No 21 Sqn, No 79 Sqn became No 4 Sqn, No 153 Sqn became No 25 Sqn, No 511 Sqn became No 36 Sqn and so on.[10] Nevertheless, with hindsight, it was clear that changing a squadron's identity in this fashion had been somewhat insensitive, the bureaucracy simply riding roughshod over current loyalties. Fortunately, because of typical RAF tour lengths, a squadron's short-term corporate memory begins to fade after about a year and any psychological scars healed quite quickly once new arrivals

This is a Canberra B(I)8, WT345, of No 59 Sqn in 1959 but two years later the unit would be renumbered as No 3 Sqn. That said, No 59 Sqn operated Canberras for less than five years, having itself been created by renumbering No 102 Sqn in 1956. What goes around comes around. (D Welch)

began to outnumber the old hands. It did not help the healing process, of course, if the Ministry renumbered a squadron twice within two years, as happened to No 3 Sqn which was reconstituted in 1959 from No 96 Sqn and again in 1961 from No 59 Sqn, switching roles from day fighter/ground attack to all-weather/night fighter to strike/attack in the process.

The 1957 policy review produced one other recommendation that is worthy of note. Harking back, perhaps, to the Trenchardian edict that number plates should not be applied to non-operational units, it was decided that those currently assigned to ferry units, Nos 147, 167, 173 and 187 Sqns, should be withdrawn in favour of functional titles.[11] This was done, although, as will become apparent, later ACSCs found it impossible to abide by this principle. Progressive erosion of the RAF's strength made irresistible the temptation to confer numbered squadron status on units which had not been recognised as such in the past.

In the short-term, however, the number plate problem was alleviated by the formation of a rash of missile units. In 1958, it was suggested that the seventeen SAM sites, then being planned for Fighter Command, might be assigned a discrete block of numbers but it was eventually decided to allocate dormant number plates from the existing series.[12] In the event, the four complexes of Thor IRBM launch sites, protected by Bloodhound Mk 1 SAMs, served to sustain a total of thirty-one

squadron identities, albeit relatively briefly.[13] But the initial enthusiasm for rockets proved to be short-lived and the missile era in the RAF lasted, in effect, for only six years, 1959 to 1964. Thereafter, the RAF maintained a much reduced commitment to SAMs, by now Bloodhound Mk 2s, for another quarter of a century but these were not replaced when the last of them were withdrawn in 1991.

A particularly unusual circumstance arose in the mid-1960s when it was decided to form two joint RAF/RN electronic countermeasures training squadrons. In view of their innovative bi-Service constitution – and manning – the new units were designated as Nos 360 and 361 Sqns, neither of these number plates having been used before, permitting both Services to contribute to building a history from scratch.[14]

There was another significant initiative in the mid-1960s. Until then it had been the practice that, pending their re-formation, the Standards of disbanded squadrons were held in the custody of the Queen's Colour Squadron of the RAF Regiment. In 1965 it was suggested that, rather than being locked away, the Standards of (the proposed figure was up to eight) squadrons that were considered likely to be reinstated within two years should be displayed in a dedicated Standards Room at Cranwell. After some negotiation it was eventually decided that such Standards should be mounted under the cupola of the Senior Flight Cadets Mess, ie the main RAF College building. At the time, the units concerned were Nos 7, 10, 15, 49 and 207 Sqns.[15] This continues to be the practice at the time of writing.

The 1968 Numbering Policy

Perhaps to test the water, in December 1967 HQ Fighter Command suggested that reserve squadrons, particularly those of No 229 OCU at Chivenor, which were now occasionally required to demonstrate an operational capability in exercises, should be permitted to hold their silver and any other memorabilia. While appreciating the sentiment involved, this plea was given short shrift, on the grounds of, 'long established precedent and there can be no question of asking AMSO to review the present policy.'[16]

While Fighter Command's suggestion had been summarily dismissed in the light of current numbering policy, that policy was about to be subjected to yet another major review. By the late 1960s

the RAF was expecting to have to lose another substantial tranche of squadrons and, as was pointed out, among the number plates in the firing line this time were those of Nos 1, 2, 3, 4 and 6 Sqns, all of which pre-dated WW I. By this time 104 Standards had been awarded, but current plans indicated that the front line would have been reduced to just 67 squadrons by 1975, which precluded the use of the previous soft option of giving precedence to squadrons with Standards. Clearly this crack was far too wide to paper over with the available tools so the Organisation Staff began a comprehensive review, in conjunction with AHB, with the aim of suggesting proposals for the future governance of number plates and it was anticipated that this might have to include allocating them to previously rejected candidates, such as training units, and even the possibility of reintroducing 'linking'.[17]

The possibility of giving flying training units squadron number plates was given a considerable boost in June 1968 by AOCinC Training Command. He recognised that this might not, 'gain the wholehearted support of many past members of Squadrons,' but he suggested that they might agree, 'on reflection that even a non-operational squadron is better than no squadron at all.'[18] This specific suggestion was drawn to the attention of the various AOCinCs and sundry concerned senior appointments at the Ministry, along with the questions of linking and the assignment of squadron number plates to reserve squadrons.[19]

The logical extension of the seniority principle would have been to apply this to Standards so that the oldest of these would continue to fly. In the process, this would have ensured the continued preservation of the select group of squadrons which had been awarded their Standards in April 1943, ie those which had established, and sustained, the case for the retention of an independent Third Service. Perhaps unfortunately, this leap of logic was not, and never has been, attempted.

Once the responses of the AOCinCs had been received, they were broadly reflected in the drafting of a paper that was eventually considered in September 1968. It is interesting to observe that this time, the matter was deemed to be of such significance that it was being dealt with by the Air Force Board (AFB) itself, rather than being delegated to its Standing Committee (AFBSC) as the Air Council had been content to do in the past.[20] The outcome of its deliberations was that there were now to be only three rules:[21]

a. Whenever a new number plate was required, longevity would be the primary consideration.

b. Regardless of seniority, any in-use number plate would be sustained until that unit disbanded, ie no more (what sometimes appeared to be random) renumberings.

c. Only when two or more new number plates of similar longevity were in contention, could some weight be given to previous service in a particular Command, region or role.

The *only* exception to these rules was to sustain, as they had been since 1946, despite their relative lack of seniority, the number plates of Nos 120 and 617 Sqns, both of which had been awarded their Standards exceptionally in 1952, well before they had completed the statutory twenty-five years' service.[22]

The current position was set out in a table prepared by AHB. This time, reflecting the concurrent revision of policy,[21] seniority had been calculated solely on the total time served, ie without the previous weighting of wartime, compared to peacetime, service or the addition of a variety of 'bonus points'. The result was a list featuring, in order of seniority, the RAF's 171 most mature squadron number plates (see Annex A) – far more than it was ever likely to need.[23] It is interesting to observe, however, that, because of occasional short-term disbandments, some of the core squadrons of the inter-war years had begun to slip down the league table. Their positions could have been preserved if some allowance had been made for the date of the award of their Standards but, since it was not, by 1968 Nos 7, 27, 31, 55 and 100 Sqns, all stalwarts of the inter-war years, no longer featured among the 'top thirty'.[24]

As in 1957, the use of linked numbers had been ruled out, as had the practice of arbitrary renumbering, but there was one minor anomaly. As noted above, in 1957 the Nos 147 and 167 number plates had been withdrawn in favour of functional titles, but this policy was reversed in 1968. To offset the imminent loss of several squadrons, the Air Force Board agreed to raise the profile of the named communications squadrons by affording them numbered status, thus ensuring that Nos 21, 26, 32, 60 and 207 Sqns would continue to fly – at least for a while. The opportunity was also taken to rule on Training Command's suggestion that number plates might be assigned to the anonymous squadrons which operated within flying training schools.[18] There was

absolutely no support for this within the Air Force Department – or from the other Commands. As in 1919, the proposal was rejected, the main counter arguments being:[25]

a. Students were not resident long enough for any beneficial effect to be significant or lasting.

b. The proposal would blur the demarcation between trainee and qualified aircrew.

c. A training unit was incapable of realistically extending the history, or maintaining the traditions, of an operational unit.

d. Any attempt to foster traditions by artificial means would serve only to debase the system.

e. FTSs had traditions and histories of their own.

f. Standards are the personal gift of the sovereign to a unit and when that unit disbands the Standard should be preserved until it re-forms – not passed on to a quasi-squadron.

At the same time, the opportunity had also been taken to review the terms under which number plates were allocated to OCUs on a reserve basis. It was decided not to make any significant changes. That is to say that the application of reserve status would continue to be restricted to those units which might be mobilised as autonomous squadrons in wartime. Furthermore, it was also agreed to sustain the policy which notionally prevented reserve squadrons from making a show of their wartime identity *until* they had been formally embodied. The latter was already a lost cause, however, as second-line Hunter, and later Lightning, units had been painting squadron markings on their aeroplanes since the late 1950s. Having tacitly condoned this naughty practice for almost ten years, it was too late to do much about it now. Besides which, this display of colourful warpaint contributed to presenting, at least the comforting illusion of, a still sizeable air force.[26]

A third issue raised in 1968 involved special pleading on behalf of No 139 Sqn. It was being argued that the unit's colonial links, to Jamaica, which were still being actively maintained, were sufficiently important to warrant this relatively junior squadron's retention (possibly as a Buccaneer unit) when its Victors were withdrawn. While never actually curtailing them, the Air Ministry had been tactfully trying to distance the RAF from these wartime regional affiliations ever since the Squadron Number Plates Committee had first highlighted their uncertain status in 1948. It will be recalled (see Part I) that, having

No 139 Sqn's first Victor B2, XL231, arriving at Wittering in February 1962. The squadron's bid for special treatment was unsuccessful. (http://victorxl231.blogspot.com/p/xl231-brief-history.html)

conducted an intensive investigation, the committee had been unable to determine where ultimate responsibility lay for policy governing 'gift and named' squadrons.[27] Since it had, in effect, been left holding the 'gift and named' baby, the Air Ministry had been obliged to assume full responsibility for it and in 1952 it had ruled that:

a. 'the name on a squadron number plate has no official significance and is normally not to be used in official correspondence' and

b. 'gift and named associations are not to be included in the official title' of a squadron, although

c. 'any association with the donor that still exists can be maintained.'[28]

Since several such connections were still being tacitly acknowledged by other concerned units, No 139 Sqn's circumstances were hardly unique. Had such considerations been allowed to influence its fate, it would have created an awkward precedent. The squadron's case was rejected.[21]

Another 'named squadron' issue had cropped up a little earlier, in 1968, in the context of Rhodesia's Unilateral Declaration of Independence (UDI) and the presentation of a Standard to No 44 Sqn, which had attracted the attention of Mr Patrick Wall MP. This caused a flurry of activity at the MOD, but it eventually declared itself content that its policy was appropriate and adequate. 'Rhodesia' no longer featured in No 44 Sqn's title or on its badge, and thus its Standard, but this had had nothing to do with UDI. It reflected the 1952 policy,[28] and No 44 Sqn was not alone in having had its colonial connections toned-down; the regional affiliations of some forty squadrons had been

similarly deleted from their titles/badges.[29] Interestingly, No 44 Sqn's case was raised again in 1977, this time by a member of the public who had been disappointed to discover that its association with Rhodesia had been played down, but the response, while sympathetic, again explained the 1952 policy.[30]

A third issue considered in 1968 involved the impending redeployment of the Vulcans of Nos 9 and 35 Sqns from the UK to Cyprus to replace the resident four squadrons of Canberras which were to be disbanded. HQ NEAF argued that, since the incoming number plates were relatively junior and had no significant record of overseas service, it would be appropriate to renumber them as Nos 6 and 32 Sqns, both of which had accumulated more service and had lengthy regional associations. Once AMSO had explained that this would have run directly counter to the recently revised policy, that did not permit random renumberings, AOCinC NEAF was content to receive the Vulcans with their present identities.[31]

In 1969 the Army Air Corps was planning a major reorganisation and, in order to reinforce its links with its wartime origins, HQ Army Aviation sought authority to restore to use number plates between 650 and 670. While pointing out that No 650 Sqn did not actually have any historical links with the Army, the Air Force Department agreed to transfer title to the entire 650-699 series, on the grounds that this block had been, 'allotted to the Army during the last war.'[32] This was also incorrect, of course, as 679-684, 691, 692 and 695 Sqns had all been RAF units with no Army-associations, but this was of little consequence because, as was observed at the time, the RAF would never need any of these numbers again.

There was a curious anomaly in 1970 when AOCinC Strike Command argued that, since a dozen Lightnings of No 226 OCU were to be assigned to NATO, the unit should have the status of an active squadron (thus permitting access to a Standard, silver, etc) and be allocated a more prominent number plate than that of its current reserve identity as No 145 Sqn. This proposal clearly ran counter to the policy reiterated as recently as 1968 which had included the proviso that, 'squadron number plates should not be given to squadrons whose primary function was training.'[33] This point of view was reinforced by a particularly robust interjection from Air Cdre J W Frost who argued that to do so would run counter to, 'the conditions agreed by King

A Lightning F1A of No 65 Sqn. Creating a fully-fledged squadron from an OCU was stretching a point, but the system proved to be elastic (or slack?) enough to tolerate it.

(https://www.pinterest.co.uk/jonspitfiremk9w/)

George VI', and went on write:[34]

> 'Although we are the junior Service, and our traditions are not so deep rooted as those of the Army, Operational Squadrons are justly proud of their Standards which were instituted over a quarter of a century ago and I consider it would be a very retrograde step to extend the entitlement to non-operational units and thereby devalue the award. To achieve this aim by converting the peace establishment title to an Operational Squadron Number Plate on the basis of an exercise and war role would not be acceptable either as training would still be the unit's primary role.'

Nevertheless, the AOCinC's wish was eventually granted, and No 65 Sqn was re-formed from the 'shadow squadron element' of No 226 OCU, the erstwhile No 145 Sqn, with effect from 1 September 1970.[35] This concession was not extended to other units that were similarly assigned to NATO, however, most notably the Phantoms of No 228 OCU whose operational commitments continued to be represented by No 64 Sqn, which retained its 'reserve' status.

Although he was aware that the rules governing the allocation of

An increase in the number of Akrotiri based Whirlwinds, like this HAR10, XK970, sufficed to warrant the re-formation of No 84 Sqn in 1972. Half a century on, the squadron is still there.

number plates had been thoroughly overhauled as recently as 1968, the issue was revisited by a new AMSO in 1972. Prompted by the fact that there were now twenty-eight moribund Standards, he was seeking ways of restoring some of these to use. The first opportunity to do so was presented by an increase in the establishment of the Cyprus-based No 1563 Flt from four Whirlwinds to seven, which was sufficient to warrant its renumbering as No 84 Sqn. In informing the AFBSC of this decision, he went on to suggest that it might be possible, for instance:

a. to allocate other dormant squadron number plates to new RAF Regiment units (there was, at the time, a proposal to form three);

b. to assign the number plates of defunct flying boat squadrons to marine craft units; or

c. to consider renumbering No 360 Sqn with a more historically significant identity.

The AFBSC agreed 'in principle' and invited AMSO to investigate further and provide more detail.[36]

Having added the possibility of assigning squadron number plates to training units, AMSO subsequently informed the Air Force Board that he was considering the implications of his ideas and suggested that the

issue be discussed under 'Any Other Business' at their imminent meeting.[37] The topic was duly discussed, but the members, 'expressed reservations about giving squadron number plates to other than "teeth-arm" units and noted that there could even be a degree of ridicule attached to the award of a number plate, carrying with it a Standard and Battle Honours, to a unit operating in an entirely different environment, such as marine craft.' Similarly, it was considered that a Regiment squadron might prefer to be awarded a Standard on its own merit, rather than being, 'given the number of a flying squadron, however historic.'[38] Since the consensus of opinion was against giving Standards to non-operational units, AMSO formally dropped his proposal.[39] The AFB had, in effect, revisited and endorsed the 1968 policy – and, indeed, the principles first laid down by Trenchard.

In 1975, by which time only seventy-nine number plates were in use, a recent Defence Review had decreed that thirteen of these would have to disappear with two more being at risk. The task of nominating the squadrons which would disband fell to the incumbent AMSO who, very specifically, applied the 1968 rules. In the event, the fourteen number plates that were withdrawn as a result of this cull were those of Nos 21, 26, 36, 45, 46, 48, 53, 58, 85, 99, 103, 214, 216, 511 Sqns. Of the two that had been at risk, No 98 Sqn was also disbanded, but No 115 Sqn survived.[40] But this seems to have been the last time that the 1968 rules were rigidly adhered to.

A year later, in anticipation of his becoming 'dual-hatted' on appointment to command (with effect from 10 April 1976) the newly-established UKAIR region within NATO, AOCinC Strike Command wrote to CAS suggesting that, because the resources of all OCUs would be used to strengthen the front line in an emergency, there would be some advantage in assigning them squadron number plates, noting that Cranwell currently held the Standards of nine dormant squadrons.[41] CAS ruled this out, citing a number of reasons among them, 'that it is time we stopped deluding ourselves, and consequently possibly others, about our front line strength', and that, 'We do not count Warsaw Pact OCUs as part of their front line (*so*) why should we count our own?' He was also concerned that giving OCUs squadron identities would devalue the 'elite' status of front line squadrons and could start a trend that would see squadron number plates being assigned to advanced FTSs and, 'even the helicopter basic training unit whose Gazelles could

have a reserve operational role in support of the Army.'[42] It was another robust defence of the 1968 policy – but while the current CAS, was determined to defend the party line, resolve elsewhere within the upper reaches of the hierarchy was beginning to weaken.

Not long after this exchange, the status of dormant Standards was reviewed. By 1977 there were eleven hanging under College Hall's cupola; they were, in order of seniority, those of Nos 216, 45, 99, 58, 205, 204, 210, 209, 65, 74 and 78 Sqns. In addition, there were, at Uxbridge, two additional Standards, those of Nos 40 and 90 Sqns, which had never been consecrated, because both units had been disbanded before their Standards could be presented. It was decided that, since there was little likelihood of some of these units ever being re-formed, their Standards should be withdrawn and permanently laid up.[43]

The 1980s and later – pragmatism increasingly trumps policy

It was inevitable that senior officers who, in the course of climbing the career ladder, had commanded a now disbanded squadron would lobby to have its number plate restored to use. Such special pleading usually fell on stony ground, as in the case of, for example, No 66 Sqn.[44] Nevertheless, there were some exceptions, arising from the fact that most of the constraints imposed on reserve squadrons had been relaxed by the later 1970s. As a result, some of the second-line units that had been allocated a conditional squadron number plate, were operating increasingly in the guise of their wartime identities, eg as early as the 1960s the markings of Nos 63, 79, 137, 145 and 234 Sqns were being worn on Hunters, Javelins and Lightnings flown variously by Nos 226, 228 and 229 OCUs. But worse was to come.

A classic case occurred in 1983 when a requirement was identified for two number plates to be brought back into use during the following year. One was needed for a new front-line Phantom squadron; the other was to become the reserve identity of the quasi-operational Tornado Weapons Conversion Unit (TWCU). The senior number plate not currently in use at the time was that of No 45 Sqn. In the list of 171 squadrons produced by the Air Force Department in 1968 (and referred to above[23]) AHB had placed No 45 Sqn 19th in overall seniority; No 74 Sqn was 63rd (see Annex A). Since then little had changed, except that No 45 Sqn had accrued three *more* years of service than had No 74 Sqn.

One of No 74 Sqn's F-4J Phantoms, ZE359 – but why was No 74 Sqn re-formed . . . ? (74 Squadron Association)

Yet the new Phantom squadron turned out to be No 74. Why? At the time, No 45 Sqn's number plate had seen eighteen years more service than No 74 Sqn's and its Standard (one of the originals awarded in 1943) was the senior by sixteen years. Furthermore, if it was considered desirable that the Phantom unit should have a number plate with a fighter tradition, No 45 Sqn's record during WW I could have more than satisfied that criterion too. One can only guess at the machinations behind the decision to re-form the relatively junior No 74 Sqn.

That said, there is some evidence to suggest how it may have come about. When considering the number plate to be given to the Phantom squadron (No 45 Sqn's having already been tentatively earmarked as the 'shadow' identity of the TWCU) AMSO had favoured No 39 Sqn on grounds of seniority. But, in doing so, he observed that, 'While this will undoubtedly upset the vociferous 74 Squadron lobby, that squadron lies 20th on our list of inactive squadrons; and it cannot, in justice, be considered.'[45] Nevertheless, a few months later AMSO, 'had reconsidered the numberplate to be allotted to the Phantom F-4J squadron and [*had*] accepted that 'special reasons' warrant its becoming 74 Squadron.'[46] One can only guess at the nature of these 'special reasons', but what is clear is that pragmatism (or was it partisanship?) was beginning to take precedence over long-established principles. Unfortunately, once objectivity had been discarded, there was no telling where this might lead.

By the autumn of 1984, No 74 Sqn was flying Phantoms while No 45 Sqn had been confirmed as the wartime identity of the TWCU, the latter development having further interesting implications. In 1986, the RAF needed to activate another number plate. The new unit turned out to be No 78 Sqn. Since there were several more senior number plates available, this decision was curious enough in itself but what was particularly significant was that the very senior No 45 Sqn had been by-passed. This appears to have established, at least by precedent, that the application of a number plate to a *reserve* squadron implied that it was, with respect to the 1968 rules, regarded as being 'in use' and therefore unavailable for reallocation. This represented a reversal of the 1959 rules, of course, as these had specifically included provision for a reserve number plate to be withdrawn for reallocation. But, if a reserve number plate was now to be regarded as a permanent fixture, it had to follow that, as an 'in use' number plate under the provisions of the 1968 rules, No 45 Sqn would not/could not be subject to arbitrary renumbering. Such a conclusion would be valid, of course, only if the provisions of previously established policy were allowed to stand, rather than 'evolve'. Now that objectivity was beginning to be increasingly set aside, however, nothing could be assumed with any confidence and time would soon show that reserve number plates were *not* sacrosanct after all.

Following the dissolution of the USSR and the Warsaw Pact, it was inevitable that there would be cuts in defence expenditure and that the RAF's front line would be further reduced. In July 1990 the Secretary of State made a statement outlining a retrenchment programme that was expected to see at least nine number plates being withdrawn. It fell to the long-serving (1988-94) AMSO, Air Chf Mshl Sir Brendan Jackson, to make recommendations as to how this might best be implemented. Taking into account the current (1968) policy guidelines,[21] his first essay at identifying the squadrons that would be affected was circulated to colleagues in December.[47]

In the light of feedback received, AMSO circulated a revised paper in April 1991, by which time the project had acquired the soubriquet of 'Options for Change'.[48] Among the salient points were his proposal that all units that survived this cull should retain their current number plates, ie that there should be no random renumberings, and that CAS had suggested that it might serve to sustain some withdrawn number

Sqn	Original Type	Disbanded	Number reassigned	as the Reserve Identity of
No 42 Sqn	Nimrod	1 Oct 92	1 Oct 92	Nimrod OCU
No 15 Sqn	Tornado	10 Dec 91	1 Apr 92	TWCU
No 16 Sqn	Tornado	11 Sep 91	1 Nov 91	Jaguar OCU
No 20 Sqn	Tornado	1 Sep 92	1 Sep 92	Harrier OCU
No 27 Sqn	Tornado	30 Sep 93	30 Sep 93	Helicopter OCU
No 19 Sqn	Phantom	9 Jan 92	23 Sep 92	No 7 FTS
No 56 Sqn	Phantom	1 Jul 92	1 Jul 92	Tornado F3 OCU
No 74 Sqn	Phantom	1 Oct 92	5 Oct 92	No 4 FTS
No 92 Sqn	Phantom	5 Jul 91	1 Sep 92	No 7 FTS

Fig 2. The allocation of number plates to reserve squadrons following the post-Cold War defence cuts.

plates if they were to be applied to OCUs. It was a difficult problem and AMSO's paper took 13 pages, plus five annexes, to review the options. Finding the right answers was further complicated by the build-up to, and the execution and aftermath of, the 1991 'Gulf War', Operation GRANBY.

His second paper having been widely circulated among the great and good for comment, AMSO produced a slightly revised final version which was formally considered by the AFBSC in May 1992.[49] The committee agreed that, 'the principle of seniority should apply in the allocation of number plates; however, priority would be given to the re-allocation of live plates.'[50] Beyond that, the two most significant outcomes of this exercise were that, as had been anticipated, nine active squadrons were disbanded, and OCUs, not just those that would be mobilised on an autonomous basis in an emergency, as had been the case in the past, were to lose their numerical identities in favour of a name plus a reserve squadron number plate.[51] The changes with respect to OCUs are summarised at Figure 2.[52]

The reference to 'live plates' was of particular significance in the case of the TWCU, as it provided the justification for No 45(R) Sqn's being obliged to forfeit its number plate in favour of that of No 15 Sqn, which had recently been disbanded in the post-GRANBY 'Options for Change' draw down. This decision provoked an appeal by the 'Old Boys' of the No 45 Sqn Association.[53] After all, while the '(R) tag' was still supposed to indicate that a squadron would only assume its identity

One of No 45(R) Sqn's (aka the TWCU's) aeroplanes, ZA606, was the Tornado display aircraft for the 1991 season wearing special markings to acknowledge the squadron's 75th birthday.

if it were to exercise its war role, this 'rule' had long since been 'more honoured in the breach than the observance'. Reserve squadrons were no longer the suppressed *alter egos* that they had once been, and they were now being permitted to take (almost[54]) full advantage of their wartime identity.[55] Indeed No 45 Sqn's *de facto* existence had been very publicly acknowledged of late, as it had provided the solo Tornado for the 1991 display season. The appeal was given a fair hearing but, because time-served as a reserve squadron 'did not count' towards seniority, No 15 Sqn was undeniably the senior unit and the decision had to stand.[56]

By the mid-1990s the RAF's numbering policy had become increasingly liberal.[57] Once the fundamental rule regarding seniority had been set aside during the 1980s, the rest of the framework of objective rationality had collapsed, including reinstatement of the discredited practice of arbitrary disbandments and renumberings. An example of the latter was the introduction of the 'Mirror Image' scheme in 1991.[58] Nos 63(R), 79(R), 151(R) and 234(R) Sqns participated in this arrangement, but it proved to be short-lived and when it was superseded in 1994 the identities of the squadrons involved gradually morphed into Nos 19(R), 74(R), 92(R) and 208(R) Sqns, all of which had been nominated as another consequence of the 'Options for Change' exercise of 1992. Squadron number plates were now being

allocated to non-operational/training units wholesale, later additions including, for example, No 60(R) (Griffin/Jupiter) and 203(R) (Sea King) Sqns. Furthermore, successive Air Councils and Air Force Boards and/or their Standing Committees, having repeatedly rejected the option of assigning operational number plates to flying training schools ever since Trenchard's day, the air marshals of the early post-Cold War era proceeded to allocate elements of Nos 3, 4 and 7 FTSs the identities of Nos 19(R), 55(R), 74(R), 92(R) and 208(R) Sqns.

At this juncture, AHB produced another league table, this time confined to the forty-six squadrons that were active at that time – see Annex B.[59] This list was far more accurate than its 1968 predecessor at Annex A, but it was too late to have much impact on the progressive devaluing of the squadron as an entity. The last shreds of policy defending the sanctity of squadron status having already been discarded by assigning reserve number plates to the advanced flying training schools, it followed that there was no reason why this privilege should not be extended to the basic school. In 2002, therefore, the two squadrons of Tucanos that comprised No 1 FTS became Nos 72(R) and 207(R) Sqns. Demonstrating an admirable sense of proportion, however, it was accepted that a third, co-located, sub-unit, the Tucano Air Navigation Squadron (TANS), was too small to justify the application of a number plate.[60] But a wedge had been inserted into No 1 FTS and it would, inevitably, be driven home. In 2007 the TANS became No 76(R) Sqn. It was now open season on reserve status so, having awarded squadron number plates to advanced and basic flying training schools – why not the elementary schools? Why not indeed, and in 2008 the units flying Tutors from Cranwell and Church Fenton became Nos 16(R), 85(R) and 115(R) Sqns.

There are other examples of points being stretched to sustain number plates. For instance, by 1982 No 39 Sqn had shrunk to such an extent that it was redesignated as No 1 Photographic Reconnaissance Unit (PRU). Ten years later, in the campaign to sustain squadron identities at all costs, the original number plate was reinstated but, presumably in an attempt to get two units for the price of one, it was decided to burden it with the cumbersome title of No 39 (1 PRU) Sqn. Another example of resources being spread thinly is provided by the seven aeroplanes which were originally shared by No 8 Sqn and the Sentry Training Squadron; in 1996 the latter was relabelled to provide a peg on which

This King Air of No 45(R) Sqn was civil-registered as G-RAFP in 2004 and it flew as such until 2010 when it adopted its military serial, ZK456. (Philp Stevens or Target Aviation Photography)

to hang the identity of No 23 Sqn. In 2005, a third number plate was squeezed out of this arrangement when the various C2ISTAR training facilities at Waddington were merged and allocated the identity of No 54(R) Sqn. In the meantime, No 45(R) Sqn's Jetstreams had been replaced by leased Beech King Airs so that we now had an RAF squadron flying aeroplanes, some of them civil-registered, that were being operated and maintained by a commercial contractor[61] and, in some cases, flown by notionally bowler-hatted ex-regular QFIs – but it sufficed to keep a flag flying.

In 2017, AHB produced another of its periodic league tables, this time featuring just the thirty most senior number plates, whether active or not – see Annex C. By this time, however, the rules that had originally been devised to govern reserve status had become so diluted and/or been circumvented to such an extent that they had become meaningless. Within a year, specifically with effect from 1 February 2018, the 'reserve' suffix was deleted from the titles of all such units. To underline this change, these units even began to accrue seniority from that date, although there was no provision for claiming the time previously spent as a reserve squadron.[62] The result, of course, was to increase the strength of the RAF by more than 50%. Overnight, its Order of Battle had been transformed from a mere twenty-nine

squadrons to a far more impressive forty-six. This 'expansion' was more apparent than real, of course, because it had had absolutely no impact on the RAF's combat potential. The forty-six squadron air force was something of a 'paper tiger'. A year later, in continuation of the 21st Century policy of scattering number plates like confetti, it was announced that Nos 23 and 216 Sqns were to be re-formed, adding two more non-flying units while further diluting the overall aeroplanes-to-squadron ratio.[63]

One could perhaps hear distant echoes of Sir Hugh Trenchard, who had noted in 1919 that he was, 'not in favour of allotting numbered squadrons to any of the Schools or Training Wings'[64] or, more recently, 1968's chorus of disapproval which concluded, *inter alia*, that, when a, 'unit disbands the Standard should be preserved until it re-forms – not passed on to a quasi-squadron.'[25] Perhaps the last words should be left to Sir Andrew Humphrey who, as CAS in 1976, had declined to confer squadron status on OCUs while counselling, 'that it is time we stopped deluding ourselves […] about our front line strength.'[42] Sadly, however, as it turned out, Sir Andrew's words would be far from the last on this subject.

Whither the squadron?

Quite plainly, by the second decade of the 21st Century pragmatism had become the order of the day. The aim, to the extent that one can be discerned, appears to be simply to sustain as many squadron number plates as possible, regardless of the status and/or nature of the units to which they have been assigned. It is a matter of opinion as to whether this increasingly liberal, some might even say careless, attitude towards the allocation of number plates really does usefully prolong the histories of, what are (or were) supposed to be, active service flying units. Whether it does or not, it is interesting to speculate on why this relaxation in attitudes may have occurred. It is suggested that it has been a side effect of a fundamental change in the way in which squadrons are perceived.

There is a tendency to think of a squadron as being a largely self-contained fighting unit. This has never been universally the case, although, until 1939 and even into the middle years of WW II, it was a fair description of most units, especially those stationed overseas. Such a unit could become a kind of 'family' and this, combined with shared

experiences, especially in wartime, could foster a strong sense of loyalty, and it is the sense of being a member of a team, and of not letting the side down, that could make the squadrons of old more than the sum of their individual parts.

Unfortunately, while the commitment which being a member of a squadron could inspire was invaluable, it was difficult to quantify, and the classic squadron concept reached its peak in the middle years of WW II; it has been in decline ever since. By 1943, four years of warfare had taught the RAF a great deal about efficiency and resource management and one of its conclusions was that the traditional squadron organisation did not always represent the best way to get things done. In fact, it very rarely did. From then on, in one form or another, a degree of devolution and centralisation of management became increasingly commonplace. UK-based units operating heavy aircraft, transport and maritime types, as well as bombers, tended increasingly to be provided with enough airmen to turn aircraft around between sorties, but extensive use began to be made of common-user facilities at station (later base) level to handle anything more complicated. This trend had begun as early as November 1941 when the groundcrew of most UK-based fighter squadrons had been withdrawn and marshalled into autonomous numbered servicing echelons (SE).

During 1943 this practice spread to Army Co-operation, Bomber and Coastal Commands and in 1944 to the 2nd Tactical Air Force. In anticipation of an eventual rapid thrust to recapture Burma, a similar system was adopted in India in late-1944.[65] This was not done in the Mediterranean theatre, however, because the innovative Desert Air Force had devised its own approach to mobility. Introduced in mid-1942, this involved a squadron's groundcrew being divided into two teams which leapfrogged each other when the unit advanced – or retreated – either team being able to support the air echelon. Such an organisation gave squadrons a high degree of mobility while permitting them to retain a substantial degree of integrity.

Although the designation of each servicing echelon (usually) reflected that of the squadron which it had originally supported, there was no guarantee that these partnerships would continue to flourish. In other words, while they might still be co-habiting, once a unit's aircrew and groundcrew had been legally separated, it was not unknown for the

A Mosquito XIII of No 29 Sqn at Hunsdon. (IWM CH14640)

exigencies of the Service to lead to divorce. A case in point is provided by No 219 Sqn whose original airmen had been hived off to create No 6219 SE in March 1944. Since the two halves of the original unit stayed together, this made little practical difference until August when, through a rather curious reorganisation (or perhaps a demonstration of the flexibility of air power?), they moved to Hunsdon where No 6219 SE promptly took over the Mosquitos of the resident No 29 Sqn while No 6029 SE took over the incoming No 219 Sqn's aircraft, also Mosquitos. But in October 1944 No 219 Sqn moved to France accompanied by No 6029 SE, this mismatched numerical pairing remaining in force for the rest of the war. Once new bonds of trust and mutual respect had been forged, of course, business continued as usual, but it is plain that the ethos of the original No 219 Sqn of March 1944 had changed. It does not matter whether the new arrangement was better or worse; the point is that it was different, that the continuity of No 219 Sqn (and that of No 29 Sqn) had been disrupted.

This sort of thing marked the beginning of the end. When the great and good began to plan the size and shape of the post-war air force, it was clear that the squadron *per se* was no longer perceived to lie at the heart of RAF organisation. As Air Mshl Sir Leslie Hollinghurst put it in a paper which he submitted to the Air Council in his capacity as AMSO in October 1945:[66]

> 'In the past, the Squadron has been regarded as the basic unit. In this country it has operated from a Station which was a static organisation providing the airfield and the domestic and

> administrative facilities for the conduct of operations. The war has shown, however, that a squadron rarely operates independently and that the basic combat unit should preferably consist of something larger than a squadron as we presently know it.'

The eventual outcome of this sort of thinking was that stations were reorganised on the familiar three-wing basis that has now been standard for well over half-a-century. Although their specific titles have changed from time to time these three wings still oversee and support flying operations and provide the essential administrative, engineering and supply services which permit these to be undertaken. Squadrons were still to be a feature of the new arrangements but in an emasculated form. No longer the robust, virile, virtually self-sufficient entities of yesteryear, they were to be more like cadres in that (Hollinghurst again), 'each squadron would be capable of temporary detachment with appropriate sections detached from the Servicing and Executive Wings so as to render it self-contained.'[66]

This structure was not imposed overnight, and the traditional squadron-based organisation faded away only slowly, along with the associated servicing echelons, some of which lingered into the 1950s. Nevertheless, once established, the cost-effectiveness of centralised facilities, eventually extending to pooled aircraft, proved to be irresistible. Squadron number plates continued to be assigned but they served increasingly to identify only a particular group of aircrew – and to justify an executive appointment, increasingly at wing commander level, an important consideration in terms of career management. For a time, remnants of the traditional system survived, particularly overseas. At Tengah, for instance, there were, in the mid-1960s, four squadrons operating three different types of aircraft in four different roles. Since centralisation could be taken only so far under these circumstances, a significant degree of autonomy was still appropriate. Elsewhere, however, there was an increasing degree of *de facto*, if not *de jure*, centralisation.

This could be seen at work during the Confrontation with Indonesia when the Singapore-based No 45 Sqn deployed up-country in 1964, taking with it all eight of its Canberras. It was replaced in Singapore by a squadron deployed from Cyprus under Operation REGALITY. This unit was deemed to be No 73 Sqn but its eight aircraft, a mixture of B15s and 16s, had clearly been drawn from across the Cyprus-based

Above: Led by a B16 wearing No 249 Sqn's emblem on its fin, on the original of this 1964 picture of No 73 Sqn's Canberras taxying out at Tengah, the tail markings of Nos 6 and 32 Sqns can also be discerned. Below: When No 73 Sqn was replaced by No 32 Sqn, with an equally random collection of aeroplanes, the badges of the contributing units were replaced by a flamingo, reflecting Akrotiri's station badge.

fleet, since some of them wore the badges of Nos 6, 32 and 249 Sqns – neither were the crews drawn exclusively from No 73 Sqn. While Akrotiri's four squadrons were still nominally independent at the time, it is evident that a degree of centralisation was already being practised and in 1966 such a system was formally imposed.

The pick'n'mix procedure adopted for the reinforcement of FEAF with NEAF Canberras was not an isolated case. There was, for example, another contingency plan current in 1963, Operation IMPULSE, which would have seen Germany-based Canberras deployed to Cyprus in a period of regional tension. It involved two

Illustrating another tell-tale sign of 'centralisation', this 1967 picture shows the badge of RAF Scampton surmounting the emblems of its three resident units Nos 27, 83 and 617 Sqns, each of which consisted of fifty-five aircrew officers and a solitary admin NCO. (Joe Bliss)

flights of six aircraft each, one to be drawn from Nos 3 and 14 Sqns, the other from Nos 16 and 213 Sqns – four squadrons from four different stations, Laarbruch, Geilenkirchen, Wildenrath and Brüggen.

At much the same time, the 1960s, centralisation tended to be introduced wherever practical. Thus, where two or more squadrons on a station operated the same type/mark they had their aeroplanes and technical support withdrawn and pooled, so that many squadrons actually comprised little more than their aircrew. In Coastal Command, for instance, the Shackleton MR 2s of Nos 204 and 210 Sqns at Ballykelly were pooled, as were the MR 3s of the three squadrons at Kinloss. Similarly, the crews who flew the likes of Britannias, Hercules, Argosys and Nimrods from multi-unit stations were allocated anonymous aeroplanes drawn from a pool, as were those who flew Vulcans.[67]

As an example, some fifteen years later, the Vulcan's participation in Operation CORPORATE, the Falklands campaign of 1982, was a joint effort, organised on a wing/station basis. No squadron number plate was associated with the enterprise at the time, although Nos 44, 50 and 101 Sqns were all subsequently gazetted as having taken part. It happened again during the campaign to eject Iraqi forces from Kuwait in 1991, Operation GRANBY, when the Tornado unit which operated from Muharraq, and which was referred to as No 15 Sqn, actually included a substantial contingent of No 17 Sqn's personnel from the outset. They were later reinforced by elements drawn from Nos 9, 27, 31 and 617 Sqns so that Brüggen, Laarbruch and Marham were all represented. The same was true of the other nominal Tornado squadrons sent out to the Gulf; they were all *de facto* composite units.

The flying suit patch devised to reflect the 'wing'-style organisation of the Tornado unit(s) deployed to Kuwait in 2003.

By 2003, when the assault against Iraq was launched, this sort of approach had become the norm. The Tornado crews assigned to Operation TELIC were initially drawn from Nos 2, 9, 13, 31 and 617 Sqns but, once in Kuwait, they operated as the Tornado Combat Air Wing. A press announcement headlined 'Identities Put To One Side As Five Squadrons Make Up New Wing', left no doubt that individual unit number plates had been suppressed.[68] Why? Because they were irrelevant to the task in hand and their retention would have served only to complicate matters. Despite the imposition of official anonymity, however, the atavistic desire for some form of heraldry led to the design of a complex wing emblem composed of distinctive features of the badges of all five squadrons superimposed on a broadly Tornado-shaped union flag motif.

With aeroplanes being widely regarded as a common-user resource and combat units being manned on a pick'n'mix basis, traditional squadron identities would no longer appear to have much relevance in the context of modern air operations. So, does the RAF need to sustain its squadron identities at all? They are, after all, a relic of times past when the Service was organised differently and operated differently. In reality, the original concept had been largely superseded by more efficient arrangements well before the end of WW II. Although the traditional number plates have been sustained ever since, the reasons for doing so have become increasingly obscure.

There can, of course, be no disputing the fact that a squadron is a squadron if the Ministry says it is, so there can be no argument about the validity of the Air Force Board's increasing tendency to sanction the assignment of number plates to units that lack aeroplanes of their own and/or of applying them to collections of people and aeroplanes mustered on an *ad hoc* basis. The ultimate extrapolation of this approach is, of course, to assign squadron number plates to units that

No 83 Sqn's Standard being paraded at Scampton in 1969. While the exclusively officer-manned unit could provide the Standard Bearer, the escort, of a warrant officer and two armed SNCOs had to be drawn from the station. While it may be acceptable to co-opt an escort, a unit must field its own Standard Bearer. If it can't 'carry its own flag', what's the point? So – shall we see a group captain doing the honours when No 601 Sqn parades its Standard? (No 83 Sqn)

do not even have a flying commitment. The most extreme case – thus far – is probably that of No 601 Sqn which 'stood up' (*awful term*[69]) in April 2017 to exploit, 'the talents of leaders from industry, academia and research to advise and shape and inspire', the Service.[70] While one can certainly see their potential value, is it really appropriate that such a group of 'influencers' should inherit a Standard bearing Battle Honours? Furthermore, since No 601 Sqn's Standard was laid up some sixty years ago, at some stage the public purse will presumably have to fund a replacement – and, if/when it does, how will the members of this unit (most, if not all, of them honorary group captains, with a 2-star CO, no less) provide an appropriate bearer when it is paraded – and how can they possibly add to its Battle Honours? While obviously well-intentioned, some readers may wonder whether assigning squadron number plates to such units,[71] does the concept of 'the squadron' any favours.

Stop Press. Shortly before this edition of the Journal went to press, 'the reformation of No 30 Squadron as an Airbus A400M Atlas C1 unit' on 28 September 2021 was announced.[72] But to be re-formed it must. of course, have previously been disbanded. But had it? The recent announcement had also noted that, on the withdrawal of its Hercules on 8 December 2016, No 30 Sqn had been, 'moved to an administrative

role'; on the MOD website this interlude is described as 'a period of transition.'[73] Neither of these terms have any historic resonance and their significance is unclear, but it would seem that No 30 Sqn will have been credited with the best part of five years' service while having had little more than a notional – and certainly non-flying – existence. This has the potential to muddy the waters when questions of relative seniority arise which, as this essay has shown, they do from time to time.

Notes:

1 AIR2/14387. 2TAF/TS.1292/AIR/CINC of 1 February 1957 from Air Mshl the Earl of Bandon to VCAS, Air Chf Mshl Sir Ronald Ivelaw-Chapman.

2 *Ibid.* Air Chf Mshl Sir Donald Hardman's view was conveyed in his loose minute AMSO/913 of 13 February 1957. The 'priority list' to which he was referring was that approved by the ACSC on 24 July 1946 – see Notes 30 and 39 to Part I.

3 *Ibid*. J C Nerney's AHB5/S.70 of 20 February 1957 to PS to AMSO. Curiously, Nerney stated in this minute that, 'Nos 1-25 Squadrons were regarded by Lord Trenchard as forming the backbone of Royal Air Force tradition . . .' which was somewhat at odds with CAS's actual selection of number plates for the peacetime air force (see Note 6 to Part I of this paper).

4 AIR2/10244. As discussed in Part I, the Squadron Number Plates Committee's points system had been laid out by its Chairman, Gp Capt H A Constantine, in a 16-page report covered by his paper, DDO(F)/A.965371/48, dated 15 June 1948.

5 AIR6/120. The ACSC discussed this issue at its Meetings 16(57) on 6 March and 19(57) on 17 June 1957.

6 AIR6/124. There is no constitutional difference between an AOCinC and a CinC. The former term was introduced in 1925, in the context of Air Defence of Great Britain, but during WW II it became conventional for home commands to have AOCinCs with those overseas having CinCs. In 1956 it was suggested that the RAF should standardise on the shorter version. However, following his review of the situation, Air Mshl Sir Geoffrey Tuttle, concluded that there was some merit in retaining the distinction and his DCAS/S162 of 10 August 1956 invited ACSC colleagues to agree, which they did. Nevertheless, while 2TAF/RAFG and FEAF continued to be commanded by CinCs, AFME and NEAF soon acquired AOCinCs. Hereinafter in this paper, unless related to a specific command, references to AOCinCs should be read as including CinCs.

7 AIR20/6929. An Air Ministry letter to AOCinCs, MS.1100/51/S.9/2702 of 20 June 1957, laid out the proposed new policy. The arrangements that were eventually implemented differed in only one detail. At its Meeting 26(57) of 26 August 1957, the ACSC decided that there should be thirty points for 'operational record' and ten for 'other distinctions' vice the originally proposed twenty-five and fifteen.

8 *Ibid*. Presented by its Chairman, the Head of AHB, J C Nerney, the Report of the Working Party on Squadron Number Plates was dated 16 October 1957. Appendix A provided details of the points associated with each Battle Honour.

9 *Ibid*. Air Ministry's letter MS.1100/51/S.9/2777 of 18 July 1958

[10] The loss of No 511 Sqn was notable as it had been one of those specifically earmarked for long-term preservation in 1946 – see Notes 30 and 39 to Part I. It was not long out of the line, however, as it was re-formed with Britannias in 1959.

[11] Nos 173 and 187 Sqns were simply disbanded on 2 September 1957. There was a move to allocate the 173 number plate to the Ferry Support Squadron at Benson, but this was not taken up and on 15 September 1958 the number plates of Nos 147 and 167 Sqns were also withdrawn when these units were merged to create The Ferry Squadron.

[12] AIR2/14387. A loose minute, MS 1100/51 of 8 January 1958, proposed the options of introducing a dedicated numbering sequence for missile units, or re-instating dormant number plates or, presumably because missiles were perceived to be 'the future', re-assigning the Nos 1-17 Sqn number plates to Bloodhound units at the expense of the current flying squadrons which would have had to be renumbered using defunct number plates.

[13] They were Nos 77, 82, 97, 98, 102, 104, 106, 107, 113, 130, 142, 144, 150, 218, 220, 223, 226, 240, 254 and 269 Sqns of Thor IRBMS and Nos 62, 94, 112, 141, 222, 242, 247, 257, 263, 264 and 266 Sqns of Bloodhound Mk 1 SAMs.

[14] AIR2/17537. Loose Minute DGO/305 of 17 March 1966, in effect, assigned the Nos 360 and 361 number plates to these units. The latter proved to be short-lived.

[15] AIR2/16026. Relevant correspondence included AF/CT2153/65 of 28 July 1965, which noted that the AFBSC had approved the suggestion that dormant Standards should be displayed at Cranwell and, same reference, of 28 October which announced the outcome.

[16] AIR2/18048. Fighter Commands' suggestion was contained in its FC/S241127/Org of 20 December 1967 and rejected by MOD letter AF/CT 2844/64 dated 29 December 1967.

[17] *Ibid*. The seriousness of the situation was drawn to the attention of concerned offices by DGO, AVM C N Foxley-Norris, in a loose minute DGO/305 of 19 December 1967.

[18] *Ibid.* AOCinC Training Command, Air Chf Mshl Sir John Davis, made the case for a more relaxed approach to the allocation of squadron number plates in his TC/280312 of 10 June 1968. It was accompanied by a list of flying training units that could have found homes for as many as twenty-nine number plates.

[19] AIR2/16571. The topics on which comment was sought were outlined in MOD letter DDAP(Raf)/C.23/200 of 4 July 1968.

[20] Following the 1964 merger of the three single-service ministries to create the Ministry of Defence, the RAF's original governing bodies, the Air Council and its Standing Committee (the AC and ACSC) became the Air Force Board and its Standing Committee (AFB and AFBSC).

[21] AIR6/172. In his Note AFB(68)27 of 13 September 1968, AMSO (nominally Air Chf Mshl Sir Thomas Prickett but, since he had been appointed only that day, the Note was actually presented to the AFB by the DGO, AVM F Bird) reviewed the situation and proposed specific amendments to policy. With one exception (a bid for No 139 Sqn to be treated as an exceptional case was rejected) the AFB endorsed these proposals on 26 September in the Conclusions of its Meeting 9(68) (see AIR6/160).

[22] AIR6/88. The case for Nos 120 and 617 Sqns to be awarded their Standards on special grounds had been submitted to the Air Council by AMP, Air Mshl Sir Leslie

Hollinghurst, in his paper AC58(51) dated 1 November 1951. This proposal was endorsed on 8 November at Meeting 16(51) (see AIR6/80). It would seem that the third 'special' squadron, No 511 Sqn, had not been special enough to qualify for the early award of a Standard.

[23] AIR6/172. AHB's 171-squadron list is Annexed to AMSO's Note AFB(68)27 of 13 September 1968.

[24] AHB's assessments of time-served appear problematic in some cases. For example AHB placed the long-serving No 31 Sqn 36th in seniority, whereas it was actually 9th – see Annex A.

[25] These arguments were condensed from the responses to MOD's trawl of July 1968 (see Note 19). They were laid out by Air Chf Mshl Sir Thomas Prickett in para 12 of AMSO's Note AFB(68)27 and endorsed by the board at its meeting 9(68) on 26 September 1968.

[26] For more detail on this, see 'Reserve Squadrons' in *RAF Historical Society Journal No 74*, pp132-154.

[27] AIR2/10244. The correspondence associated with the Squadron Number Plates Committee's investigation into the history of 'gift' and 'named' squadrons is on this file. Its conclusions are summarised at para 17 of its initial report, DDO(F)/A.965371/48 of 15 June 1948.

[28] AIR20/10459. Air Ministry policy letter A.998844/50/DofO dated 10 June 1952 to all AOCinCs. The party line was reiterated ten years later in C.144606/61/OG1 of 17 April 1962.

[29] AIR20/10903. The party line was set out (again) by Sir Martin Flett, a PUS to the AFB, in a minute to AMSO of 18 January 1968.

[30] DEFE71/829. The response, USofS(RAF)/15/H of 25 August 1977, was signed by James Wellbeloved MP, PPS to Gerry Reynolds, Minister of Defence (Administration).

[31] AIR2/18048. HQ NEAF's case, and the counter argument, were presented to AMSO, Air Mshl Sir Charles Broughton, by the DGO, AVM C N Foxley-Norris, in his DGO/305 of 2 April 1968. The decision was notified to the NEAF staff via MOD letter AF/CT 2844/64 of 16 May1968.

[32] AIR2/18569. The Army was granted authority to use the Nos 650-670 number plates, and those of Nos 671-699 should they be needed, by Air Ministry letter AF/CT2844/64 of 16 September 1969.

[33] AIR6/160. This statement is at para 3e of the Conclusions of AFB Meeting 9(68) held on 26 September 1968, which endorsed the proposals contained in Note AFB(68)27 (see Note 23).

[34] AIR2/18276. Loose minute AF/P1(Cer)S4034/II of 13 April 1970 from DPS1, Air Cdre J W Frost, to DofO&AP, Air Cdre J Miller.

[35] AIR20/12515. AMSO, Air Chf Mshl Sir Thomas Prickett, laid the case for No 226 OCU to be assigned an active squadron number plate before colleagues in his letter AMSO/229 of 1 July 1970. Having secured their concurrence, the re-formation of No 65 Sqn as an active unit was authorised by MOD letter AF/CT725/70/BF1/1382 of 26 August 1970.

[36] AIR8/2731. Conclusions of AFBSC Meeting 1(72) held on 10 January 1972.

[37] *Ibid.* Air Chf Mshl Sir Neil Wheeler's loose minute AMSO/93 of 14 January 1972.

[38] AIR20/10903. The AFB's discussion of squadron number plates at its Meeting

1(72) held on 24 January 1972, was summarised in a Note by the Secretary dated 28 January 1972.

[39] AIR8/2731. AMSO's loose minute AMSO/172 of 26 January 1972.

[40] AIR6/192. In AMSO's Note AFB(75)14 of 30 May 1975, Air Mshl Sir Anthony Heward explained the rationale underpinning the number plates that he proposed should be withdrawn (essentially seniority where a choice had to be made) and sought the Board's agreement. The AFB provided its endorsement on 3 July in the Conclusions of its Meeting 7(75) (see AIR6/193).

[41] AIR20/12643. Letter STC/125/4/CINC SEC of 5 March 1976 from Air Chf Mshl Sir Dennis Smallwood to CAS.

[42] *Ibid*. CAS 90216 of 11 March 1976 from Air Chf Mshl Sir Andrew Humphrey to AOCinC Strike Command.

[43] DEFE71/829. The position was explained by DofO&AP, Air Cdre B Hamilton, in a loose minute AF/CT535/75 of 25 January 1977.

[44] DEFE71/828. AVM Peter Bairsto's RAFSC/298002/AOT of 20 March 1978 put forward a case for the dormant No 66 Sqn, which he had commanded in 1958-60, to be reinstated as the, then projected, second Chinook squadron. As he had anticipated, while sympathetic, AVM J R Rogers' DGO/105 of 4 April 1978 had been unable to oblige, on the grounds that, in terms of seniority among dormant number plates, No 66 Sqn's was currently 24th in line.

[45] AIR8/3393. Air Mshl M W P Knight's loose minute, AMSO32/5 of 3 May 1983.

[46] *Ibid*. AMSO's loose minute AMSO32/5 of 23 November 1983.

[47] AIR8/3744. AMSO's Note AFBSC(90)27 'Defence Options Implementation – Squadron and Group Number Plates' dated 12 December 1990.

[48] AIR6/321. Circulated under cover of D/Sec(AS)2/4 of 12 April 1991, AMSO's Note, AFBSC(91)3(X), 'Options for Change – Squadron and Group Number Plates' was dated the previous day.

[49] AIR8/3744. AMSO's revised 'Options for Change' Note, AFBSC(92)5(X), was dated 28 February 1992.

[50] AIR6/343. Conclusions of AFBSC Meeting 5(92) held on 1 May 1992.

[51] AIR8/3744. The outcome of the AFBSC's deliberations were initially publicised by a signal addressed to, *inter alia*, HQs Strike and Support Commands released by ACAS, AVM T Garden, on 3 June 1992.

[52] At the time the active OCUs were No 226 (Jaguar), 228 (Phantom), 229 (Tornado F3), 233 (Harrier), 236 (Nimrod), 237 (Buccaneer), 240 (Puma/Chinook), 241 (VC10/TriStar) and 242 (Hercules). Of those not covered by Fig 2, Nos 228 OCU, already No 64(R) Sqn, had closed in 1991, No 237 OCU had also closed in 1991 without ever acquiring a reserve number plate, while No 242 OCU became No 57(R) Sqn, followed, in 1993, by No 241 OCU but neither of these 'owned' any aeroplanes.

[53] AIR8/3744. Letter to CAS , dated 17 March 1992, from AVM M M J Robinson, whose first, 1948-51, tour had been with No 45 Sqn.

[54] See 'Reserve Squadrons' in *RAF Historical Society Journal No 74*.

[55] *Ibid*. As a recent example of this relaxation, in his Note AMP AA4451 of 11 November 1991, Air Mshl Sir Roger Palin had informed colleagues that, following a formal application to the Palace, HM The Queen had 'graciously giver her consent (…) to the transfer of Squadron Standards to Reserve Squadrons'.

[56] *Ibid*. Letter CAS.90394 of 31 March 1992 from Air Chf Mshl Sir Peter Harding to AVM Mike Robison.

[57] While most of the later changes in number plate allocations can be determined from public announcements, from this point on references in this paper to primary sources relating to these changes will be relatively scarce. At the time of writing (2021), the most recent file relating to the allocation of squadron number plates that has been deposited with The National Archives (TNA) is dated 1994 – twenty-seven years ago. In 2010 the '30 year Rule' was superseded by the '20-Year Rule' and the permitted transition/adjustment period required all documents dated as late as 1996 to have been transferred to Kew by 2019. Since the 20-year rule is supposed to have been observed since then, it is clear that the MOD has made little progress in adjusting to the new timeframe.

But there are other serious deficiencies. For example, a file dealing with the allocation of squadron number plates, DEFE71/328 covering 1966-70, never reached Kew; in TNA's on-line catalogue it is annotated 'missing at transfer', just one of many. Far too many – at least another thirty in DEFE71, and a dozen in AIR8; there are others.

[58] In brief, the 'Mirror Image' scheme involved Chivenor and Valley both offering the same, combined, Hawk-based Advanced Flying Training and Tactical Weapons Unit courses. This parallel arrangement avoided a mid-sequence posting and enhanced continuity at a significant reduction cost, in term of both flying hours and manpower. A reduction in throughput made it uneconomic, however, and Chivenor closed down in 1994.

[59] This table, and its 1968 predecessor, were not the only such exercises. There were, for example, several tables produced for AMSO's office in March 1981 offering a variety of options for sustaining and/or renumbering squadrons; a copy of this document may be found in AIR20/13235. Another, in DEFE71/1297, listed the most senior inactive number plates, as at December 1985. Since it is such a critical factor, papers of this nature routinely include details of length of time served by each unit.

[60] The case for the two basic flying training squadrons of No 1 FTS, but not the TANS, to be awarded reserve number plates was made to the AFBSC by AMP, Air Mshl Sir Christopher Coville, in his paper PTC/10/3/AMP of April 2002.

[61] In 2004, Serco Group plc was awarded a 'multi activity contract-and multi-engine pilot training interim solution' under which it was to provide, at Cranwell, management and administration, aircraft maintenance and mechanical support facilities, avionic and electrical support facilities, media services, communications information systems, MT operations and maintenance, supply support, fire and crash rescue services, an aptitude testing team and aircraft leasing. The initial deal involved a fleet of seven King Airs to provide 5,500 flying hours, plus 3,000 simulator hours, per year for five years at a cost of £60M. The details were subsequently amended to reflect changing requirements, but Serco retained the contract until the King Air was withdrawn from service in 2018.

[62] RAF Internal Briefing Note 03/18 dated 1 February 2018.

[63] At CAS's Air & Space Power Conference on 17 July 2019, Air Chf Mshl Sir Stephen Hillier, announced the forthcoming re-formation of No 23 Sqn, which would be dedicated to space operations, and No 216 Sqn which would develop 'swarming' technology for UAVs.

[64] AIR2/1524. At Minute 50 of 27 November 1919, the Director of Training and

Organisation (DTO), Air Cdre P W Game had proposed the allocation of squadron number plates to a variety of training units. CAS vetoed that idea the next day.

[65] The initial tranche of Fighter Command Servicing Echelons was allocated 3000-series numbers which did *not* reflect the numerical identity of their associated air echelons, eg No 3008 SE supported No 247 Sqn. When the system was later extended to embrace other Commands, however, most SEs were identified by the number of their parent unit preceded by an appropriate number of digits to make a total of four, thus No 7045 SE supported No 45 Sqn. The initial digit identified the Command, for example the 4000 series SEs of Transport Command, the 6000s of ADGB/Fighter Command/2ndTAF, the 7000s in India/Burma, 8000s in Coastal Command and 9000s in Bomber Command.

[66] AIR6/65. AMSO's argument was submitted as Memorandum AC40(45), The Organisation of Stations and Combat Units dated 20 October 1945.

[67] Even within a centralised system, however, some folk evidently still felt the need to express a sense of sub-unit identity within the unified system. Thus, while the Britannia fleet was flown by crews drawn from Nos 99 and 511 Sqns on a pooled basis, 2nd line maintenance was handled by two Line Servicing Squadrons, LSS A and LSS B. It is said that you could tell which one had handled an aeroplane because of the way its propellors were dressed; one LSS left them diagonally, as an ✕, the other vertically, as a +. This practice was reportedly also adopted by the Hercules of LSS A and B at Lyneham.

[68] *RAF News*, Issue 1,070 of 4 April 2003.

[69] Possibly a careless import of USAF jargon, the 21st Century use of the term 'stood up' is simply inappropriate in the context of RAF squadrons unless, of course, they had previously been sitting down or had had the misfortune to have fallen over. It appears to be a back-formation derived from a misconstruing of long-established military usage whereby troops may be ordered to 'stand to', meaning to adopt a higher state of readiness, the counter-order being to 'stand down'. But, in this context, 'stand *up*' is simply not in the British airman's (or soldier's) lexicon and to use it in relation to RAF units betrays a lack of familiarity with the *patois* – and/or a tin ear.

While the squadrons of other air forces may stand up, sit down and, who knows, even tap dance and curtsy, those of the RAF do not (or didn't used to). They are formed and disbanded. Between those events they may be certified as having achieved an operational capability, be reduced to a cadre and/or be 'declared' (made available) to a Commander and so on. If/when any of these arrangements are downgraded or terminated, the unit may be 'stood down' from a commitment. But it is contended that the only circumstances in which an RAF squadron can be 'stood up' is when its girlfriend fails to turn up for a date.

[70] Defence Secretary Sir Michael Fallon's speech at the Airpower 2017 Conference at https://www.gov.uk/government/speeches/defence-secretary-celebrates-uks-partnerships-at-airpower-2017

[71] Other recent (2021) examples might include Nos 20 and 78 Sqns whose number plates have been assigned to the Air Surveillance and Control System OCU at Boulmer and the RAF element within the London Area Control Centre at Swanwick.

[72] See, for example, *Air Forces Monthly*, Issue 404, November 2021, p9.

[73] https://www.raf.mod.uk/our-organisation/squadrons/30-squadron/

Annex A

SQUADRON SENIORITY IN 1968

This table is based on the top 80 entries in a list of 171 squadrons, in order of seniority as determined by AHB in 1968.[1] AHB's relative rankings are noted in col (d). This writer's assessment of seniority, at col (a), is based on longevity and records, at col (c), total time served 1912-68 (part-years reflect days as a decimal part of 365) and, while the two results, cols (a) and (d), are reasonably consistent, it is evident that a mismatch of as little as a couple of months could result in a difference of several places in the two seniority columns. Note that, in calculating total time served, time spent as a dormant partner during the short-lived 'linking' system of the 1950s was considered to have accrued to *both* squadrons.[2]

There are, however, a few marked anomalies (shaded) which are difficult to rationalise.[3] For example, AHB appears to have short-changed Nos 31, 43, 55 and 203 Sqns by between four and seven years, and its placing of No 19 Sqn as 60th in seniority implied about 38 years of service, whereas it had actually accrued more than 50 years; this cost it thirty-five places in AHB's ranking. In the opposite sense, AHB credited No 34 Sqn with about four years of additional service, moving it too far up the table, while the extra ten years it credited to No 78 Sqn had promoted it by some twenty-eight places. It is also difficult to account for the absence of, for instance, No 92 Sqn, whose 31·1 years of service, actually made it 80th in seniority, whereas AHB's reckoning had placed it 95th.

Notes:

1 TNA AIR6/172. The complete 171-squadron table is appended to Note AFB(68)27 which was submitted to the AFB by Acting AMSO, AVM F Bird, on 13 September 1968. Another copy may be found at AIR20/10903.

2 AMO A.177 of 27 March 1952, expanded on the introduction of Standards that had originally been announced by AMO A.886 of 1943. At para 3, which reiterated the qualifying conditions, essentially having completed 25 years of service, it stated that, 'When two squadrons are associated as "linked" squadrons, the claims of each will be considered individually and independently of the other.' In other words, since the squadrons constituting a linked pair were both considered to be active (which was, of course, the point of the exercise), time served was credited to both.

3 While the table cited at Note 1 reflects, at col (d), AHB's assessment of seniority, it does not provide specific figures for 'time served'. These can, however, be estimated

approximately, but with a tolerable degree of accuracy, by comparison with cols (a) and (c).

Seniority	**Sqn No**	**Years 1912-68**	**AHB Seniority**
(a)	(b)	(c)	(d)
1	**2**	56·6	1
2	**1**	56·4	2
3	**4**	56·3	4
4	**6**	54·9	3
5	**3**	54·0	12
6	**24**	53·3	6
7	**14**	52·9	5
8	**208**	52·9	17
9	**31**	52·5	36
10	**8**	52·4	7
11	**56**	52·4	28
12	**25**	52·3	13
13	**30**	52·2	18
14	**5**	51·8	9
15	**47**	51·8	16
16	**28**	51·8	15
17	**60**	51·8	8
18	**45**	51·6	19
19	**70**	51·5	11
20	**84**	51·4	14
21	**12**	51·2	10
22	**216**	51·0	20
23	**39**	50·5	22
24	**20**	50·4	21
25	**19**	50·1	60
26	**29**	49·9	24
27	**32**	49·7	25
28	**13**	49·4	30
29	**9**	49·1	23
30	**16**	48·9	29
31	**100**	48·1	33
32	**11**	47·9	26
33	**41**	47·6	31
34	**55**	47·2	57
35	**58**	47·0	32
36	**23**	46·9	34
37	**207**	46·5	27
38	**111**	45·9	37

39	**205**	45·7	35
40	**99**	45·4	41
41	**27**	44·8	45
42	**43**	44·3	54
43	**203**	44·1	55
44	**15**	44·0	39
45	**7**	43·8	40
46	**17**	43·3	44
47	**202**	43·0	38
48	**101**	42·5	46
49	**54**	42·4	47
50	**201**	41·5	43
51	**209**	41·4	49
52	**204**	40·8	48
53	**22**	40·7	51
54	**210**	40·5	50
55	**33**	40·3	58
56	**35**	39·9	52
57	**57**	39·7	59
58	**36**	38·8	61
59	**10**	38·7	56
60	**26**	38·7	53
61	**230**	37·2	62
62	**48**	36·5	65
63	**74**	35·3	63
64	**65**	34·9	68
65	**18**	34·7	69
66	**64**	34·7	67
67	**38**	34·6	66
68	**80**	34·1	71
69	**83**	34·0	72
70	**78**	33·8	42
71	**73**	33·8	74
72	**72**	33·6	76
73	**66**	33·5	75
74	**52**	33·3	79
75	**42**	33·3	77
76	**21**	33·2	70
77	**37**	32·8	73
78	**114**	32·7	80
79	**49**	31·7	78
80	**34**	30·7	64

Annex B

SQUADRON SENIORITY IN 2001

This table reflects the forty-six squadrons that were active as at 1 January 2002.[1] By comparison with the data at Annex A, it is apparent that most of the marked inconsistencies that had been apparent in the 1968 tabulation had been corrected. That said, differences between this writer's assessment of time served, at col (c), and AHB's equivalent calculation, at col (e), still frequently differ by several months, even, in some cases, eg Nos 23, 27, 201 and 202 Sqns, by up to two years, and there are still some even more significant anomalies, eg No 111 Sqn had now been short-changed by about five years (possibly by omitting a period spent 'linked'?), whereas No 230 Sqn had gained five years.

Notes:

[1] The data at cols (d) and (e) are taken from AMP's draft paper, PTC/10/3/AMP of April 2002, 'Adoption of Reserve Sqn Numberplates at No 1 Flying Training School, RAF Linton-on-Ouse' which provided, at Annex B, a selection of 'league tables' as background information.

Seniority	**Sqn No**	**Years 1912-2001**	**AHB Seniority**	**AHB Years**
(a)	(b)	(c)	(d)	(e)
1	**2**	89·6	1	89·08
2	**1**	89·4	2	89·05
3	**4**	89·3	3	89·04
4	**6**	87·9	4	87·08
5	**3**	87·0	5	86·11
6	**24**	86·3	6	86·04
7	**14**	85·9	7	85·11
8	**8**	85·4	10	85·05
9	**25**	85·3	9	85·06
10	**30**	85·2	14	84·04
11	**31**	85·2	8	85·07
12	**5**	84·8	11	84·09
13	**47**	84·8	12	84·09
14	**70**	84·5	13	84·07
15	**84**	84·1	15	84·02
16	**12**	83·5	16	83·06
17	**32**	82·7	17	82·09
18	**9**	82·0	18	82·01

19	**11**	80·7	19	80·11
20	**28**	80·7	20	80·09
21	**41**	78·9	22	78·11
22	**111**	78·9	32	74·04
23	**100**	78·0	24	78·00
24	**23**	77·8	21	79·11
25	**43**	76·6	26	76·06
26	**202**	76·0	23	78·01
27	**216**	75·8	27	75·11
28	**54**	75·4	29	75·04
29	**7**	74·8	30	74·11
30	**201**	74·5	25	76·08
31	**13**	74·4	31	74·04
32	**101**	73·8	33	73·10
33	**22**	73·7	34	73·08
34	**39**	73·4	35	73·05
35	**33**	72·5	36	72·00
36	**10**	71·7	37	72·04
37	**27**	70·8	38	69·09
38	**230**	70·2	28	75·07
39	**18**	67·0	39	67·00
40	**72**	66·6	40	66·07
41	**206**	63·4	41	63·06
42	**120**	61·1	42	61·01
43	**51**	60·1	43	60·01
44	**617**	55·4	44	55·05
45	**99**	53·6	45	53·00
46	**78**	52·4	46	52·03

Annex C

SQUADRON SENIORITY IN 2017

This table reflects AHB's thirty most senior squadrons as at 30 June 2017, of which Nos 22, 25 and 216 Sqns were dormant at that time.[1] By comparison with similar tables reflecting the situation in 1968 and 2001 (see Annexes A and B), the differences between almost all of this writer's assessment of 'time served' and AHB's equivalent calculations are now marginal – NB a difference of 0·1 of a year is just 5 weeks and, depending upon whether a two-decimal-place total has been rounded up or down, this can produce a marginally different result. However, because a difference of as little as 0·1 may result in a difference of one or two places in the seniority table, on this occasion, it would be splitting hairs, to little effect, to publish both sets of figures. That said, there is one significant error in that, while currently inactive, No 111 Sqn had accumulated 88·5 years of service and should, therefore have been included as one of the 'top thirty', at the expense of No 27 Sqn. There are one or two other anomalies which this writer has failed to resolve – eg it is contended that the 100·2 and 94·3 years of service credited to Nos 6 and 28 Sqns, respectively, by AHB should have been 101·1 and 96·2. This would improve No 28 Sqn's ranking by two places and would promote No 6 Sqn to fifth place overall vice AHB's 10th.

Note:

[1] The data at cols (a) and (c) are taken from AHB letter FOI2017/06102 of 31 July 2017 responding to a request, submitted under the terms of the Freedom Of Information Act, for details of the thirty most senior squadrons. AHB's table contained a number of minor inconsistencies in that the relative seniority assigned to several squadrons did not reflect the tabulated time served, eg No 8 Sqn's 100·8 years made it sixth in seniority, rather than ninth, and No 31 Sqn should have been eighth, rather than tenth. These errors, and others like it, have been corrected in the table as presented here, ie the figures at col (c) are those provided by AHB, and the relative seniority at col (a) has been adjusted to reflect these.

AHB Seniority (amended)	Sqn No	AHB Years 1912-2017
(a)	(b)	(c)
1	**2**	105·1

2	**1**	103·3
3	**3**	102·6
4	**24**	101·9
5	**14**	101·1
6	**8**	100·9
7	**30**	100·8
8	**31**	100·8
9	**47**	100·3
10	**6**	100·2
11	**84**	99·7
12	**5**	98·9
13	**32**	98·3
14	**12**	98·3
15	**9**	97·6
16	**4**	97·6
17	**70**	96·0
18	**11**	94·9
19	**28**	94·3
20	**100**	93·6
21	**202**	92·3
22	**25**	91·6
23	**7**	90·5
24	**101**	89·4
25	**13**	88·5
26	**39**	88.4
27	**216**	88.3
28	**33**	87.6
29	**22**	87.9
30	**27**	86.4

25A	**111**	88.5

AN INCIDENT ON No 45 SQN IN 1917

by Wg Cdr Jeff Jefford

This picture of No 45 Sqn's 2/Lt Harry Forrest was recently brought to the attention of your Editor in his capacity as that squadron's chronicler. Forrest was with the squadron only briefly, but an account of the sortie that led to his departure is a tale worth retelling. When, as a recently qualified pilot, he joined No 45 Sqn at Ste-Marie-Cappel on 2 April 1917, he had 12 hours on the Sopwith 1½ Strutter in his log book. Hardly enough, of course, but it was actually *a lot* more 'time on type' than many new arrivals had in 1917. On receipt of his latest batch of new pilots, the CO, an increasingly disenchanted Maj Willie Read, noted in his diary that, 'Forbes, Evans, Harriman, Macmillan and Forrest are the absolute edge in rottenness – as pilots.'

2/Lt Harry Forrest of No 45 Sqn, April-May 1917.
(Andrew Thomas)

After a week or so, he recommended that several of them should be sent back for further training and, on 11th, 2/Lts C H Harriman and H B Evans did go home. Read's judgement may have been a trifle hasty, however, as another of his candidates for repatriation, 2/Lt Norman Macmillan, was allowed to stay and he soon matured to become a successful fighter pilot and a Flight Commander. Macmillan remained in the aviation business after the war and went on to pursue a notable career as a test pilot, author and war correspondent.

But what of Forrest, another survivor of the CO's cull? He settled in, but not for long. The following passage is reproduced from the squadron's published history:[1]

'There was a remarkable incident on May 7th. On that day

2/Lt Forrest and Gnr Lambert were flying alone over the lines in A1075 when they were attracted towards a British AA barrage directed at a pair of German aircraft. Being unable to gain the last few feet of altitude necessary to bring his front gun to bear, Forrest passed about 200 feet beneath the intruders to permit his gunner to fire upwards. Not unreasonably, he had anticipated that the AA battery would hold its fire when the friendly aircraft appeared on the scene. But it did not. The Sopwith was hit by two shells. Fortunately, they were not impact-fused so neither exploded but the first damaged the aircraft's tailplane and the second passed right through the rear fuselage, severing all the control lines to the tail surfaces and leaving the pilot with only the ailerons with which to attempt to control the aircraft. The stricken aeroplane dived, accelerated than pulled up into a spontaneous loop (the first that either man had ever experienced) followed by another. In the course of the second of these involuntary gyrations, four spare ammunition drums for Lambert's Lewis gun slid into the rear fuselage and became lodged there. This redistribution of weight went some way towards balancing the aeroplane and thenceforth it confined itself to a succession of self-induced climbs, stalls and dives. It had already lost about 2,000 feet during the loops, and it fell another 7,000 feet in the series of zooms and stalls. With no means of influencing longitudinal stability the crew could only keep the wings level, cling on to something and wait. In the event the aeroplane hit the ground towards the end of one of its dive recoveries; its wheels tangled with a fence, and it flipped over onto its back. The crew survived and were physically unharmed, but they were deeply shocked by their nightmarish experience. Frederick Lambert was transferred to ground duties within the squadron, as an armourer, and Harry Forrest was repatriated for a lengthy period of recuperation. As it happened, the few rounds which Lambert had managed to get off had done their work and one of the HA was seen to fall OOC, although its eventual fate could not be confirmed.'

Forrest was struck off the squadron's strength on 10 May.

[1] *The Flying Camels* by Wg Cdr C G Jefford (Privately published, 1995).

BOOK REVIEWS

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

Groundcrew Boys by David Gledhill and Simon Jakubowski. Grub Street; 2021. £25.00.

This title in Grub Street's seemingly never-ending (and why should it?) 'Boys' series is a little unusual as it isn't about aircrew. This one, a 223-page hardback with about 150 photographs, 60 of them in a colour insert, provides nineteen essays by engineering personnel covering most technical trades – riggers, plumbers, sooties, leckies *et al*. One is by an AAC soldier and one a FAA engineering officer, but the rest are from RAF personnel, all but one of them non-commissioned. Their offerings range from specific incidents, often amusing, occasionally outrageous, to more general career overviews. The timeframe is broadly the last 50 years, so Cold War and later. Most stories relate to fast jets, Lightnings, Phantoms, Tornados and the like, leavened by the occasional V-bomber, Shackleton and Nimrod-based tale.

One particularly informative episode concerns significant (aka expensive) damage inflicted on a Tornado undergoing a maintenance procedure which resulted in a Board of Inquiry (since then, the reader is advised on page 95, replaced by Service Investigation)[1] as seen from the point of view of one of the airmen involved. Another tells of three incidents involving towing things behind a tractor. One involved disturbing Binbrook's RHAG, which resulted in several Lightnings being diverted. Another inflicted physical damage on a Lightning – and the tractor – while a third bent the pitot probe of a visiting *Luftwaffe* F-4. The driver was the same in all three incidents, but he lived to tell all three tales; in fact, after the second incident, he was elevated to fill the post of the squadron's towing examiner – who better? There are one or two insights into the downside of military life, not least the 2010 announcement that HMS *Ark Royal* was to be decommissioned and the

[1] Strictly speaking, that should be 'Service Inquiry', not 'Investigation'. JSP328, *Guide To Service Inquiries* says, 'From 1 Oct 08 a service inquiry must be convened in accordance with the provisions of The Armed Forces (Service Inquiries) Regulations 2008.' This edict superseded the previous power to convene BOIs or unit/regimental inquiries under the respective single Service Acts. Not a lot of people know that. **Ed**

Above, Swift F4, WK275 spent more than 40 years in the open air near Leominster before she was acquired by Chris Wilson's Jet Art Aviation. (eLaReF) *Below, immaculately restored, since 2017 she has been on display at Doncaster Sheffield Airport (aka Finningley) alongside Vulcan XH558.* (Graham Miller)

jointly-manned Harrier force disbanded, all of which came as something of a surprise, a shock even. It is easy, of course, to say, 'If you can't take a joke . . .' but the reality is that such decisions have significant domestic implications for many of those involved.

Although Chris Wilson spent only eight years in the RAF, his two contributions have to be the most impressive. His first account covers his immediately post-training two years with the Red Arrows – lots of travel, much of it in the back seat of a Hawk. His last four years were spent working on the Tornado F3s of No 11 Sqn, which took him to

Alaska, Florida, Oman and Saudi Arabia. After leaving the Service, he capitalised on the skills that he had acquired to establish what eventually became Jet Art Aviation which, with a small team of ex-RAF colleagues, today refurbishes retired aeroplanes, including Harriers, Tornados and Jaguars and sells them on to collectors and museums.

While reflecting the ups and downs of Service life, the over-riding tone in this book is upbeat, and the stories convey a sense of professional competence and pride. I suspect that we may see a Vol 2. **CGJ**

Dowding's Despatch: the 1941 Battle of Britain narrative examined and explained by Andy Saunders. Grub Street; 2021. £25

Like buses, you wait ages for an analysis of the despatch written by Sir Hugh Dowding on the events of the Battle of Britain, and then two arrive – if not quite at the same time – in a relatively short time. The *Air Power Review* published an article by Seb Cox – well-known to members of this society – in 2015, which identified and commented on important areas of the despatch.[2] It might be described as an ex-tended summary of the despatch, while this new book by Andy Saunders reprints the despatch paragraph by paragraph, interspersed with comments and analysis which both explain some of Dowding's text and broadens and expand its coverage. Occasionally it has been necessary to explain that some of the original text (for example, Dowding's statement on the claims made by the RAF and *Luftwaffe*) was based on information which has subsequently been found to be erroneous.

A prologue and a rather brief biography of Dowding set the scene for the despatch. Saunders discusses issues such as the rather arbitrary dates used for the Battle, which became part of the criteria for the Battle of Britain clasp, and the identification of the units whose aircrew could receive the clasp. He points out that one of these units (No 59 sqn) was deleted when the list was revised in 1960, which resulted in some aircrew having their entitlement to the clasp revoked. Other aspects which receive expanded comment include Operations Rooms, the Observer Corps and the question of pilots (on both sides) being attacked after baling out.

[2] Available via https://www.raf.mod.uk/what-we-do/centre-for-air-and-space-power-studies/documents1/air-power-review-vol-18-no-2-battle-of-britain-75th-anniversary-special-edition/

In terms of print quality, the book is well produced, although I found it difficult at times to tell where Dowding's text stops and Saunders interjects start – the font used for the latter is slightly different from, but similar to, that reproduced from the original despatch; the key is that Dowding's paragraphs are numbered. Photographs include a number that were new to me, several 'old friends' and one from the 1969 film, although that is acknowledged and used in context. Most are reproduced as clearly as is possible without using glossy paper. My archival training would have preferred the sources of the photos to be acknowledged, but most readers are unlikely to be troubled by that.

Slightly puzzling is the way in which the Appendices to the despatch are not reproduced in the same order: Appendices C, CC and CD are followed by Appendix F, then a new Appendix I, reproducing a draft Foreword for the despatch. Appendix II reproduces Appendix A, III and IV are the original CA and CB (there was no Appendix B in the original) and Appendices V and VI are the original D and E. Two new appendices give a brief chronology of air fighting in the period, and set out the Government Departments and appointments referred to in the text.

Andy Saunders has woven a great deal of information into the framework of Dowding's despatch, giving it more context and creating a very readable document that makes the original text (originally published in the *London Gazette* in 1946) widely available. To continue the analogy I started with, which bus would I get on: Cox or Saunders? I think I'd travel on both, in either order – and by the time you read this, I will have received my bus pass!

Peter Elliott

Jet Man by Duncan Campbell-Smith. Head of Zeus; 2020. £17.99 (also available as a softback).

Sir Frank Whittle will need no introduction to members of this Society, nor perhaps to the wider public – he was the only RAF officer in the BBC's 'Top 100 Britons' poll in 2002. However, he has not been well served by biographers, and so this new biography is welcome. This is a biography of the man – for a broader history of the development of the jet engine up to 1945, including an assessment of the importance of the inventor v industry in bringing it into service,

Hermione Giffard's book is a very good source.[3] But is this biography an advance on previous ones? In short, yes, although this conclusion is not without reservations.

The author has clearly done extensive research in various sources, including Whittle's own papers, and recounts the story well. Whittle is presented in a balanced light; he is not just, as the popular view has it, the ignored inventor who, had he been listened to, could have prevented World War II by giving the RAF jet fighters before 1940. Campbell-Smith does not shy away from describing his flaws, identifying the key one early on with reference to Whittle's time as an Apprentice Boy at Cranwell: 'Apprentice Boy Whittle would insist on being his own team leader for each of the projects and was quick to dismiss interference by his less gifted peers' (p22). This is an enduring theme; Campbell-Smith acknowledges that for Whittle, it was his way or no way, although he recognises that such a stance may ultimately have been counter-productive to Whittle's sole aim, that of getting a jet fighter into service. This undoubtedly contributed to the stress Whittle felt, and must have contributed to his various spells in hospital. (The author also does not shy away from mentioning Whittle's Benzedrine addiction in this context, which Whittle himself alluded to in his autobiography of this period.) Whittle's way was also not the only possible way to build jet engines. His complex reverse-flow design was to keep the shaft of the engine as short as possible to avoid 'whirling', but both Halford and Lombard were able to design engines with longer shafts that allowed for straight through airflow, which made the engines simpler, for example.

However, one is left with the feeling that Campbell-Smith sees Major George Bulman, the Air Ministry (and then Ministry of Aircraft Production [MAP]) Director of Engine Development, as the villain of the piece. He writes that, 'Bulman resented having to cope with an obsessive individual whose pursuit of an uncompromisingly novel technology plainly struck him as slightly crazed' (p233). While the author acknowledges the other stresses that the Air Ministry and MAP were under during the rearmament of the RAF and then once the war

[3] Giffard, Hermione; *Making Jet Engines in World War II: Britain, Germany, and the United States* (University of Chicago Press; 2016). Members may recall that this Society contributed towards Ms Giffard's project – see *Journal No 53*. **Ed**

began, one is left with a sense that Campbell-Smith still in his heart of hearts feels that an opportunity was missed in not giving Whittle more support. With hindsight this is true, but it is important to acknowledge that Whittle was a relatively junior RAF officer with no engineering qualifications until he did the Engineering Course at Henlow in 1932-33 followed by 3 years at Cambridge. To expect the Air Ministry to ignore the advice of the Royal Aircraft Establishment and spend significant time and money on his ideas was asking too much of an organisation undergoing significant change once rearmament began; perhaps Campbell-Smith does not make enough of the organisational inertia that would have had to be overcome to make that leap of faith and support Whittle earlier, and the risks that such a choice would have created. It also needs to be considered that the alloys needed for the engine were unavailable until later in the 1930s, although as Whittle himself recognised, this was a chicken and egg situation – without the turbine engine, manufacturers did not need to create these alloys, but without the alloys, there could be no practical engine.

What does emerge is a portrait of Whittle as a driven man and a 'fiercely determined perfectionist' (p418) whose thinking and ability to translate this into reality was far ahead of his peers both in the RAF and industry. His perfectionist approach, and knowing that he was right, meant he was not a savvy Whitehall warrior, an environment 'for which he had not the slightest aptitude' (p195). Sadly this led to unnecessary conflicts with the establishment, and one is forced to agree with the author that this was to the ultimate detriment of his goal of getting a jet fighter into squadron service as early as possible.

What are this reviewer's caveats? At times the author's journalistic background comes through, with speculations about why people did what they did, or how they felt, which, while they make for a very readable book, does at times jar. There are, for example, numerous references to Whittle's socialist beliefs and how these perhaps coloured his views of the firms he was forced to work with, with little evidence provided to support these. It is also frustrating that Campbell-Smith does not discuss why Whittle was so naïve as to believe that he would be allowed to dictate to companies such as Rolls-Royce and Rover. Presumably this was because Whittle assumed MAP and the Air Ministry would force these major concerns to do his bidding because, in his view, it was the fastest way to get the jet into squadron service;

but it is not clear why such an intelligent man as Whittle would not have recognised how unlikely it was that this would happen. Campbell-Smith is also perhaps less familiar, or certainly less precise, with some of the Service details, describing Freeman as coming back to the Air Ministry in November 1940 to be Portal's 'Deputy Chief of the Staff' whereas in fact he came back to be the Vice Chief of the Air Staff, for example.

However, none of the above prevents me from recommending this 445-page (plus notes) book as a worthwhile and readable addition to one's library, and one that sheds new light on an engineering genius who was always proud of being an RAF officer, and full of praise for the opportunities the RAF gave him.

Mark Russell

Buccaneer Boys 2 by Air Cdre Graham Pitchfork. Grub Street; 2021. £25.00.

I must confess that I was not a great fan of the early 'Aircraft Boys' genre of books, which were in many cases just a series of drinking and flying ego trips. However, this one is not in that mould.

After an introduction by Sir Peter Norris, there are 24 individual chapters by authors whose Buccaneer backgrounds range from the Fleet Air Arm to the Royal Air Force via the South African Air Force. As well as from pilots, and observers or navigators, there are two accounts from engineering officers, and one from an aircraft technician. This gives the book a great spread, from the early days of the Mk 1 Buccaneer through Fleet Air Arm operations (from both light and dark blue aircrew), RAF maritime and overland operations, plus some 237 OCU stories, various RED FLAGs and other exercises, and Operation GRANBY.

I would pick out three as particular examples. First, Dries Marais' account of the Battle of Cassinga, against SWAPO forces in My 1978, is a fascinating tale of the thin divide between extreme professionalism and sheer foolhardiness. The late David Herriot's much told tale of early detachments to Decimomannu at least puts the infamous 'golf cart in the swimming pool at Fortes Village' story into its proper context, and onto the record. Finally, Nick Berryman's chapter on the trials and tribulations (pun intended) of bringing the Laser-guided Paveway bomb, and its Pavespike designator pod, into operational service is a

genuine historical record.

Now, whilst there may be the odd 'embellishment' to certain stories, what comes through is a general sense of reflection and, in particular, the camaraderie of the Buccaneer squadrons. The social elements have their place, but so do the friendships that have endured over the years.

Lastly, it is a good quality book: well-presented and on good quality paper; and very well illustrated, with an excellent selection of colour photographs in the middle, many of which have not been published previously.

Gp Capt Christopher Finn

From Lightnings to MiGs by Squadron Leader Russ Peart AFC WKhM. Pen and Sword, 2021. £25.00.

I met the author while sharing a flying refresher course at Manby in 1971 and wondered why a young flying officer who had just returned from the Far East as a Lightning pilot should need a refresher on the Jet Provost? All becomes clear in the early chapters of this entertaining autobiography because his next tour took him to Arabia to be a 'loan' pilot with the Sultan of Oman's Air Force in the, then secret, Dhofar War flying the Strikemaster.

His early life, upbringing and ambitions leading to his commission as a direct entry officer is typical of the pattern of the late 1960s but what followed led to a unique and successful service career followed by an assortment of military and airline flying. Training on the Jet Provost and Gnat, was followed by almost a year holding with some Chipmunk flying, before following the pattern of Hunter tactical training and the Lightning OCU at Coltishall. His first tour was at Tengah with No 74 Sqn where he describes routine deployments, exercises and activities from the northern Malayan peninsula to South Australia – together with the customary fire warnings, accidents and ejections. His tour ended with his participation in Exercise Panther Trail, the deployment of the Tigers' Mark 6 Lightnings from Singapore to Cyprus to re-equip No 56 Sqn. The leg from Gan to Akrotiri was an eight hour sortie which confirmed further the viability of deploying fighters over long ranges, refuelled in flight.

Following advice from one of his RAF superiors in Singapore he applied for a posting on secondment to the Sultan of Oman's Air Force. This was approved and following his 'refresher' on the Jet Provost at

Manby he settled quickly into the Omani Strikemaster operational environment, a very different culture to that of the more disciplined Lightning. He outlines the history of the lengthy and savage conflict when Britain, covertly, provided military support for the Sultan from 1963 to 1976; his descriptions of operational flying in the Oman are riveting. His accounts of Strikemaster actions against communist dissidents, known as the Adoo, go into great detail, along the lines of a raw mission report, far beyond the customary and largely unremarkable stories from other autobiographies. Almost one third of this book describes his time on active service in the Dhofar War and the operational tactics and weapons delivery options both airborne and on the ground when deployed with Army units. Written in an informative and entertaining style, his adventures flying the Strikemaster, Beaver, Caribou and Skyvan in the less regulated atmosphere of the desert make enjoyable reading, as is his less welcome account of battle damage and personal injury from a mortar attack on the airfield which kept him out of the cockpit for a month.

On his return to Britain in 1974, he was well qualified to become one of the first RAF Jaguar pilots and his time as a tactics instructor on the OCU included achieving a little known world record, flying from Edinburgh to London. This was followed by a tour on No 6 Sqn and promotion to squadron leader, which prepared him for his attendance at the Empire Test Pilots' School in 1980, a course which he acknowledged as demanding but rewarding. The chapters describing the course and his subsequent tour on A Squadron, where he became the senior pilot, are fascinating with detailed accounts of trials of all the RAF fast jets from unusual air-refuelling to multiple weapons carriage and release, including carrying, but retaining for a gentle landing, twelve 1,000 lb bombs on a Tornado. An additional responsibility was flight testing and displaying the Argentine Pucara which had been captured and recovered from the Falklands.

Having elected to retire at his optional date, with the aim of pursuing a career in civil aviation, he was retained by A Squadron until his 38th birthday and abruptly detached to the Bangladesh Air Force for eight months to create a qualified weapons instructor course flying the MiG-19 and MiG-21. This was a surprising addition to his aircraft types, which exposed him to the challenge of interpreting a new language and cockpit labelling, which was not without incident but, accompanied by

his young family, his stay was adventurous both in the air and on the ground.

Having retired from the RAF, another tour in Oman followed, this time as a contract Jaguar pilot. Many of the pilots were contemporaries from his time at Lossiemouth, but major changes to the environment and infrastructure had modernised the country in the intervening years since his Strikemaster days. The political scene had stabilised, and the external threat reduced but with his wide experience and qualifications the tour was satisfying, although not quite as challenging as his exploits twelve years earlier.

Finally, his intention to join the airlines was realised and after a brief tour with Royal Brunei, flying the Boeing 737 and 757, he joined Cathay Pacific in 1989 and settled his family in Hong Kong for the next 13 years flying various wide-body airliners, sailing competitively and racing Formula 2000 cars, an Asian equivalent to Formula Ford. He retired to Cyprus for some years before settling with his family in the south of England.

From Lightnings to MiGs is a very readable account of a unique flying career, profusely illustrated with original photographs and, although not all are of good quality, they serve to illustrate many of the events described in this excellent book. Editing errors, factual inaccuracies and typos are few, such as my doubt that No 74 Sqn re-equipped with the Meteor F4 in August 1944 and Cold Lake in Canada being described as Cold Bay. The illustrations include several photographs in black and white, but which are repeated in colour elsewhere in the book, with broadly similar captions. These are minor observations of Russ Peart's autobiography which is both absorbing and highly entertaining. With comprehensive annexes, it is one of the most informative of several similar autobiographies from Pen and Sword, so I have no hesitation in recommending *From Lightnings to MiGs* as an engrossing and enjoyable read for anyone with an interest in military aviation.

Gp Capt Jock Heron

Undaunted by Ben Kite. Helion; 2021. £29.96.

In Journal 75 this reviewer enthused about *Through Adversity*, Vol I of this two-volume work that covers *Britain and the Commonwealth's War in the Air 1939-45*. In statistical terms, Vol II is even heftier than

its predecessor, running to 550 gloss-coated pages with more than 190 photographs, 16 excellent maps in colour, others in B&W and twenty annexes, many of the latter reproducing tables and data from HMSO publications. The vast majority of the pictures have been drawn from the AHB collection and, while many have been published before, they are of uniformly high quality and have been carefully selected to illustrate the narrative.

To summarise the content, I must, inevitably, recycle much of my description of Vol I. Over the last three-quarters of a century the direction and conduct of WW II have been exhaustively recorded and analysed so, rather than re-examining primary sources (although there are some references to documents at Kew), the author has based his account on the official histories published by HMSO, AHB's narratives and monographs, and an extensive bibliography including several of this Society's 'Bracknell-series' publications. All of which implies that there is little, if anything, 'new' here. But that is not the point. The author did not set out to rewrite WW II – this is no polemic. It is a concise, yet thorough, overview of the air campaigns of WW II.

Vol I covered three aspects of air warfare – air superiority, the bomber offensive and the air war at sea. Vol II addresses aspects such as: air intelligence, including photo reconnaissance and special duties operations; the provision of air support to the land campaigns in North Africa, Italy, NW Europe, Burma and the RAAF's contribution to the campaign in the SW Pacific, embracing, in addition to the mainstream offensive and defensive air operations, the less obvious, but equally significant, contributions made by, for instance, the AOP Austers and the RAF Regiment; the evolution of airborne forces and their employment on D-Day, at Arnhem and crossing the Rhine, and the vital contribution of air transport to the campaign in Burma. In each case, the narrative describes how tactics and equipment evolved, and how operations were carried out, with representative examples. The author rounds off his description of the aircrew experience with chapters devoted to McIndoe's 'Guinea Pigs', and what it took to become a member of the Goldfish Club, the Caterpillar Club and the Late Arrivals Club and, finally, an account of the PoW experience in the hands of both the Germans and the Japanese.

While the core content of this book is accurate and uncontentious – and very well-written in easy flowing prose – its USP is its frequent

inclusion of first-hand accounts, drawn from the many autobiographies among the 345 titles in the bibliography. As with the photographs, these extracts have been very well-chosen and their, sometimes graphic, descriptions of specific incidents add flesh to the bare bones of the history, and it is these that make the book so eminently readable, and indeed valuable.

Errors? Just to prove that I did read the whole book, I found a couple of typos, eg Dunsford for Dunsfold on p156, a 'was' that should have been a 'were' on p396, a reference on p417 to Map 15 should have been Map 16, and the theatre commanded by MacArthur was to the west, not east, of Nimitz' Pacific Ocean Area (p227). But these are clearly mere slips of the pen and there are remarkably few of them in 550 pages.

Kite's final chapter is a masterly nine-page summary of the conduct of the entire air war, which includes some justified gentle criticism where appropriate, but again, this is no polemic, so the author's reasoned conclusions are simply offered, rather than being driven home. In the book's final paragraph he writes: 'This book's original aim was to explain some of the tactics and techniques employed by the British in the war in the air, as well as highlight the challenges experienced by those who had to carry out such operations.' He achieved his aim – in spades.

Strongly recommended. If you feel that you deserve a late Xmas present, you cannot do better than this book and its Vol I companion. They are remarkable value for money even at the publisher's price but, if you shop around, you can find these books for £20 apiece, inc p&p.
CGJ

Behold The Dark Gray Man – *Triumphs and Trauma; the Controversial Life of Sholto Douglas* by Dr Katharine Campbell. Biteback Publishing; 2021. £20.00.

Extremely favourable reviews have already been written about Katharine Campbell's book, part biography part auto-biography, of her father's life in which she inter-weaves his achievements in two World Wars, becoming a high-ranking RAF officer with what might be called the exigencies of the Service that his high-flying career had exposed him to. So writes the current Chief of the Air Staff:

> 'A fascinating and humbling account lovingly written by his daughter, of the life of Marshal of the Royal Air Force Sholto

Douglas, a truly inspiring and compassionate man.'

For the layman, now usually familiar with the condition known as post-traumatic stress disorder – PTSD – it will come as no surprise to find that Douglas's fast-moving life as a fighter pilot serving in the RFC during WW I left him with a considerable burden of stress, and that this burden would only increase as he worked his way up the RAF to the most senior levels of military command during WW II. By the time he had completed his time as Military Governor of the British Zone in Germany he had probably had more than enough. He went on to become the Chairman of BEA, turning that organisation round during the fifteen years he was in post.

As a young girl, the author got to know her father towards the end of his long and distinguished life and when his mental health began to break down as he approached old age. Now, some 52 years after his death and with eight years of research and writing, the neuroscientist Katharine Campbell has searched out world leading experts on PTSD as she homes in on this illness that affected her father and lays out in brave detail what he, as well as his family, experienced as a result.

Sholto Douglas rose to great heights, His memorials reflect his accomplishments. His military career is already well documented. But there is one more book about him that is well worth an investment, and this book is it. Full of vivid account, impressive for its eye for detail and ability to put in the mind of the reader so much of the rich history of the formative years of the RAF. Katharine Campbell provides much to reflect on, not least through creating a better understanding of the mental and physical wellbeing that stress and strain can place on those who serve and reach high office.

Highly recommended.

Cdre Toby Elliott[4]

Air Power and the Evacuation of Dunkirk: The RAF and Luftwaffe during Operation Dynamo, 26 May – 4 June 1940 by Harry Raffal. Bloomsbury; 2021. £85.00

This book covers a mere 10 days in May and June 1940, but how important they proved to be. Dunkirk and Operation DYNAMO soon

[4] Probably the only submariner who is a fully paid up member of the RAFHS, Cdre Elliott spent 1998-2009 as CEO of Combat Stress, the charity that assists veterans suffering from a variety of mental health conditions; including PTSD.

acquired almost mythical status in British history as an armada of small boats plucked the defeated remnants of the British Expeditionary Force (BEF) from the beaches to fight again. The propaganda value of the evacuation was seized upon immediately by the beleaguered British. Films highlighted the heroism; the press concentrated on courage. Despite the BEF's catastrophic military defeat, the rescue of 338,000 personnel from Dunkirk was transformed into a 'miracle of deliverance'.

Harry Raffal, known to many readers as Historian at the RAF Museum, examines sources from Britain, Germany and beyond to analyse air operations during the evacuation, building on his PhD thesis. He cuts through the myths and challenges the assumptions. It is a forensic tale of the tape for both protagonists. While RAF material is abundant, in assessing the German perspective Raffal has secured, from various far-flung locations, as many relevant *Luftwaffe* documents as survived the war.

DYNAMO has generated a wide-ranging historiography. Significantly, with the Navy co-ordinating the evacuation and the Army being rescued, the RAF's role is often marginalised, echoing the BEF's frequent lament, 'Where was the RAF?' Most helpfully, at the outset of this study, there is a concise, informative review of existing literature and its shortcomings and gaps, with fully 10 pages of detailed notes. The *Luftwaffe* sought air superiority so that its bombers could prevent further evacuation. The RAF sought air superiority to continue evacuation.

Central to the book is Raffal's contention that both sides suffered an aerial defeat at Dunkirk, dismissing the claims by Churchill and post-war histories that the RAF recorded a notable victory. He attributes good fortune, the Royal Navy's endurance and *Luftwaffe* errors to DYNAMO's success, beyond the 48-hour operation initially envisaged. Indeed, with better weather and the ability to operate effectively at night against Dunkirk, he argues the *Luftwaffe*, not German artillery, could have stopped the evacuation. It was particularly potent when dive bombers attacked unprotected ships, low on anti-aircraft ammunition and without fighter cover. It did halt daylight evacuation temporarily on 29 May and permanently from 1 June. Moreover, Raffal is at pains to stress the concurrent demands on the *Luftwaffe* to the south as the Germans prioritised Paris and the complete defeat of French forces.

ACM Sir Hugh Dowding had been ordered to provide and maintain 'continuous fighter patrols in strength' over the British enclave. The major effort was shouldered by no more than 200 Fighter Command aircraft from 16 squadrons of AVM Keith Park's No 11 Group. In all, the RAF flew more than 3,500 fighter, bomber and reconnaissance sorties, but this was simply not enough to provide a permanent 'air umbrella'. Nevertheless, the evacuation was far more successful, if of longer duration, than envisaged. The AOCinC was concerned at the long term impact that losses of aircraft and, more importantly pilots, over France would have on his ability to maintain air superiority over Britain when the likely, and decisive, battle eventually materialised. As a result, he restricted his squadrons to the provision of air cover over Dunkirk. More fighters could have been sent. Intelligence did not forecast German attacks on the England's channel ports.

Indeed, Raffal's charge sheet on the RAF's shortcomings at Dunkirk is long. Fighter Command's tactics were out of date, while the RAF was poorly led by officers who were too inexperienced or too old. Other weaknesses included a lack of self-sealing fuel tanks, and a low standard of gunnery. Raffal dismisses claims by the RAF hierarchy that they fought the air battle at Dunkirk at a disadvantage. To achieve success the *Luftwaffe* faced a bigger task. The RAF faced providing patrols above the evacuation fleet and bombing sorties supporting Allied ground forces. The *Luftwaffe* was tasked with halting the evacuation and destroying resistance in Dunkirk pocket.

Other corrosive issues also emerged for the RAF which were a foretaste of future controversies. The utility of larger Wing Patrols was a key aspect of Dunkirk. However, they posed all kinds of problems. Most notably, larger patrols meant fewer patrols, leaving the evacuation with less protection. Moreover, even with three squadrons, aircraft got in each other's way, with problems of deployment, leadership issues, tactical failings and limitations with radio communications.

Raffal highlights the efforts of Coastal Command and the Fleet Air Arm fighters in covering the evacuation sea route, operating against German E-Boats and U-Boats, as well as *Luftwaffe* raiders. Coastal Command also bombed E-Boats in Rotterdam harbour and mounted bomber operations supporting Allied forces on the Dunkirk perimeter. However, Bomber Command resented mounting tactical attacks to delay the Germans and was critical of their effectiveness. It preferred

to mount strategic attacks, another foretaste of future friction, but their impact was negligible. Some attacks on Dunkirk's perimeter displayed successful close co-operation but the strategic effort was largely wasteful when greater tactical effort could have made a real contribution. Overall, Raffal states Bomber Command's impact was largely negligible and local, although he observes that with DYNAMO every little delay to the Germans assisted the evacuation.

Quibbles are few. Surprisingly, in the abbreviation AHB is shown as the 'British Air Historical Branch' rather than Air Historical Branch (RAF). The organisation of the book involves occasions when stories are repeated, but this is necessary and not intrusive within the narrative. Typos are rare. But, while it contains valuable figures, tables and appendices, a 336-page book could probably do with a few pictures. The biggest concern is the price – originally a hefty £85, at the time of writing this had been reduced to a little over £60, but that is still a lot.

Nevertheless, these are minor detractions in the wider picture. This seminal study shows the extent of Raffal's impressive research prowess. It most certainly cements his position as an air power historian.

Alastair Noble

Atlantic Linchpin by Guy Warner. Seaforth; 2021. £25.00.

Sub-titled *The Azores in Two World Wars* this 160-page hardback qualifies for a review in this Journal on two grounds. First, the RAF maintained a substantial presence there 1943-46, and secondly, the author is a long-term member of, and contributor to, this Society so a little nepotism is appropriate.

The strategic significance of the Portuguese-owned Azores was two-fold in that they represented a staging post between the Americas, Africa and Europe – which meant that it was essential that they should be in Allied hands – and they provided a base from which to counter the U-boat threat. Use of the facilities was diplomatically complicated, however, in both wars. In the first case because Portugal did not declare war on Germany until the spring of 1916 and, even then, little happened until a year later when Germany implemented a policy of unrestricted U-boat warfare. The sinking of American ships provoked the USA into joining the war in February 1917 and thereafter there was an increasing US Navy presence in the Azores. At the end of the year the US Marine Corps established an aviation component. Initially operating Curtiss

floatplanes and later HS-2L flying boats, by the spring of 1918, weather permitting, anti-submarine patrols were being mounted on a daily basis.

Between the wars, the Azores was used as a stepping stone by a number of pioneering long-distance flyers, not least Italo Balbo's spectacular 24-aircraft fleet of Savoia-Marchetti flying boats that staged through in 1933. The British had made no use of the Azores during WW I, and that remained the case until the late 1930s when Imperial Airways, began to make some tentative use of the facilities in the early days of transatlantic commercial aviation. They were not alone, of course, Lufthansa, Air France and, particularly, Pan Am were all testing the water at much the same time.

Throughout WW II, Portugal declined to join either side but, despite its being a fascist dictatorship, it tended to favour the Allies. Most significantly, it honoured the Anglo-Portuguese Treaty of 1373 (yes – 1373) which eventually led to the establishment of an RAF presence on the island of Terceira (but *only* Terceira) in October 1943. This was HQ 247 Gp, under AVM Geoffrey Bromet, and the first order of business was to construct a 5,000 ft × 150 ft PSP runway at Lagens.[5] This became the operating base for, initially, the Hudsons of No 233 Sqn, Fortresses of No 206 Sqn and the Fortresses, and later Liberators, of No 220 Sqn. These were later supplemented by Wellingtons of Nos 172 and 179 Sqns, No 280 Sqn with ASR Warwicks and No 269 Sqn which operated a variety of aeroplanes, including the Walrus, Martinet, Spitfire, Warwick and Hudson. Between them these units were credited with the sinking of at least six U-boats which served to close off the southern sector of the mid-Atlantic gap. As an aside, until 1944 there was only one possible diversion, the small airstrip at Santana on the island of São Miguel, but the diplomatic sensitivities were such that, in the early days at least, it was not unknown for Portuguese AAA to fire on an overflying RAF aircraft.

Meanwhile, with the USA having entered the war, an agreement was eventually negotiated with Lisbon in 1944 which permitted the Americans to build both an airfield of their own on the island of Santa Maria and to develop Lagens to provide it with a proper blacktop three-runway layout; one of them, at 10,567 ft, was the longest in the world at the time. By 1945, with the U-boat threat largely neutralised, the

[5] Lagens was restyled Lajes in 1953.

value of the Azores was as a staging post for the supply of aeroplanes from the USA to Africa, Europe and elsewhere, and to repatriate casualties. By June 1945 8,689 aircraft had staged through Lagens, among them 1,200 heavy bombers, and some 30,000 casualties had been flown the other way.

All of this is recounted in appropriate detail, and the text is amplified by a remarkable 200 photographs – more than one per page. Problems? I found one or two typos, eg the USS *Truxtun* misnamed as *Truxton* on p19, confusion between U-401 and U-402 on page 90 and fn9 and Bromet has his post-nominals re-ordered on p96, but that is hardly significant in 160 pages. While not totally dedicated to the RAF, about half of this book is concerned with the RAF's activities in a theatre that has received little previous coverage.

CGJ

ROYAL AIR FORCE HISTORICAL SOCIETY

The Royal Air Force has now been in existence for one hundred 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 gradually becoming available under the 20-year rule, *although in significantly, and disturbingly, reduced quantities since the 1970s*. 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 two 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 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 RAF officer or airman, a member of one of the other Services or an MOD civil servant. The British winners have been:

1996	Sqn Ldr P C Emmett PhD MSc BSc CEng MIEE
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2017	Wg Cdr D Smathers
2018	Dr Sebastian Ritchie
2019	Wg Cdr B J Hunt BSc MSc MPhil
2020	Gp Capt J Alexander BA MBA MA MSt MSc RAuxAF

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 a copy of the medal should be awarded periodically to a nominal holder (the original resides at the Royal Air Force Club, where it is on permanent display) who was to be an individual who had made a particularly significant contribution to the conduct of the Society's affairs. Holders to date have been:

Air Marshal Sir Frederick Sowrey KCB CBE AFC
Air Commodore H A Probert MBE MA
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Air Vice-Marshal N Baldwin CB CBE

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