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SELECTED ABBREVIATIONS

AAA	Anti-Aircraft Artillery, aka <i>Flak</i>
AFDS	Air Fighting Development Squadron
ASR	Air Sea Rescue
AWRE	Atomic Weapons Research Establishment
BCATP	British Commonwealth Air Training Plan
CPGB	Communist Party of Great Britain
GCI	Ground Controlled Interception
GRP	Glass Reinforced Plastic
JIC	Joint Intelligence Committee
MAP	Ministry of Aircraft Production
MCS	Marine Craft Section
NSDAP	<i>Nationalsozialistische Deutsche Arbeiterpartei</i> (ie <i>Nazi</i>)
ORB	Operations Record Book
QRA	Quick Reaction Alert
RNLI	Royal National Lifeboat Institution
RSL	Range Safety Launch
SASO	Senior Air Staff Officer
UAS	University Air Squadron

THE SECRET STATE: OLD AND NEW

Peter Hennessy FBA

**Attlee Professor of Contemporary British History
Queen Mary, University of London**

My theme for this evening is a poignant one as it links the Cold War ‘secret state,’ constructed, refined and maintained over the forty-or-so years from 1947 to the sudden ending of the great east-west confrontation and, albeit briefly, to present anxieties, drawing a comparison with that huge and unavoidably concealed enterprise and the much more open ‘protective state’ which the government has been building at great speed since the tragedy of 11 September 2001.

Why poignant? Because for those like us who spent the bulk of their lives in the shadow of the bomb, that the Cold War ended at all is probably the greatest shared boon of our lifetime. That it finished without global war and nuclear exchange verges on the miraculous. The twentieth century is piled high with the bodies of British dead – but not our half of it. Yet if World War III had come, the body counts within a few hours would have surpassed the great bloodlettings of World Wars I and II by a factor of 10. That we can recollect the Cold War in tranquillity and examine many of its most secret files, drills, plans and contingencies is quite wonderful for human as well as historical reasons. And yet – and here lies the poignancy – we meet at a time of great and, I fear, justified anxiety about the safety of our realm from those of hostile intent. More on that in a moment.

Let me first explain the thinking behind the exhibition at the National Archives in Kew which uses, among other things (including a WE177 bomb which greets visitors as they arrive) a scattering of the documents which you had waiting on your seats. The WE177, by the way, was kindly lent by the Atomic Weapons Research Establishment. When the National Archives team visited Aldermaston before Christmas 2003 to see what could be borrowed, one of our anxieties was that carting it to Kew might cause anxiety to the people of the London Borough of Richmond. ‘You might call it the Kew Missile Crisis’, came the droll reply from one of our friends at AWRE.

Enough of that. Five themes blend in the making of that exhibition and what I would like to talk about this evening:

Secrets and mysteries. Intelligence was at the heart of the Cold War. For myself and my students the Joint Intelligence Committee's assessments of the Soviet Union, its intentions and capabilities, provide the spinal cord of all our research.

The nuclear bias. The dilemma of whether to spend our money on active or passive defence was, from the Attlee Government on, always resolved in favour of the former, the nuclear deterrent especially. Civil defence and any kind of serious shelter policy was ever the loser.

Vetting, filing and smashing. By which I mean the countering of Soviet intelligence, assessing the degree to which the Communist Party of Great Britain was an 'enemy within' and refining Whitehall's methods for exposing or keeping out the crown servants of George VI and Elizabeth II who were prepared to moonlight for Stalin and his successors. Plus the plans to 'smash' (the JIC's word) the CPGB in the last days of peace and intern the very small proportion of its members who were deemed dangerous by M15.

Breakdown. The dreadful job of peering into the abyss of a post-nuclear attack Britain and assessing, as best one could, the point at which society would begin to breakdown with survivors so desperate they would simply refuse to take any notice of those who tried to order them about for the purposes of orderly survival let alone reconstruction even when the penalties at the disposal of the authorities might ultimately involve life or death.

Bunkerdom. The plans for a War Cabinet to retreat to a final redoubt in the Cotswolds under Box Hill between Bath and Corsham and for the country to be split into 12 mini-kingdoms presided over by a Cabinet minister as regional commissioner with military government in the most devastated areas.

Retaliation. The drills for getting the V-bombers airborne in time. The instructions on what to do if the Prime Minister and the two ministers designated as his alternative decision-takers were wiped out by a bolt-from-the-blue attack by Soviet missiles. The decision would have fallen to a man in uniform, the Chief of RAF Bomber Command, and we have his instructions on the wall in the exhibition.

There is one, extraordinary scrap of paper which we have on show at Kew (*and is reproduced here at Figure 1*) that pulls all of this together.¹ Let me explain its genesis.

It is the first rough draft (the finished article is still classified, deemed sensitive to this day – this scrap of paper was left in the file by mistake) of a summary prepared for the Queen in 1965 of the War Book drill which, if it had been implemented, would have meant the end of her kingdom. A new man taking over the retaliation desk in the Cabinet Office realised that in the thirteen years of her reign to that date, the Queen had not been briefed on the Government War Book. Amazing.

‘MACMORRIS’ and ‘FLUELLEN’ (it should be) are the codenames for the early stages of the transition-to-global-war when the communications networks were to be prepared. The Precautionary Stage was the one we were a few hours away from when Mr Khrushchev backed down at the height of the Cuban Missile Crisis in 1962.

‘TURNSTILE’ was the codename of the War Cabinet’s last redoubt beneath Box Hill. ‘VISITATION’ is almost certainly the codename for nuclear retaliation. This, for me, is one of the most significant, let alone the most chilling, of the miles of paper preserved in the National Archives.

May I turn now to another document (*Figure 2*) from the retaliation files which dates from 1961?² If you didn’t have it in your hand, and I told you about it citing my source as ‘private information,’ you would think I was making it up. After a review stimulated by the Chief of the Defence Staff, Lord Mountbatten (who thought the Prime Minister, Harold Macmillan, should, like the American President, have an officer with him at all times carrying the retaliation codes), a compromise was reached. Mr Macmillan wanted no fuss and no attending officer. The Treasury wanted to spend as little money as possible.

So, the last link in the chain, if a nuclear attack on the British Isles was both imminent and unexpected and the PM was out of town, you can see in the top right-hand corner. Macmillan’s Rolls Royce was

¹ NA, PRO, CAB 21/5655.

² NA, PRO, DEFE 25/49.

fitted with what was then a rarity – a car phone. It was linked to the AA network for contacting their legendary patrolmen-on-motorbikes. The warning to Macmillan and his response would be transmitted *en clair*, courtesy of the Automobile Association! Of all the nuclear weapons powers, only the British could have produced a solution like this.

If Sir Michael Quinlan were here, he would tell you that it wasn't quite the Ealing Comedy/Heath Robinson affair that I have depicted.

May I now link the old secret state with the current protective state by drawing your attention to a third document?³ This one was found not by me but by Dr Stephen Twigge of the National Archives.

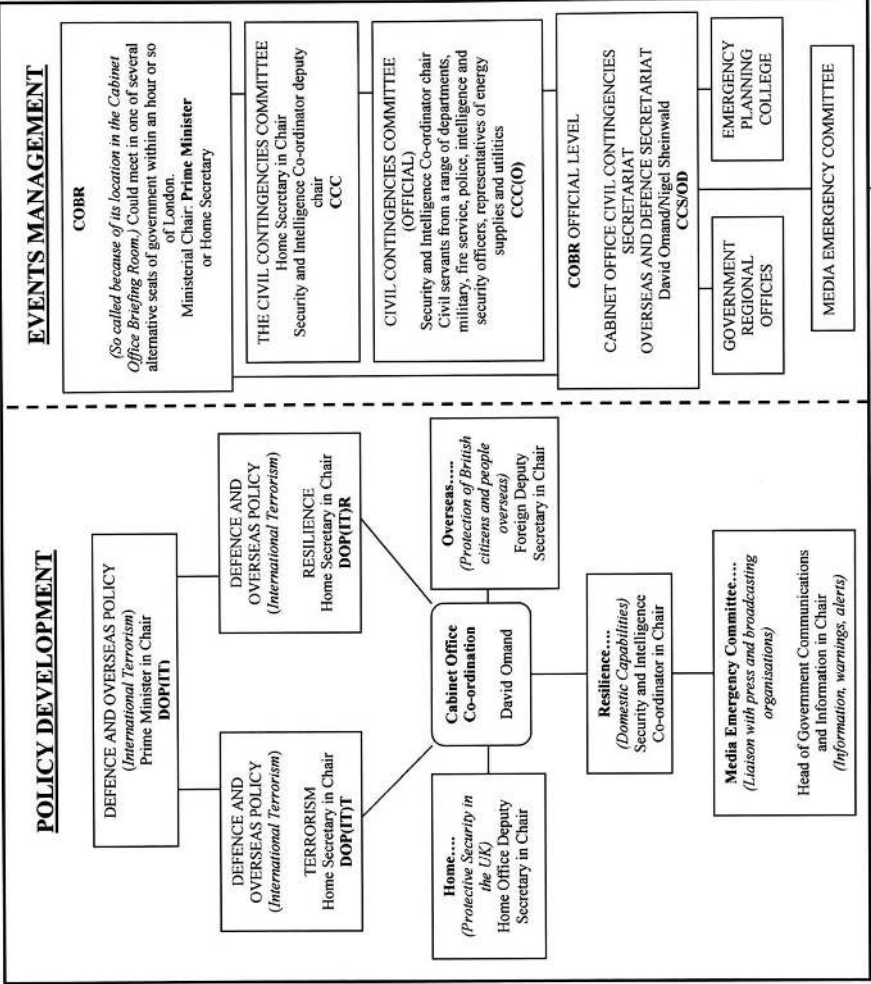
Quite deliberately, given the immense sensitivity of the topic it was considering for the Chiefs of Staff, the group that raised the document in November 1950 was given a boring and misleading cover-name – the Imports Research Committee. Its task was to consider what could be done if the, recently nuclear capable, Soviet Union were to launch a clandestine atomic attack on the UK using a freighter docking in a British port or by delivering the weapon in an unidentified civilian aircraft. This study was undertaken at a particularly perilous moment of the Cold War during the first months of the war in Korea.

Just listen to the chilling pre-echo of '9/11' tolling through the section on 'Detonation in a Civil Aircraft'

'...the use of a civil aircraft carrying an atomic bomb to be exploded at a low altitude we do not consider so likely as the use of a merchant ship; nevertheless it is possible and there does not seem to be any answer to it. The crew of the aircraft in order to detonate the bomb at the right time would have to know what their cargo was and would therefore be a suicide squad. Short of firing on every strange civil aircraft that appears over our shores we know of no way of preventing an aircraft that sets out on such a mission from succeeding.'

The continuities between 'secret state' and 'protective state' are fascinating if chilling. For example, one of the things the Cabinet Secretary, Sir Richard Wilson, did in the days after 9/11 was to examine and update the old continuity-of-the-state files from the Cold

³ NA, PRO, AVIA 65/2055.



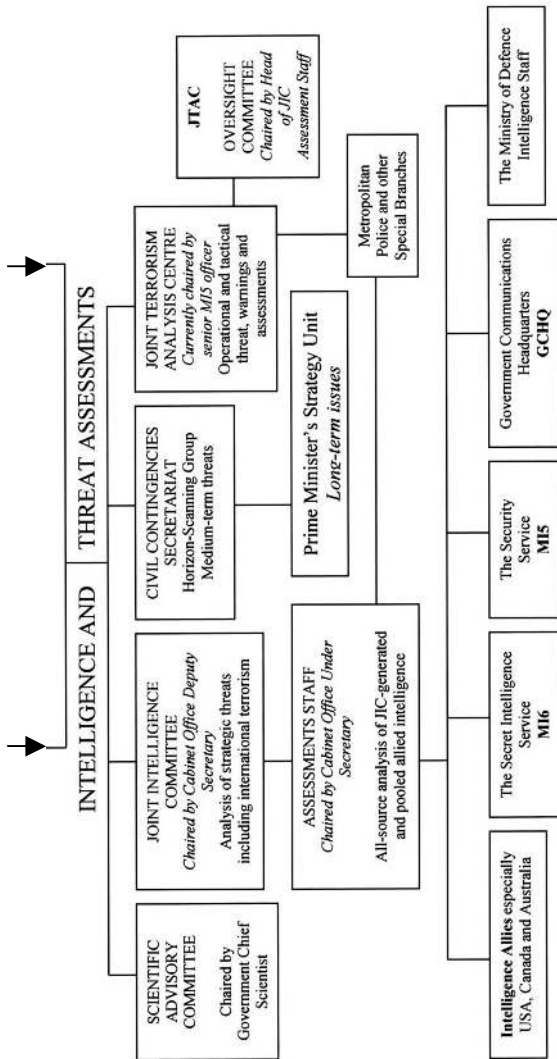


Fig 3. The Post-9/11 UK Protective State
Spring 2004
 Policy Development and Events Management
 Intelligence and Threat Assessments

War. Once more our Prime Minister has two alternative decision-takers among his ministerial colleagues lest, heaven forbid, our country is attacked by a bolt-from-the-blue. The worst contingency that is foreseeable comes nowhere near to the twelve million dead and four million seriously injured straightaway from a ten, 10-megaton H-bomb attack that the Strath Committee foresaw in its 1955 report on fall-out. But it is bad – bad enough to require the rejigging of the state which is reflected in a very interesting and revealing way by the Civil Contingencies Bill currently before Parliament.

What the draft bill does *not* contain is a sense of the overlapping enterprises which go into the making of the Government's five-to-ten-year counter-terrorism strategy – a strategy which, in its way, is Cold War-like, being one of what might be called containment plus rollback. There seem to be four threads to it:

Pursuit of existing terrorists globally with allies.

Protection of people and installations likely to be terrorist targets.

Preparation for dealing with an outrage and its aftermath.

Prevention over the long-term by attempting to diminish the factors which make and shape and motivate terrorists and terrorism.

So, in essence, it is a task that involves not just a rejigging of the British state, the growth of resilience, the shrinking of certain civil liberties, the creation of powers to make government very hands-back-on indeed if the worst happens – but also a possibly permanent and, unarguably long-term commitment of people, systems and public money to a hugely difficult enterprise. And, in contrast to the Cold War secret state planning, this mix of preparations is likely to be tested in the next few years. So it is a mixture of continuities and discontinuities.

Sir David Omand, the Cabinet Office's Co-ordinator of Security and Intelligence, and I updated our organogram of the new protective state in the spring of 2004. The result is at Figure 3.

Old hands like yourselves will recognise the similarities with Cold War days. The whole apparatus is intelligence-based. It has a planning mode and a 'for real' mode. Unlike the Cold War Secret State of

which you were a part, I have a dreadful feeling that our new Protective State *will* face a ‘for-real’ test.

May I finish on a thank-God-it-didn’t-happen note? Some of you, I know, were involved in the Cuban Missile Crisis. You can now see at the National Archives the directive that was operational in the early 1960s empowering ‘Bing’ Cross to despatch you to your targets had Macmillan and his ministers been wiped out by a bolt-from-the-blue. This extract spells out the doomsday drill:

1. The Prime Minister has agreed as a basis for future planning, certain powers for C-in-C Bomber Command to cover the following situations.
 - (i) A “bolt-from-the-blue” that is, a tactical warning, with no preceding period of strategic warning, that a nuclear attack is imminent.
 - (ii) A nuclear attack actually having been received (i.e. nuclear bombs having burst) in this country before any authority has been given to a nuclear force to retaliate.
2. These powers are as follows
 - (a) To order all his bombers airborne under positive control.
 - (b) To seek contact with the Prime Minister or his deputy in London or at BURLINGTON (the codename which preceded TURNSTILE), and if possible the United States authority responsible for launching United States strategic nuclear weapons from this country;
 - (c) In the last resort, when he has confirmed that a nuclear attack has actually landed on his country, to order on his own responsibility nuclear retaliation by all means at his disposal.

With slightly different wording, this was the essence of the directive Sir Tom Pike, Chief of the Air Staff, despatched to Sir ‘Bing’ Cross on 25 September 1962.⁴ Some documents speak for themselves and no commentary is necessary especially for an audience like mine this evening. It has been an honour and a pleasure to speak to you.

⁴ NA, PRO, DEFE 25/49.

DISCUSSION

Wg Cdr Jeff Jefford was curious about the date of the Directive to Air Mshl Cross, 25 September 1962, only a couple of weeks before the Cuba crisis. Might this have indicated that we actually knew something before the Americans did? **Prof Hennessy** was quite sure that it had been mere coincidence, the Directive, which was not the first, only the most recent update, had probably been issued in connection with an Exercise MICKEY FINN which was being run at about that time. He went on to say that a JIC delegation that happened to have been in Washington, was briefed on the crisis shortly before the US Ambassador produced the U-2 photographs in London, but that had not been until about 15 October.

AVM Peter Dodworth pointed out the contrast between the enormous investment in hardware and operational infrastructure and the Prime Minister's rather 'Mickey Mouse' control system. But, he argued, that may not have been of great consequence because the whole point of deterrence was to deter; if you actually had to use the system, it had already failed. The essential characteristic of a deterrent policy was that the opposition should perceive that it would work, which meant that the visible parts of the machine needed to be seen to



be highly effective; Moscow would surely have taken it for granted that it would have been backed by an equally efficient release procedure. It followed that, notwithstanding the fact that we might have had to rely on the AA, we had got our priorities right. In the wider

The deterrent shop window. The V-Force advertised its capabilities by conducting, very visible, loud and frequent practice scrambles. These are BLUE STEEL-armed Vulcans from Scampton.

context of deterrence, AVM Dodworth also recalled that there used to be a Staff College debate on whether there was actually any point in releasing your own nuclear weapons once the other side had done so.

Prof Hennessy was interested in the latter issue, since he poses much the same question to students who undertake his *Secret State* module. They play a declassified transition-to-war exercise, that was originally run in 1968 as an element of FALLEX, which involves the Cabinet giving the Prime Minister, and a small group of principals, the right to authorise the release of nuclear weapons. Having been given the classic the-Red-Army-has-rolled-across-the-entire-Central-Front-and-has-resorted-to-First-Release scenario, the students are asked whether they would retaliate. As a rule, one third say that they would; two thirds say, 'What would be the point?' and conclude that they would not.

With reference to the practicalities of authorising the release of nuclear weapons, **Prof Hennessy** acknowledged that the facilities were rather rickety, although two deputies did provide a measure of redundancy with, as last resort, the AOCinC Bomber Command also being able to act independently. Furthermore, the inadequacy of the system was actually masked by the security in which it was cloaked, although he noted that it had been fortunate that (so far as is known) Soviet Intelligence never gained access to the retaliatory drills, pointing out that, if they had done, one could imagine the howls of laughter in the Kremlin as someone explained what the AA actually was.

Pursuing the point about the differing views of students who would and would not 'do it', **AVM Nigel Baldwin** suggested that bomber crews dealt with the problem by 'compartmentalising' it. In effect, they reasoned that, if they did their job properly, 'it' would not happen so, if it was not going to happen, they could sleep soundly at night. He also noted that, throughout the time that he spent on the V-Force during the QRA-era, he could recall no atmosphere of introspection, nor even any conversations, which might have permitted a latter-day academic to conclude that there might have been some element of doubt; that some crews might not have 'gone'. **Prof Hennessy** concurred that, of the many V-bomber men he had met, he had yet to find one who admitted to having had any doubts, but he wondered how a Polaris submarine commander would have dealt with his

slightly different problem, in that he might well have been faced with launching into a void, knowing that the UK, and much else, had already been obliterated – so, again – what would be the point?

Cdre Toby Elliott, who had served in the Polaris Programme from 1967 right through to the beginning of the Trident era, commanding HMS *Resolution* and the Tenth Submarine Squadron en route, said that he had always wondered what he would read if he had ever had to open the envelope, particularly in the case of a retaliatory strike. That said, however, his faith in deterrence had been such that he had been confident that he was never likely to find out. **Prof Hennessy** agreed, because, on a change of premiership, the envelopes, which contained the Prime Minister's personal instructions, were always returned to the Cabinet Office where they were destroyed unopened. Having established that Cdre Elliott had been with the Polaris force in 1979, Prof Hennessy was able to tell him that his envelope would actually have said 'Do it', because Jim Callaghan had told him so ten years later – for a Radio 3 broadcast!

Reverting to the subject of the command and control system, **Prof Hennessy** observed that a recently declassified file dating from 1969 had contained an interesting account of a television link that had recently been installed to permit the Prime Minister to communicate with Northwood. It had been an attempt to dispense with the services of the AA man but the first time the system was used it was a shambles, which caused the Chiefs much concern, although it was sorted out later.

Prof Hennessy pointed out another oddity about the UK system in that the British were the only nuclear power whose command bunker was not even underground; it was collocated, with the Cabinet, in a semi-underground installation in the heart of their capital city. Hardly the safest place for it, as contemporary projections of the effects of a ground burst on Horse Guards Parade made only too clear.

AVM Baldwin pointed out that, apart from Macmillan, who went just once, the Prime Ministers of the 1960s never visited the V-Force, which must raise questions over their awareness of some of the practical implications of their nuclear responsibilities. **Prof Hennessy** agreed, adding that, twenty years later, he had had an opportunity to discuss some aspects of the responsibilities associated with nuclear control with Sir Alec Douglas-Home. Sir Alec had recalled that, like

Harold Macmillan, he had found that US Presidents were always willing to talk about it 'because we were the only people who understood what it was like' – which represented an interesting transatlantic bond. He had gone on to explore some of the odder inconsistencies within the release procedures, like the fact that, unlike a President, the Prime Minister was not constantly shadowed by a military officer carrying the necessary authentication codes, and the inadequacy of the communications available beyond the confines of Whitehall. The oddest thing, Prof Hennessy noted, was that Sir Alec did not seem to have registered these limitations, even though he had been personally responsible for the deterrent for a year – and with the memory of the Cuban missile crisis still very fresh.

Pointing out that, in reality, it may not have been essential for the Prime Minister to be permanently at no-notice, **Prof Hennessy** touched on the complex system of monitoring signs and indicators, culminating in Fylingdales, that would have permitted (or at least was intended to permit) Western intelligence agencies to provide warning of an impending problem. But he also recognised that forecasting such problems was practically impossible, suggesting, for instance, that if, in 1961, the Chiefs had been asked where the next crisis was likely to occur, they would surely have said Berlin – again – *not* Cuba! That said, he observed that the JIC had identified the potential for such a problem as early as 1957 when it had considered the possibility of an expansive USSR's deploying nuclear weapons on the soil of a client state, perhaps one of the newly emergent independent countries of the post-colonial era. In other words, the JIC had actually predicted a Cuba-type crisis five years before it occurred, although they had lost sight of the contingency again in the interim.

Prof Hennessy provided an even more spectacular illustration of a bizarre and totally unforeseen incident by asking who, as late as 1988, would have been prepared to stake his pension on the Soviet Union's having ceased to exist within two years? – and without a shot being fired in anger. He drove his point home by reminding the audience of the great aircraft carrier debate of the mid-1960s and asking what sort of reaction the Navy might have provoked if they had based their case for a new generation of carriers on an obligation, at some unspecified time during the ensuing twenty years, to project naval power into the far south of the Atlantic to defend the Falkland Islands? Similarly, he

conjectured that, in the late 1980s, no one would have been prepared to forecast that Article 5 of the NATO Treaty would actually be invoked and that, if it was, it would be to do with the southern end of the Balkans. Despite the imponderables, Prof Hennessy considered that the JIC probably did as good a job as it was possible to do, although it did suffer from a handicap in that it always assumed that a potential enemy would be rational, and cautious –General Galtieri had been neither.

Sir Freddie Sowrey drew attention to the many thousands of people who had been involved in the deterrent programme, some of whom had devoted virtually their entire careers to the business. Although we had eventually won the Cold War, he considered that there had been scant recognition of the efforts of those who had made it possible and he wondered whether that situation was ever likely to change. **Prof Hennessy** was of the opinion that it would, and that it was already beginning to happen. To support his contention he cited the facts that his most recent book, *The Secret State*, had sold faster and in greater numbers than any of his previous works and that an associated public event, hosted by the National Archives at Kew, had been sold out. Just as significantly, his course on the subject is fully subscribed, and with mature students, not youngsters. Despite their very varied social, economic and political backgrounds, he reported that they take the underlying questions very seriously and that there is no sign of the anti-military bias that was so prevalent in the CND-days of the 1960s. He went on to observe that, in examining the problem in depth, it is evident that some students can become quite moved when they peer into the abyss – and just occasionally it has provoked genuine nightmares. Prof Hennessy, confessed that, despite his familiarity with the material, he was not totally immune himself, recalling an occasion when a combination of listening to Brahms' German Requiem while poring over policy files dealing with Armageddon, having just finished reading Neville Shute's *On the Beach*, had been enough to make him put down his pen and go for a walk....

THE DAM BUSTERS RAID – SUCCESS OR SIDESHOW?

**by Wing Commander T M Webster MB BS MRCGP MRAeS
DAvMed DRCOG DFFP RAF**

Introduction

At 2128 hrs on the evening of 16 May 1943 the first aircraft of the newly-formed No 617 Sqn, AJ-E piloted by Flt Lt Barlow, lifted from the grass runway of RAF Scampton and set course for Germany. So started Operation CHASTISE, an attack that had been in planning on and off since October 1937¹ and that would come to be recognised as Bomber Command's most spectacular operation of World War II. By dawn the next day two major German dams had been breached, significant areas flooded, over 1,250 deaths caused and the industry of the Ruhr Valley disrupted. On the British side, eight aircraft and fifty-three aircrew had been lost.

The British would use post-raid reconnaissance pictures to show the world the damage caused to the dams, to the countryside below them and, by implication, to the industrial complex of the Ruhr Valley. The post-raid propaganda was not confined to Britain but was trumpeted around the Empire, in newspapers in the United States and in leaflets dropped into Occupied Europe.

The understandable wartime use of the raid for propaganda purposes may have led to overstatement of its success. The publication of Webster and Frankland's review of the air offensive against Germany brought a re-evaluation of the raid which, whilst acknowledging the precision of the attack, held that the physical outcome of the raid was neither 'of fundamental importance nor even seriously damaging'.²

This paper will use published sources to examine the context of, and build up to, the Dams Raid, to recount the raid itself, to assess the damage directly caused and the German response to it, to outline the lessons that were or could have been learned from the raid, and finally to place the raid in perspective.

The Background To The Raid

Contrary to popular belief, the origins of the Dams Raid did not lie

¹ Sweetman (1990) p1.

² Webster and Frankland (1961) p168.

with Barnes Wallis, the Vickers' engineer who designed the 'bouncing bomb',³ used against the dams. As early as October 1937 planners within the Air Ministry were developing attack options for the expected war with Germany: these were called Western Air (WA) Plans and there were thirteen of them. Plan WA5 required Bomber Command 'to attack the German War Industry including the supply of oil with priority to that in the Ruhr, Rhineland and Saar'.⁴ This was refined by Bomber Command into a plan to achieve the same effect by attacking the Ruhr's forty-five power and coking plants: it was believed that these could be destroyed in a fortnight's bombing (amounting to about 3,000 sorties) with an expected aircraft loss rate of about 6%. That these estimates were wildly inaccurate was shown by the 11.5% loss rates of the RAF's then-heavy bombers in the period of the Phoney War⁵ and the Butt Report's conclusions on Bomber Command's accuracy,⁶ which on simple arithmetic alone (and taking no account of the doubtful effectiveness of the bombs with which the RAF started the war) would suggest that perhaps 12,000 sorties would have been required. Extrapolating these figures, a loss of approximately 1,400 aircraft might have been expected.

Even on the basis of the original estimates, the loss rate for the new plan was considered unacceptable and the Air Ministry's Air Targets Sub-Committee turned to devising an alternative means to achieve the same end: the result was a plan to attack the Möhne and Sorpe dams instead. The logic behind this plan held that the Ruhr's heavy industry was dependant on the water the dams held for industrial processes, for power generation and for drinking water: if the dams could be destroyed then industry would grind to a halt. Assuming that the logic

³ The 'bouncing bomb' is part of the mythology of the raid. The weapon is more accurately described a ricocheting depth charge: it ricocheted across the water rather than bouncing and its explosion was triggered by hydrostatic pistols of the kind used in Royal Navy depth charges.

⁴ Sweetman (1990) p1.

⁵ Sweetman (1990) p12.

⁶ Quoted in Terraine (1985) pp292-3, the Butt Report assessed the accuracy of Bomber Command's efforts for the period 2 June-15 July 1941 by studying the photographs taken when bombs were dropped. It reached the depressing conclusion that of all aircraft taking off on raids only about a quarter actually got within 5 miles of the target, and of those actually claiming to have attacked only one in three was within 5 miles of its target.

contained no flaws, the next step was to identify a way to attack the dams themselves. Considerable effort went into this, concentrating particularly on the Möhne, which was a gravity dam:⁷ suggestions included attacking the air-side of the dam with semi-armour piercing bombs, dropping high-explosives onto the dams or attacks with multiple torpedoes from the water-side. None of these was considered feasible and the development of a guided-bomb based upon an anti-aircraft target drone was, for a while, considered the best option. Unfortunately, the fall of France placed the target out of the range of such a weapon.

Even before the fall of France Wg Cdr Finch-Noyes, under the auspices of the Research Department Woolwich, was working on alternative means for attacking the Möhne dam. After reviewing the papers already produced, he proposed that a 20,000 lb explosive charge detonated 40 feet from the top of the dam on its water-side and in contact with it (or a succession of 2,000 lb charges close together) would have a reasonable chance of destroying it. His proposed weapon would be launched from an aircraft at low level, propel itself into the dam, sink and then be exploded by hydrostatic fuses at the desired depth.⁸ Practical considerations meant that no single weapon could be used, no RAF aircraft was yet capable of delivering it to the target, and so multiple smaller weapons would have to be substituted. The Wellington bomber could carry a 2,000lb charge weapon under each wing to be dropped at height and distance from the dam and, with the weapon propelling itself after hitting the water, skip over any intervening torpedo nets, strike the dam, sink and explode. It was proposed to use a total of sixteen weapons but by April 1941 Bomber Command had decided that this plan, too, was fraught with technical imponderables and it was quietly shelved. Before the Dams Raid took place other means of attack were put forward: Combined Operations suggested floating a charge down the reservoir and onto the dam, while the Special Operations Executive proposed an attack by

⁷ Two types of dams were involved. The Sorpe was an earth dam (a waterproof concrete core surrounded by earth banks on either side) and not susceptible to destruction by shockwaves; the rest were gravity dams which derive their strength from their own weight but are vulnerable to shockwaves.

⁸ Sweetman (1990) p8.

parachutists who would place explosive charges against the dam.⁹

Weapon Development

Work on the design of the weapon that would eventually be used on the Dams Raid started in the autumn of 1939. The man behind it was Barnes Wallis, an aero-structures engineer with Vickers-Armstrongs' Aviation, who was already well known for his work on the R100 airship, and the Vickers Wellesley and Wellington bombers. Wallis had come to the view that modern warfare depended on industrial production, which in turn relied on sources of power. He further argued that while production could be dispersed, making it relatively invulnerable to the bombs then available to the RAF, sources of power such as coal mines, oil fields and hydroelectric dams could not. They were, however, equally invulnerable to the bombs available to the RAF.¹⁰ Wallis believed that much heavier bombs could be effective against dams and coal mines, and he had started to work, with the blessing of the Ministry of Aircraft Production (MAP), on a massive 22,000 lb bomb, similar in shape to his R100 airship,¹¹ which was expected to achieve supersonic speed in its fall from altitude. This would be suitable for these targets as it buried itself deep in the earth before exploding and caused shockwaves that would shake structures apart: the same effect could be achieved by exploding the bomb in the water close to a dam.

In autumn 1940 experiments were started at the Road Research Laboratory to determine just how much explosive would need to be detonated at what distance from the Möhne dam to destroy it. Initial experiments were on 1/50 scale models, working upwards to progressively larger models and eventually to a one-off test on the disused 180 ft long, 35 ft high Nant-y-Gro dam near Rhayader, which on 24 July 1942¹² proved conclusively that such dams could be destroyed by an underwater explosion in contact with the dam,

⁹ Sweetman (1990) p43. Neither plan progressed, though there is a suggestion that Combined Operations' effort was held in reserve in case the bombing raid should be unsuccessful. It is hard, however, to see how a charge floated down the reservoir could have avoided the Möhne's existing defences.

¹⁰ Sweetman (1990) pp18-19.

¹¹ Sweetman (1990) p14. The intention was to achieve supersonic speeds in the drop from height to bury the bomb as deep in the ground as possible before it exploded.

¹² Sweetman (1990) pp32-34.

although this was not yet Wallis' intention. The early model tests gave Wallis the information needed to support his 'A Note on a Method of Attacking the Axis Powers',¹³ which he circulated widely. He argued that his massive bomb dropped from high altitude would be effective against the Möhne dam but there was no RAF bomber capable of carrying it to the required altitude and so the project ran in parallel with a proposal for an equally large bomber to deliver it. The Air Staff rejected both.

Wallis, however, was not to be put off. Somehow, in June 1941, he gained the support of MAP's Aerial Attacks against Dams committee for further experiments on the effects of explosives on dams. Progress was slow, however, and Wallis himself admitted 'the growing conviction that my original suggestion was impracticable led me to seek for other methods.'¹⁴ Early in 1942 he hit upon the idea of ricocheting a spherical weapon across the surface of the reservoir thus avoiding torpedo nets and other surface defences, striking the dam, sinking and then exploding in contact with it at a predetermined depth thanks to hydrostatic fuses. Wallis could not account for how he got the idea, the mythology relates it to skimming stones across a pond, but there are similarities to Finch-Noyes' earlier plan.

By the end of April 1942, Wallis had gained important support from Professor Blackett, a scientific adviser to the Admiralty, and from Sir Henry Tizard, who had influence with the Air Council, MAP and the Chiefs of Staff Committee. Their support gained him access to the National Physical Laboratory's water tanks to perfect the delivery technique that now definitely included the backward rotation of the weapon. Why Wallis decided on this is unclear although he claimed three advantages: 'it increases the distance which the missile will travel after release from the carrier, before striking the water; it diminishes the tendency of the missile to plunge downwardly on impact with the water surface; it increases the distance which the missile will travel whilst ricocheting.'¹⁵

¹³ Sweetman (1990) p18.

¹⁴ Sweetman (1990) p28.

¹⁵ Sweetman (1990) p30. The third point is counter-intuitive: most golfers realise that a back spun golf ball stops short on pitching rather than leaping forward. Wallis was a golfer; indeed he was working from offices at his own golf club.

In mid-June 1942 Wallis demonstrated his ‘bouncing’ spheres (the weapon was at this stage spherical in shape even though Wallis was beginning to have doubts about this) to interested spectators from both MAP and the Admiralty. The Royal Navy was, indeed, quick to grasp the potential of the weapon for attacks on capital ships. By the end of June 1942 MAP had granted permission for a Wellington bomber to be used for tests involving mock-up spherical bombs commissioned by the Admiralty. The first ground spinning test did not take place until 20 October 1942¹⁶ and the first air test until 2 December 1942 but it was then proved that it was possible to spin the weapon without shaking the aircraft apart. Two days later the first dropping trials took place at Chesil Beach in Dorset; they were unsuccessful, the spheres were destroyed as they hit the water. A further series of experimental drops continued until early February 1943 as Wallis sought to overcome this major problem. At this stage it seemed that Admiralty interest in a medium-sized version of the weapon (codenamed HIGHBALL) to be used by Mosquito aircraft to attack ships, and the *Tirpitz* in particular, was greater than Air Ministry interest in the full-sized version (codenamed UPKEEP) for attacks against the dams. There was also a small-sized version (codename BASEBALL) meant for launching against ships from a mortar in the bows of a fast attack craft.

Wallis continued to lobby for his weapon and in early February 1943 he gained support from Churchill’s scientific adviser, Prof Lindemann, previously not just sceptical but actively hostile to the plan. Things also seemed to speed up at the Air Ministry and MAP although there was concern that, if Wallis devoted his time to developing UPKEEP, the development of the projected Vickers Windsor bomber would be neglected.¹⁷ Indeed, Vickers was forced to admit that work on the Windsor was already behind schedule due, in part, to work undertaken to convert de Havilland Mosquito aircraft to carry HIGHBALL.

¹⁶ Sweetman (1990) p35. These timings appear to be correct. Although Wallis would later claim that initial dropping trials occurred in September 1942, there is no documentary evidence to support his assertion.

¹⁷ Andrews & Morgan (1988) pp387-9. The Vickers Windsor was a four-engined bomber developed to meet Specification B3/42 but which would, in fact, never enter series production: four prototypes were built of which only three flew.

On 14 February 1943, as Bomber Command was preparing to open the 'Battle of the Ruhr', its Senior Air Staff Officer wrote a paper for his Air Officer Commanding-in-Chief, the redoubtable 'Bomber' Harris, describing both UPKEEP and HIGHBALL. At this time, although the Germans were being beaten in Russia, in North Africa and in the Atlantic, with the Russians calling for a second front in Europe only Bomber Command had the capacity to take the war to the continent. Its task had been set at the Casablanca meeting of the Combined Chiefs of Staff that January:

'[The] primary object will be the progressive destruction of the German military industrial and economic system, and the undermining of the morale of the German people to a point where their armed resistance is fatally weakened.'¹⁸

Harris interpreted this as giving him a free hand to attack any large German city: this having the effect of attacking both the industry located there and the local population despite the uncertainty of the evidence over the effect of such attacks on civilian morale. Indeed, he went so far as to state that his task was 'destroying the main cities of the Ruhr.'¹⁹

There is no doubt that Harris was unimpressed by UPKEEP: he claimed that it would shake the carrying aircraft apart if not perfectly balanced when spun and that the ballistics would not work. It has been noted in a number of sources that Harris did not seem initially to grasp the difference between UPKEEP and HIGHBALL; it also seems he did not grasp that the concept had already been trialled or he would surely not have raised the objections he did. Harris' own account of the Dams Raid is brief in the extreme and makes no mention of his scepticism. Indeed, on the subject of UPKEEP he wrote,

'It was one of the weapons designed for the Command outside the official Ministry of Aircraft Production and Air Ministry organisations...it could be taken almost as a rule that such weapons were successful.'²⁰

¹⁸ Terraine (1985) p514.

¹⁹ Terraine (1985) p518.

²⁰ Harris (1947) p157.

This contrasts with his missive to Portal, the Chief of the Air Staff, in which he railed against:

‘...enthusiasts and panacea mongers.....careering round MAP suggesting the taking of about 30 Lancasters off the line to rig them up with this weapon, when the weapon itself exists so far only in the imagination of those who conceived it.’²¹

Harris’ further assertion that ‘we have made attempt after attempt to pull successful low attacks with heavy bombers. They have been, almost without exception, costly failures’²² was undoubtedly a more reasonable objection. On 21 February 1943 Wallis was finally, at the instigation of Cochrane (AOC 5 Group), able to show his film of the Chesil Beach tests and the National Physical Laboratory tank tests to a still-sceptical Harris. But by now Portal had authorised the conversion of three Lancasters for use in the development of UPKEEP and on 26 February 1943 a formal decision to go ahead was taken with the weapon. It was to be ready for use that year, the latest date for its use to achieve maximum effect being just three months away. Maximum effectiveness required that the dams had to be full of water, which meant the attack must occur before the end of May 1943. Time was going to be extremely short.

Development of UPKEEP and the specially modified Lancaster that would carry it now began in earnest. Responsibility was split between Vickers and Royal Ordnance for UPKEEP, and Vickers and Avro for the aircraft. Gradually UPKEEP evolved through the series of trial drops, at Reculver Bay on the North Kent coast rather than at Chesil Beach, and by trial and error it became a cylinder not a sphere and lost the originally intended wooden covering. The trials were not perfect, the test pilots having difficulty effecting the drops from the right height and at the right speed: unsurprisingly, therefore, UPKEEP did not behave as expected and as late as 2 May 1943 further trial drops were authorised.²³ The extra, successful trials were all to be

²¹ Messenger (1984) p119.

²² Sweetman (1990) p44.

²³ Sweetman (1990) p56. It appears that the extra trial drops were requested by MAP and Air Ministry officials rather than by Wallis. At this stage the attack was only two weeks away and No 617 Sqn was well into its training for the operation but the method of attack was not yet fully proved.

flown at 60 ft, at a groundspeed of 210-220 miles per hour with UPKEEP being spun at 500 revolutions per minute. The final trial drop was on 13 May 1943: UPKEEP was ready for use but only just in time.

Meanwhile, the Admiralty and the Air Ministry were still debating whether UPKEEP or HIGHBALL should be used first or whether attacks against the dams and the *Tirpitz* should occur simultaneously. The apparently confused Chiefs of Staff had set up a committee to monitor both UPKEEP and HIGHBALL developments²⁴ but despite, or perhaps because of, multiple and varying 'expert' opinions on the validity of the different targets it was difficult to reach a conclusion. Finally on 13 May 1943, having been informed that UPKEEP trials had been successful while HIGHBALL trials had failed, the committee agreed that Operation CHASTISE (the Dams Raid) should proceed. The Chiefs of Staff, who were in Washington for discussions with their American opposite numbers, confirmed the decision the next day.

Preparation For The Raid

Responsibility for execution of the Dams Raid fell to Bomber Command. On 15 March 1943, Harris passed that responsibility to Cochrane, who had been responsible for Harris seeing Wallis' films. He was told to form a special squadron (Harris having already nominated the experienced and highly-decorated Wing Commander Guy Gibson to lead it) to attack the dams but that this would not be the squadron's only mission. Gibson had significant control over the selection and training of the aircrew, was allowed to devise the means to reach the target and to suggest amendments to the Operational Order, and given control of his force in attacking the dams: an early example of mission command in the Royal Air Force.²⁵

That Bomber Command was well aware of the potential propaganda value of a successful raid was shown when HQ 5 Group informed Gibson that he would be required to write a book about the

²⁴ Sweetman (1990) p76. Initially chaired by Rear-Admiral Renouf the appointment soon passed to AVM Bottomley, ACAS (Ops).

²⁵ AP3000 p1.3.4. Mission command gives instructions on what is to be achieved and why rather than what to do and how to do it.

mission.²⁶ Indeed, Harris' own account of the Dams Raid follows on immediately from comments on the difficulty of gaining public support for the Royal Air Force, which included:

'The Air Ministry had certainly had the idea that it would be a good thing to get the support of the Press and to have the operations of the Air Force reported as fully as possible. No doubt it was hoped to compensate in this way for the obvious inability of the Air Ministry, by comparison with the ministries of other services, to get the attention and the favour of those who matter; public support was to be called in to redress the balance.'²⁷

Harris intended to draw the new squadron's aircrew from volunteers within 5 Group who had completed or nearly completed two operational tours but this did not happen; many of the aircrew had actually completed less than ten operational sorties and some of the flight engineers none at all. Equally, not all of them were volunteers. The original intention to draw the aircrew from amongst the most experienced members of No 5 Group, whilst partly meant to reduce disruption to line squadrons, suggested the formation of an élite unit and also acknowledged the difficulty of the task. Harris was on record as opposing élite units, he had opposed the Pathfinder Force saying, 'I am not prepared to accept all the very serious disadvantages of a Corps d'Élite in order to secure possibly some improvement of methods...at a serious loss of morale and efficiency to the other squadrons.'²⁸ But Harris himself said No 617 Sqn was to be 'a Special Duty Squadron under the operational control of AOC 5 Group' to undertake missions 'that entail special training and/or the use of specialist equipment.'²⁹ The difficulty of the task can be gauged by

²⁶ Messenger (1984) pp73-74. Harris was not averse to publicity. He had authorised the 'Thousand Bomber' raid against Cologne in May 1942 as much for domestic propaganda reasons as for operational ones.

²⁷ Harris (1947) p156. One does not have to be unduly cynical to infer that the potential propaganda and public relations benefits of a successful attack on a high profile target helped to smooth the way for high-level support of the Dams Raid.

²⁸ Messenger (1984) p85.

²⁹ Sweetman (1990) p83. The statement suggests that Harris, despite his avowed dislike of élites, accepted from the start that No 617 Sqn was to be an élite squadron kept in-being for specialised tasks.

comparison with the efforts of Bomber Command's Main Force at around the same time: on 6 March 1943, 293 aircraft attacked Essen but only 153 were found to have bombed within three miles of the target.³⁰

Notwithstanding the new squadron's élite status, rigorous and realistic training would be required if they were to achieve the required standards of bombing accuracy. Cochrane's original instructions to Gibson, whilst giving no details of the proposed targets, made it clear that mastery of night-time low flying over water would be required. Gibson himself, with two of his senior pilots as passengers, tried out the required night-flying skills over the Derwent Reservoir; the results were not encouraging. The squadron commenced its low-level, cross-country training on 31 March 1943 and by the end of April, following intensive training in which over a thousand flying hours were logged, was able to 'navigate from pinpoint to pinpoint at night at low level by map reading; they could bomb accurately using a special rangefinder sight; and fly safely over water at 150 ft.'³¹

Not all of No 617 Sqn's night-flying training was actually done at night. A system, grandly called 'Synthetic Night Flying Equipment', was used to simulate night-flying conditions. Blue celluloid covered the cockpit transparencies while aircrew wore amber-coloured flying goggles of varying intensities: the combination of blue and amber effectively cut the light levels transmitted from outside the cockpit to approximately that of good moonlight, but cockpit instruments could be clearly seen through the goggles. A safety pilot without goggles was able to see the outside world clearly through the celluloid. One apparently unexpected side-effect of prolonged use of the celluloid-goggle combination was that when goggles were taken off outside the aircraft, the world appeared red.³²

³⁰ Verrier (1968) p220. Whilst these results clearly show that an average heavy bomber squadron could not bomb sufficiently accurately to destroy the dams, they also show that standards in Bomber Command were improving. By comparison with the Butt Report's one-third of attacking aircraft bombing within 5 miles of the aiming point, the Main Force was now achieving one-half bombing within 3 miles.

³¹ Sweetman (1990) p64.

³² Sweetman (1990) p66. This simulation was effective but is no longer used. A similar visual anomaly (magenta eye) is, however, experienced after prolonged use of

A further medical problem encountered during low-flying training was airsickness. Few of the aircrew would have had much experience of low-flying in the Lancaster, an aircraft that was not designed for it and in which some of the crew sat at an angle to the line of flight. The situation was sufficiently severe to cause the squadron's medical officer to fly on a training flight to experience the problem for himself: thereafter airsickness sufferers were treated with chlorobutanol.³³ Low-flying did not just cause medical problems: concerns were raised about its effects on the aircraft's structure after a number of bolts on one airframe were found to have sheared.³⁴

On 26 April 1943, having mastered flying at 150 ft, the squadron was required to cut the bombing height to 60 ft and the release speed to 210 miles per hour. Over the next week they trained intensively again, dropping nearly 300 practice bombs that on average fell within 120 feet of the aiming point. Training now concentrated on the Eyebrook Reservoir near Uppingham, the Abberton Reservoir near Colchester and, deputising for the Sorpe dam, the Derwent Reservoir near Sheffield; the screens previously used at the Wainfleet range to mimic the towers of the Möhne dam were now transferred to Eyebrook.

If constant practice under realistic conditions had allowed the

night vision goggles. This is caused by suppression of the sensitivity of retinal green cones by the purely green light transmitted by night vision goggles while at the same time the sensitivity of red and blue cones is increased. The response of the eye when re-exposed to white light is to produce over-reaction to the red and blue frequencies and hence a magenta image.

³³ The phenomenon of airsickness caused by low-level buffet in aircraft not originally designed for low-level flight is still encountered in the RAF where Nimrod MR2 rear crew are particularly prone to it for precisely the same reasons. No 617 Sqn's sufferers were treated with chlorobutanol, now recognised as a hypnotic and sedative: it is interesting to speculate on the potential impact on performance of using such a drug in low-level flight. It is impossible now to establish whether any aircrew actually used chlorobutanol during the raid and whether their performance might have been degraded by it.

³⁴ Sweetman (1990) p68. Bomber Command would have further experience of the damage done by low-level flight to aircraft not specifically intended for that role in 1965. The Vickers Valiant was designed as a high-speed, high-altitude unarmed bomber but in early 1964 was switched to the low-level role as high-altitude operations were deemed to be too dangerous. Less than a year later the entire fleet was grounded with fatigue damage to the wing main spar.

aircrew to master the necessary flying skills,³⁵ although none of them had yet dropped the new weapon and would not do so until 11 May 1943, there were still a number of technical problems to be overcome. One of these was the difficulty of achieving, particularly at night over water, the precise 60 ft altitude required to drop UPKEEP accurately. A number of unsatisfactory solutions were tried before Lockspeiser, Director of Scientific Research at MAP, suggested the use of intersecting spotlights. This was not a new idea, Harris himself had tried it in flying boats and, having failed to make it work, was once more sceptical: Coastal Command had also tried it unsuccessfully as an aid to nocturnal, shallow-water attacks on U-boats. No 617 Sqn's crews were duly sceptical and difficulties were encountered in making the system work adequately, particularly at such low altitude. The two spotlight beams were set to meet on the water (which on a reservoir could be expected to be sufficiently smooth not to interfere with the functioning of the system) just forward of the port wing. Here it was difficult for the pilot to monitor and this duty fell to the navigator, who was thus responsible for altitude³⁶ as well as for navigating to and from the dams.

Having devised a means to drop UPKEEP from the correct height, it was now necessary to find a means to drop it from the correct range: dropped too close it might simply bounce over the dam endangering the aircraft as the mine exploded out of the water³⁷ or if dropped too far away simply never reach its target. A simple device was devised at Boscombe Down to overcome this problem: a triangular sight using the bomb-aimer's eye at the base of a triangle completed by two nails mimicked the desired drop position of the aircraft in relation to the dam's towers. In effect, with the sight correctly held by the bomb-

³⁵ In many ways this was an innovation as most World War II aircrew had to master their operational flying skills on operational sorties.

³⁶ Getting UPKEEP on target was a genuine team effort: the pilot set the line, the air engineer who controlled the throttles was responsible for airspeed, the navigator monitored altitude and the bomb-aimer was responsible for the timely release of the weapon. Given the precise requirements in all parameters to drop UPKEEP successfully, it is a testament to the crews' skill that the weapon was delivered with sufficient accuracy for it to function at all.

³⁷ This happened to Flt Lt Hopgood, the second aircraft to attack the Möhne. It is not entirely clear that the destruction of this aircraft was caused by the explosion of UPKEEP and it is felt it was more likely to be due to defensive gunfire from the dam.



ED817 was the second Lancaster airframe to be adapted to carry the UPKEEP weapon. It was involved in trials drops and eventually became No 617 Sqn's A.J.C, but it did not take part in Operation CHASTISE. (MAP)

aimer, the aircraft was in the right position to drop UPKEEP when the nails obscured the dam's towers. Some crews used this sight but others used their own variations on the theme, often including a length of string and chinagraph pencil marks on the clear-view panel.

It was now possible to drop UPKEEP at the right speed, at the right height and from the right range: if the weapon worked as advertised the dams should be destroyed. But UPKEEP and the aircraft to carry it were in short supply and could not be wasted in unnecessary attacks. It would be possible after each attack to see if the dam had been breached and aircraft could be diverted elsewhere. Accordingly, Gibson needed to be able to control the attack, to call a halt when the objective was achieved and to divert aircraft to subsequent targets. In normal area bombing practice such control was not necessary and Bomber Command's aircraft were not fitted with radios that allowed such control to be exercised. The standard TR 1196 radio was perfectly adequate for air-to ground use (and would be used to communicate with HQ 5 Group during the raid) but was found to be unsuitable for air-to-air use, especially at night. Specialist advice was sought and the fitting of the TR1143 radio used in fighter aircraft was suggested. This, with a few extra tweaks, proved suitable and was flight trialled by No 617 Sqn's two Flight Commanders one week before the mission. In the meantime a series of booths acting as a radio simulator had been rigged in the squadron's crew rooms to

enable procedural training to take place before the radios had been fitted to the aircraft.

The Raid

The attack on the dams was made in three waves. Gibson led the first consisting of nine aircraft to attack the Möhne dam. The second wave, five aircraft, was led by McCarthy (it actually took off first although its leader was delayed by problems with his aircraft) and was to attack the Sorpe dam (correctly identified by the Ministry of Economic Warfare as a vital target if the raid was to achieve its desired endstate) even though UPKEEP was not designed to be used against that earth-bank type of dam. The third wave, led by Ottley, comprised a further five aircraft: they were briefed to attack either the Möhne or Eder dams but also had alternate targets. Instructions as to which target they should attack would be passed by radio from HQ 5 Group as the progress of the raid became apparent.

The nine aircraft of the first wave made their way at low-level to the Möhne, losing one aircraft (Astell) to anti-aircraft fire en route. On arrival Gibson made a trial run before actually dropping his UPKEEP: this appears to have fallen short and did not breach the dam. Hopgood followed but dropped his weapon too late: it bounced over the dam and destroyed the dam's power station instead. At the same time Hopgood's aircraft was shot down by the gunners on the dam. Third to attack was Martin whose UPKEEP fell both short and wide of the target and failed to breach it. Young's was the fourth attacking aircraft: his mine exploded in contact with the dam and Maltby, next to attack, reported that there was a breach in the dam before releasing his own UPKEEP. Maltby's mine also exploded in contact with the dam causing a definite breach.³⁸

Once the breach had been confirmed, Gibson led the aircraft which still had an UPKEEP to use (plus Young as deputy leader) to the Eder dam. Maltby and Martin headed for home. Achieving the correct position from which to drop UPKEEP proved very difficult at the Eder, Shannon had three unsuccessful goes before handing over to Maudslay who had two unsuccessful attempts. Shannon then tried two

³⁸ It seems likely that, on balance, the Möhne dam was breached by the first UPKEEP to explode in contact with it and that Maltby's mine merely widened the breach.

more times before finally getting the right alignment and dropping his UPKEEP such that it exploded in contact with the dam but did not breach it. Maudslay came next and finally released his weapon on the third attempt but the release was too late, the mine hit the dam's parapet and exploded damaging Maudslay's aircraft.³⁹ Finally the last aircraft of the first wave, Knight, attacked: he took one practice run but on the next run UPKEEP was successfully dropped and the dam breached. Gibson ordered a return to Scampton but Young's aircraft was shot down by anti-aircraft fire on the way home.

Informed by radio that both the Möhne and Eder dams had been breached Harris, at HQ 5 Group, placed a call to Portal, who was in Washington for a conference with his fellow British and American Chiefs of Staff,⁴⁰ to inform him of the success. Portal in turn informed Churchill.

The second wave, intended to attack the Sorpe, actually left before the first. McCarthy should have led but his aircraft had mechanical problems and he had to change to another: he finally left well behind the rest of his wave. In the end, though, McCarthy was the only one of the wave to reach the target: it took him ten attempts to satisfactorily drop UPKEEP but whilst the dam was damaged it was not breached. Barlow's aircraft, which actually led off the raid, was shot down by *Flak* over Germany and the UPKEEP failed to explode in the crash. As a result the Germans captured UPKEEP intact, rapidly worked out how the weapon worked and produced (but never actually used) their own, more complicated, version. Next came Munro whose aircraft was severely damaged by *Flak* over Holland and forced to return to Scampton. He was followed by Byers, who was shot down by anti-aircraft fire over Holland, and by Rice who, flying too low over the Afsluitdijk, had the UPKEEP wrenched off by impact with the water without the aircraft crashing. Rice had no option but to return to

³⁹ The evidence on the fate of Maudslay's aircraft is unclear. At the time it was thought to have been destroyed by the mine's explosion but radio transmissions were heard afterwards and German records suggest that the aircraft was actually shot down by anti-aircraft fire on its way home.

⁴⁰ Euler (2001) p40. The TRIDENT conference was held to clarify future Anglo-American operations: these included confirmation of POINTBLANK, the joint strategic bombing offensive aimed at fatally weakening Germany. The directive was issued on 10 June 1943.

Scampton and so only one of the five aircraft originally destined to attack the Sorpe reached its target.

The third wave was a reserve force, each had its own intended target such that all six dams in the Operational Order⁴¹ might have been attacked but could be re-tasked by HQ 5 Group to attack the Möhne, Eder or Sorpe dams as required. Ottley led the wave but was shot down before HQ 5 Group could divert him to the Sorpe, while Burpee, always destined for the Sorpe, was shot down over Holland. Brown came third and attacked the Sorpe: as with McCarthy, he and his crew found it difficult to place their UPKEEP appropriately and, although they did hit it, the dam was not breached. The fourth aircraft, Townsend's, was tasked against the Ennepe: difficulty was experienced in finding the target and, although UPKEEP was dropped, the dam was not damaged. Uncertainty exists about which dam Townsend's crew attacked: they were sure they attacked the Ennepe but the War Diary of the *Oberkommando der Wehrmacht* records that the Bever dam was attacked that night and not the Ennepe.⁴² Last of all was Anderson's aircraft, originally tasked against the Diemel but diverted to the Sorpe, which never found its target and returned to Scampton, the UPKEEP unused.

The Effect In Germany

Breaching the Möhne and Eder dams unleashed huge amounts of water: at the Möhne 116 million cubic metres of water escaped within the first 12 hours (approximately 88% of the total contents of the reservoir) while at the Eder 154 million cubic metres of water were lost (approximately 76% of its total contents). Downstream of the Möhne, in addition to the damage done to its two electricity generating stations, significant damage was inflicted by the passage of the flood-water: bridges were destroyed up to 50 km away and buildings up to 65 km away. The official German figures give the final death toll for the Möhne as 1,294 killed or missing while 11 factories and 92 houses were destroyed, 971 houses and 32 farms damaged, 2,822 hectares of farmland made useless with a further 1,221 hectares damaged, and over 6,300 cattle and swine killed. In addition, nearly

⁴¹ Operation Order B.976. The six, in the order of importance attached to them, were the Möhne, Eder, Sorpe, Lister, Ennepe and Diemel dams.

⁴² Euler (2001) p108.

fifty road and railway bridges were damaged and several kilometers⁴³ of railway embankment required repair. On top of this, a large number of power or pumping stations and gas or water supplies were damaged.⁴⁴

The results below the Eder caused less loss of life, only forty-seven people were killed, but the effects reached far from the dam. Floods requiring the use of boats for mobility were recorded up to 140 km away and the damage to the river system was considerable: both the Rivers Fulda and Weser had to be dredged to restore them for navigation. Over 5 km of riverbank needed rebuilding and 50 hectares of land was made unusable.

It is worthwhile to digress at this point on the morality of this attack and the legality of the target. By today's standards the collateral damage, the loss of non-combatant life would be unacceptable: the current RAF would not countenance attacking such a target. But in 1943 high levels of civilian casualties were part and parcel of the strategic bombing offensive: the need to aim at city centres because bombing accuracy was insufficient to allow anything else was bound to mean significant levels of collateral damage. The civilian casualties caused by Operation CHASTISE would be eclipsed within three months by the Battle of Hamburg: on the night of 27/28 July 1943, Bomber Command's incendiary attack raised a firestorm which within 30 minutes had covered 22 square kilometres of the city. The exact casualty numbers will never be ascertained but figures of 40,000 killed with a similar number of injured seem likely.⁴⁵ In such a climate, the loss of around 1,300 lives was considered entirely acceptable in the pursuit of the disruption of German industry; Harris even defended the results of the attack on Hamburg:

'In spite of all that happened at Hamburg, bombing proved a comparatively humane method. For one thing, it saved the flower of the youth of this country and of our allies from being mown down by the military in the field, as it was in Flanders in

⁴³ Cooper (2000) p72. Experience with flood damaged railway tracks in the US suggested that it took up to 25,000 man-hours per mile to repair them and the Ruhr-Kassel railway line was, indeed, unusable for several months.

⁴⁴ Sweetman (1990) pp154-5.

⁴⁵ Terraine (1985) pp546-7.

the war of 1914-1918.⁴⁶

Albert Speer who had responsibility for the German war economy as Minister of Armament and War Production led the German response to the raid. He flew from Berlin the following morning to inspect the damage, initially from the air. Speer recorded that the flooding of the valley below the Möhne had caused the 'seemingly insignificant but grave consequence that the electrical installations at the pumping stations were soaked and muddied, so that industry was brought to a standstill.'⁴⁷ He rapidly mobilised manpower to repair the damage: 7,000 men were diverted from constructing defences on the Atlantic Wall to repair the dams. Sweetman⁴⁸ records that a further 20,000 workers, again many of them drawn from the Todt Organisation's workers on the Atlantic Wall, were diverted to help with the clean-up. It seems likely, therefore, that a total of over 10,000 construction workers were diverted from constructing defences against the invasion of Europe which would occur the following year for a period of several months: what impact might the fortifications that they would otherwise have built have had on that invasion? In addition to construction workers, both military and civilian specialists of many types were involved in the clean-up operation.

In order to restore electricity and water supplies in the Ruhr, Speer ordered the requisitioning of electric motors and the importation of experts from elsewhere in Germany regardless of the consequences. His aim was to restore armament production in the Ruhr to half-production within one week and to full production within two weeks.⁴⁹ Whilst this did not represent the total and prolonged suspension of production that Wallis and others had hoped for, it did represent the loss of three-eighths of the Ruhr's monthly production: a not insignificant achievement that takes no account of production losses elsewhere caused by the concentration of efforts into the Ruhr.

Any attempt to quantify the actual production losses caused by the Dams' Raid is fraught with difficulty: at this stage of the war, the German economy was (surprisingly) still transforming itself onto a

⁴⁶ Harris quoted in Terraine (1985) p548.

⁴⁷ Speer (1970) p281.

⁴⁸ Sweetman (1990) p162.

⁴⁹ Sweetman (1990) p162.

war footing and output was rising rapidly so production losses are difficult to show definitively. What can be shown is that water production in the Ruhr dropped by 75% in the aftermath of the raid and took six weeks to return to normal levels, Ruhr steel production of over 300,000 tonnes was lost in both May and June (normal production loss was less than 100,000 tonnes per month) and gas availability fell by 50%.⁵⁰ Commentators have argued that this did not represent a good return on the training time invested in preparation for the raid or on the lives of the aircrew lost. The flying hours put into training for Operation CHASTISE were approximately equivalent to those taken up in a 500-bomber raid on the Ruhr but CHASTISE caused far more damage than any normal raid. No normal raid halved the Ruhr's production for a week and, at a 4.7% loss rate,⁵¹ a 500 aircraft raid would have expected to lose twenty-three or twenty-four aircraft compared to Operation CHASTISE's eight: for the effect achieved the loss was acceptable, if heavy to bear for a single squadron.

Another rapid response to the raid was the strengthening of defences around German dams. The level of commitment can be illustrated by reference to the Eder dam: a total of forty-eight barrage balloons, nine searchlights, six rocket launching vehicles, thirty-six anti-aircraft guns varying in calibre from 20-88 mm and a smokescreen system were provided. In addition, there was an infantry company to guard against parachute attacks so that up to 1,500 men were tied up in protecting one dam. Taking all the German dams into account 10,000 front-line troops were involved, the equivalent of a full division that could not be employed elsewhere.⁵²

The final effect, and surely not one that the Allied planners intended, was that on German air plans. Hitler was furious, an entry in the Reich's Propaganda Ministry's log recording, 'The *Führer* is extremely angry and impatient at the inadequacy of our defensive measures'⁵³ and he blamed the *Luftwaffe* for failing to prevent the

⁵⁰ Sweetman (1990) pp180-2.

⁵¹ Terraine (1985) p518. Bomber Command lost 872 aircraft out of 18,506 sorties despatched during the 1943 'Battle of the Ruhr', a loss rate of 4.71%.

⁵² Sweetman (1990) pp184-5.

⁵³ Quoted in Rumpf (1975) p74.

attack. This failure reinforced Hitler's prejudices about air power; he did not believe that an effective defence against bombing could be mounted. He refused to allow the Messerschmitt Me 262 to be developed as a pure fighter (a role in which it was pre-eminent) instead insisting that it be developed as a fighter-bomber.

Allied Effects

With the surviving aircrew back at Scampton and a reconnaissance Spitfire on its way to Germany to photograph the aftermath of the raid, the Air Ministry set out to exploit the publicity and propaganda benefits of the raid. The news was broken by the BBC's morning news bulletin, the Air Ministry's communiqué coming too late for the morning newspapers. They would not report the raid until their 18 May 1943 editions but they made up for the delay with the enthusiasm with which they greeted the news in their headlines. In a generally more restrained era these included, 'Huns Get A Flood Blitz' (*The Daily Mirror*), 'Floods Sweeping Ruhr From Smashed Dams – RAF's Major Victory' (*The Daily Sketch*) and 'RAF Blow Up Three Key Dams in Germany' (*The Daily Telegraph*). Every front page carried aerial reconnaissance pictures of the destroyed dams but already inaccuracies were creeping in, as evidenced by *The Daily Telegraph* headline's implication that three dams had been destroyed.

News of the attack was quickly spread in the United States: Portal briefed the Combined Chiefs of Staff on 17 May 1943. On 18 May 1943 the *New York Times* reported: 'The RAF has secured another triumph' and hailed the 'unexampled daring, skill and ingenuity.'⁵⁴ Such headlines must have been welcome to the British contingent at the TRIDENT conference: they were facing an American military establishment which was, to say the least, sceptical about British military capability. Churchill made the most of the opportunity in his address to the US Congress on 19 May 1943 saying, to cheers from the floor of the House:

'You have just read of the destruction of the great dams which feed the canals and provide power to the enemy's munition works. That was a gallant operation costing eight out of nineteen Lancaster bombers employed but it will play a very

⁵⁴ Sweetman (1990) p174.

far-reaching part in German military output. It is our settled policy, the settled policy of our two staffs of war-making authorities – to make it impossible for Germany to carry on any form of industry on a large or concentrated scale, either in Germany, in Italy, or in the enemy-occupied countries.... In the meanwhile, our air offensive is forcing Germany to withdraw an ever larger proportion of its war-making capacity from the fighting fronts.’⁵⁵

Such declarations were doubtless aimed also at the Russians who, already fighting the Germans on the Eastern front, were as we have seen calling for the opening of a second front in Europe. The Dams Raid dramatically demonstrated Bomber Command’s ability to take the battle to Germany.

A successful precision raid was also useful for propaganda purposes in Occupied France: the British War Cabinet had debated the effect of inaccurate British bombing on support there. Leaflets were dropped, both in France and in Holland, which used pictures of the aftermath of the raid, accompanied by explanatory text, to stress the precision of the operation: factual accuracy was not complete here as the text claimed a breach of nearly 100 metres at the Sorpe, in addition to the Möhne and Eder successes.⁵⁶

On a less positive note, the realisation soon dawned in the Britain that if an unexploded UPKEEP had fallen into German hands, as Barlow’s had, it would be possible for them to reverse engineer their own version and use it to attack British dams: the Heinkel He 177 was, at least theoretically, capable of carrying such a weapon.⁵⁷ The Ministry of Home Security continued to debate the problem for nine months without reaching a definitive conclusion although steps were taken to protect the dams above Sheffield. As it happened the Germans did not attack, neither did they reverse engineer UPKEEP preferring an unsuccessful attempt to produce a more sophisticated version. This did not work effectively and was never used operationally.

⁵⁵ Euler (2001) p117.

⁵⁶ Sweetman (1990) p175.

⁵⁷ Philpott (1980) p114.

Benefits And Lessons

In addition to the direct results in terms of the damage caused by the floodwater which have been detailed previously, there were a number of indirect benefits too. The most obvious of these was the continuing existence of No 617 Sqn, albeit that it took some time to recover from the crew losses sustained. The presence of a squadron that had proved its ability to deliver novel weapons, using new techniques and with great precision enabled the RAF to look towards further such precision raids. The original variation of WA5, which envisioned crippling the industry of the Ruhr by attacking its power and coking plants, was a 'choke point' plan seeking strategic effect by targeting precise locations rather than by area bombing. The RAF had now proved that it had the potential ability to apply his concept to other 'choke points' in production and other such attacks would be undertaken. An example was the 20/21 June 1943 attack (again carried out by crews from No 5 Gp but with the assistance of a small number of Pathfinder aircraft) on the Zeppelin factory on Lake Constance, which was thought to be vital to German radar production. The concept of attacking 'choke points' remains firmly part of RAF doctrine, although more likely these days to be applied to attacks on infrastructure, logistic chains or communication nodes than to production facilities, a task made easier by the development of truly precision-guided weapons.

Allied to No 617 Sqn's continued existence was a willingness by the Air Ministry and MAP to look more favourably at Barnes Wallis' other ideas for large bombs. These would evolve into TALLBOY and GRAND SLAM: respectively 12,000 lb and 22,000 lb penetration bombs. No 617 Sqn was to use the TALLBOY with great accuracy on a number of occasions. In a four-week spell in June and July 1944 alone they successfully attacked the Saumur railway tunnel preventing the transit of a *Panzer* division on its way to attack the Normandy bridgehead, the E-boat installations at Le Havre and Boulogne, V1 launch sites in the Pas de Calais and the first launch site for the proposed V3 weapon.⁵⁸ In addition, the No 617 Sqn-TALLBOY combination destroyed the Dortmund-Ems canal, the Krebs Dam (using delayed-action fuses and low-level attack, not the high-level

⁵⁸ Sweetman (1990) p189.

attack for which TALLBOY was designed) and twice (in conjunction with No 9 Sqn) attacked and finally sank the German battleship *Tirpitz*. The massive GRAND SLAM bomb was successfully used against the Bielefeld viaduct that had resisted all previous attempts to destroy it.

Gibson had been the first to use the 'Master Bomber' technique, controlling the actions of formation and directing them from one target to another by radio. Three months later Gp Capt Searby would attack as 'Master Bomber' in the raid against the V-weapons research site at Peenemünde. This raid was altogether larger in scale with nearly 600 attacking aircraft, controlled by air-to-air radio as Searby circled the site for the duration of the attack,⁵⁹ and caused Goebbels to comment that, in relation to V-weapon attacks, 'preparations were set back by four or even six weeks.'⁶⁰ The combination of this technique and of radio control from Group HQ would eventually lead to the development of sophisticated airborne command and control systems. The use of ground-spotters using ground-to-air radio to talk tactical aircraft onto targets would become common-place in Normandy following D-Day. In Afghanistan we have recently seen ground troops calling in close air support from B-52 heavy bombers via controllers in an orbiting AWACS aircraft.

Conclusions

If the sole criterion of success is the permanent paralysis of the Ruhr's munitions industry and Germany's consequent inability to prolong the war, then Operation CHASTISE was not successful. The Air Ministry and the Ministry of Economic Warfare both knew that the destruction of the Sorpe dam was vital if this aim was to be met but that UPKEEP was not really a suitable weapon for the task. It is interesting, however, to speculate on what might have happened if more of the second and third wave aircraft had reached and attacked this target. If the disruption to German transport infrastructure, reduced agricultural production, and the diversion of labour from the construction of Atlantic defences are considered a picture begins to emerge of the Dams Raid as a triumph.

⁵⁹ Terraine (1985) p541.

⁶⁰ Morpurgo (1972) p282.

As we have seen, however, there are other important factors to take into account. The raid had very important moral and psychological effects. It was one of a number of Bomber Command ‘set pieces’⁶¹ which raised both the British public’s confidence in the Command’s ability to take the fight to the Germans and public morale in general. Allied to this, the timing of the raid was fortuitous as it allowed the British to parade an aerial success before the Combined Chiefs of Staff Conference and Churchill to exploit that success before the United States Congress. Furthermore, the dramatic pictures could be used both in persuading the Russians that Britain was doing its share against Germany and in showing occupied Western Europe that Britain could now attack precision targets. The Germans were not immune to the psychological effects: Speer records that the raid made ‘a deep impression on the *Führer*.’⁶² Reinforcing Hitler’s prejudices as it did, this assisted the move to the misemployment of the *Luftwaffe* as an offensive rather than defensive force. In addition, fear of repeat attacks (never undertaken or even apparently contemplated) caused the equivalent of an entire regular division to be tied down protecting the remaining dams: in itself this was probably worth the loss of eight aircraft.

There were other gains for the RAF: the start of the ‘master bomber’ technique allied to the demonstration that bomber aircraft could be effectively controlled by radio; the demonstration that Bomber Command could undertake precision attacks (albeit with specialised training and selected crews); the creation of an ‘élite’ squadron which would go on to develop new techniques and undertake other precision or novel attacks; and the impetus the raid gave to the Command to take Wallis’ other specialised bombs seriously.

Undoubtedly it was, at the time, in Webster and Frankland’s words ‘the most precise bombing attack ever delivered’⁶³ even if their

⁶¹ The first ‘Thousand Bomber Raid’ against Cologne, for example, could be seen in the same light. Harris needed a major raid wreaking significant damage to demonstrate that his ideas on the employment of Bomber Command could work. Nonetheless, the need for 1000 aircraft rather than 900 was undoubtedly for propaganda purposes.

⁶² Speer (1970) p280.

⁶³ Webster & Frankland (1961) p168. It is a testament to advancing technology that

assertion of ‘a feat of arms which has never been excelled’ smacks of hyperbole. Allying this precision to the dramatic post-raid reconnaissance photographs, the undoubted bravery of the crews involved and a pre-determination to use the raid for propaganda purposes, it is hardly surprising that the Dams Raid remains the RAF’s most famous single operation and No 617 its most famous squadron.

All in all, the Dams Raid was an all-round success and not a sideshow.

what in 1943 was thought of as remarkable precision would be routine with today’s laser and GPS guided weaponry.

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SUMMARY OF THE MINUTES OF THE EIGHTEENTH ANNUAL GENERAL MEETING HELD IN THE ROYAL AIR FORCE CLUB ON 30 JUNE 2004

Chairman's Report.

AVM Baldwin noted that the Society had held two seminars at the RAF Museum during the past year. The first of these, in October 2003, had included members of the US Air Force Historical Foundation who had also enjoyed a programme of visits which had included the RAF Museum, RAF Bentley Priory, the American War Cemetery near Cambridge, the Imperial War Museum at Duxford and Windsor Castle. The formal seminar had covered aspects of Anglo-American Air Co-operation from WWI to the 1991 Gulf War and the proceedings would be published in the Journal 32.

The second seminar, just before Easter 2004, had covered RAF maritime air power. The Society was most grateful to Air Chf Mshl Sir Michael Stear for agreeing to chair the day. A raffle, organised by Al Pollock at the seminar, had raised £250 which had been split between the Maritime Air Trust and the Vulcan to the Sky appeal.

The next seminar would be held on Saturday 30 October 2004 at the RAF Museum, the topic being 'Supply: An Air Power Enabler' for which an excellent panel of speakers was expected. The seminar would be held on a Saturday in response to members' requests for a weekend event. On 22 March 05, a seminar on the history of the Harrier would be held in Bristol. Gp Capt Heron, Vice-Chairman, had prepared a full programme, to be chaired by Sir Patrick Hine and with speakers including John Farley and Prof John Coplin.

Membership of the Society, now just over 900, continued to climb slowly, and finances were broadly in good shape, although the time had come to consider an increase in the annual subscription to £18. It had been held at £15 for many years, mainly by the prudent management of the committee, but seminars were increasingly being subsidised, albeit this was to encourage attendance. Were the proposal to be carried, the Chairman would appreciate the early completion of revised standing order mandates.

Concluding, the Chairman thanked the committee for their continued hard work on behalf of the Society. The committee greatly appreciated the helpful advice and encouragement of the President,

Marshal of the Royal Air Force Sir Michael Beetham, and the Vice-President, Air Marshal Sir Frederick Sowrey.

Secretary's Report.

Gp Capt Dearman noted that since the last AGM, fifty-seven new members had joined, while forty had ceased membership for various reasons. The membership stood at 904. The sale of journals had realised £756 since the last AGM. A steady flow of correspondence, including many queries from as far afield as New Zealand, Australia, Canada and France, reflected the worldwide interest in the Society and its work.

Treasurer's Report.

Mr Boyes tabled the annual accounts for 2003 which showed a loss of £3,264 with £25,250 in reserves. Extraordinary expenditure of some £1,857 had been incurred in connection with the American visit and a grant of £500 had been made to the Malta Hangar Appeal. Costs of journal production were expected to reduce significantly, and income from increased Gift Aid declarations, together with other savings should see finances break even in the current year. The cost of seminars continued to rise inexorably, however, and in accordance with the committee's recommendation, the Treasurer proposed an increase in subscriptions to £18 from 1 January 2005. Seconded by J S Cox, the proposal was carried.

A proposal by AVM Herrington, seconded by Gp Capt Heron, that the accounts be accepted and that Messrs Pridie-Brewster of 29/39 London Road, Twickenham TW1 3SZ be re-appointed independent examiners was carried.

Appointment of Executive Committee.

The chairman noted that all the executive committee members had offered themselves for re-election, together with the existing ex-officio members. Proposed by Air Cdre Atkinson and seconded by Tony Richardson, the motion was carried. The members so elected were:

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

Mr J Boyes TD CA
 Wg Cdr C G Jefford MBE BA
 Air Cdre H A Probert MBE MA
 Wg Cdr C J Cummings

Treasurer
 Editor & Pubs Manager

The ex-officio members of the committee elected were:

J S Cox BA MA	Head of AHB
Dr M Fopp MA PhD FMA FIMgt	Director RAF Museum
Gp Capt C J Finn MPhil RAF	DDefS(RAF)
Wg Cdr W Carter RAF	JSCSC

Discussion.

The chairman announced that Wg Cdr Tim Webster had won the Two Air Forces Award sponsored jointly by the Society and its counterpart, the (US) Air Force Historical Foundation. Sir Michael Beetham presented the trophy and an inscribed copy of *Sagittarius Rising*.

In connection with the forthcoming Harrier seminar, Gp Capt Heron sought a speaker who was familiar with the details of the 1960s debate over direct lift versus vectored thrust for VTO aircraft.

Air Cdre Dye expressed his thanks to the Society for its support, which had been crucial, of the planned British Air Services Memorial at St Omer in Northern France, and drew members' attention to a model of the memorial and to prints which were on sale to raise funds. Any donations would be most welcome. The memorial would be unveiled and dedicated on 11 September 2004 and an open invitation was extended to Society members to join the 600 people expected to attend. Sir Frederick Sowrey, as patron, also expressed his appreciation for the Society's support.

There being no further business, the meeting closed at 1840 hrs.

FEEDBACK

DENNIS HEALEY AND THE F-111

Air Cdre Pitchfork's excellent contribution to the seminar on Maritime Air Power did contain one misleading statement, to the effect that the F-111 was a 'casualty of the Dennis Healey axe'. Dennis actually fought hard for the F-111. Its future was twice considered in Cabinet. On the first occasion the F-111 was kept in the programme by a narrow majority. On the second, Dennis lost by a reportedly even narrower margin and, as he writes in his autobiography, he agonised over whether he should resign. As his MOD PR man at the time, I can vouch for the truth of Dennis' account.

Although I cannot swear to what was alleged at the time – that the cancelling of the F-111 was the price paid to persuade the left wingers in the Cabinet to accept the introduction of NHS prescription charges – one would not be surprised if this were so.

T C G James
Pinner

REGARDING THE ICONIC SUNDERLAND

As a couple of Catalina pilots who logged several thousand hours on Coastal Command Catalinas between 1941 and 1945 we offer a few comments in response to AVM George Chesworth's review of Alan Deller's book, *The Kid Glove Pilot* (Journal 33).

Alan Deller did not fly the Catalina on operations yet he is quoted as saying that the Catalina was 'an ugly duckling that was clumsy to handle in the air and on the water compared with the Sunderland.' Neither of us would describe the 'Cat' as being clumsy to handle in the air, if flown properly, using long-range flying techniques to and from a convoy and endurance settings while escorting it. For maximum endurance, power settings could be reduced to attain the lowest speed at which the aircraft could be comfortably flown (80 knots IAS or less). Yes, it was physically challenging, but it was also, as John Cruickshank VC is quoted as saying, 'a splendid aircraft for

anti-submarine warfare,' which is what it was originally designed for. In contrast, the Sunderland was not designed for military operations, so much as developed from the old Short C-Class Empire flying boat. On the water, the Catalina was not difficult to handle and in rough seas it was possible to make a fully-stalled landing that would have played havoc with a Sunderland. The 'Cat' arrived very early in 1941 and soon began to make a difference in anti-U-boat warfare in the Atlantic, the Mediterranean and the Far East. It was cheaper to build, fly, maintain and crew than the Sunderland. The fact that 700 of them were ordered by the Air Ministry is a tribute to their effectiveness in all theatres.

Sunderland operations were customarily briefed for twelve-hour patrols, whereas Catalina patrols were normally planned for eighteen hours and often exceeded twenty-four hours aloft. In 1941 George Foot twice flew a Catalina non-stop from Scotland to Archangel on the Dvina River via the North Cape of Norway, over the Kola Peninsula and the White Sea – a short flight for the 'Cat' of only nineteen hours. Alan Robertson's log book records a flight of more than twenty hours on an operational sortie from Gibraltar in 1943 when a U-boat was sighted and attacked while on an anti-submarine patrol. Both of these flights were considered to be 'routine' for the crews of Nos 202 and 240 Sqns.

By the way, the *Concise Oxford Dictionary* describes an ugly duckling as '...one who turns out to be the genius of the family after being thought the dullard.' An aircraft should be judged on its ability to achieve or better its operational requirements, ie to be efficient, easy to maintain, reliable and cost-effective. The Catalina, in our humble opinion, was all of these things. Glamorous, no, but it was probably the most cost-effective of all Coastal Command aircraft during the Second World War.

Gp Capt George Foot OBE and Flt Lt Alan Robertson MBE (both ex-Nos 202 & 240 Sqns)
Cobble Hill, BC
Canada

PS Robertson's book, *The Last Generation*, was reviewed by Dr Tony Mansell in Journal 32.

OBITUARY – ROY WALKER

Roy Walker, who died in the summer of 2004, had joined this Society as early as 1989. While he may not have had a very high profile, he was actually one of our more active members and between 1997 and 2000, he served on the Executive Committee in the capacity of Publications Manager. After spending 1945-48 in the RAF, mostly in India, Roy pursued a career in banking, but he maintained an interest in the Service, primarily through a family connection with No 77 Sqn which led him to produce two booklets on that unit's contribution to WW II. Both were published privately by an enterprise begun by his wife, Joyce, and it was the expertise gained in this fashion that Roy was later able to place at the disposal of the RAFHS. The Society has lost a particularly knowledgeable and productive member and the Committee wishes to extend its sympathies to his family.

AN AIRMAN AT ARNHEM

Wing Commander Geoffrey Richards

By September of 1944 the Allied armies has advanced to Brussels and entered Holland. The final barrier to the penetration of Germany itself was the Rhine. A direct assault across the river would have been very costly. The British Second Army was streaming north into an area where the Germans were in disarray and Montgomery saw the chance of crashing into Germany through the side door. His plan involved the crossing of four waterways: the Maas at Grave, the Waal at Nijmegen, the Maas/Waal canal and – the northernmost – the Lower Rhine at Arnhem. The US Divisions were to take on the southern ones and the British 1st Airborne Division was to drop at Arnhem and hold the bridge while the Second Army punched through the 10 miles from Nijmegen to relieve them, within – at the most – 48 hours. They could not hold out for longer.

From the outset the plan was beset with difficulties. So many airborne troops were involved that it was impossible to transport them within one day. If the three southernmost bridges remained uncaptured the position at Arnhem would be untenable. So priority for transportation had to be given to the Americans. As a result the 1st Division's landings had to be spread over two days by which time the element of surprise, so vital to airborne operations, would be lost. Just as grave was the fact that the nearest possible landing zone for the gliders was some miles removed from the bridge.

The plan would depend crucially on the Second Army's ability to push through in time and this would depend greatly on the strength of the opposition in the area. Intelligence had estimated this to be not excessive. They did not know that that the remnants of the 9th and 10th Panzer divisions were refitting in the area, nor that the German 1st Parachute Army had paused there on its retreat from the west. Furthermore the road from Nijmegen to Arnhem ran along a causeway about four feet above the level of the surrounding soft ground. Along this road the tanks of the Guards Armoured Division could advance only in single file; if they left the road they bogged down. On the higher ground to each side of the causeway the tanks and self-propelled guns of the Panzer Divisions were strategically sited. They could shell the causeway freely and accurately. Just one

knocked-out tank or truck would block the road until another could push it over the edge. There was no other route.

Finally and disastrously, in flat disobedience of instructions, an American soldier was carrying the complete orders for the entire operation. His glider was shot down, the plans were found on his body and within two hours of the first landing they were in the hands of the German General Student.

Early in September I was called to a briefing at Fighter Command. I was surprised to find only four of us there, two Squadron Leaders, another Flight Lieutenant and myself. The briefing officer was a Wing Commander Brown. He collected invasions as other men collect beer-mats. He claimed that up to this stage of the war he had not missed a single one and he had no intention of missing this one. Brown told us that we were to be taken by glider to a position between the British and the Germans near Aachen. We would take with us 'portable' GCI equipment (the generator alone weighed over 200 lb) which we were to set up on arrival. There would also be, he added, some airmen mechanics. Finally he said, 'Gentleman, I must tell you that your chances of survival are about one in five.' That was about the only thing he got right.

We were sent down to Harwell. By now I was wearing khaki battledress with airborne flashes on the sleeves and carrying a revolver at my hip. The Mess at Harwell was full of Airborne officers, all singing and drinking – except for one young Lieutenant who sat quietly reading a Greek New Testament. He was going to be ordained after the war. I hope he survived to make it. We felt out of it. Presumably they all knew what was happening but it would never have occurred to them that we too were involved so naturally they did not speak of it in our presence.

Soon after breakfast on 17 September we stood and watched the almost completed arrangements. Tugs were lined up on the perimeter track at the end of the runway, a queue of gliders facing them with tractors attached to the first three of four. Two ropes were laid out on each side of the runway. Then they started to move, with astonishing precision. The first tug moved on to the runway and immediately the first glider was towed in behind it. The tractor moved off while the tow-rope was connected. As the combination started its take-off run



Typical Halifax/Horsa tug/glider combination. (MAP)

the second pair was already moving into place. But for ourselves we still had no orders and went back to the Mess. The next morning while we were watching the second day's lift preparing to take-off, Brown rushed up in a jeep. 'We're on,' he said. 'I've persuaded General Browning to let us go.' We were each pushed into a glider and given an escape kit as we entered. My glider, I noticed, contained some troops, a few airmen, and all down the centre aisle a row of jerry-cans filled with petrol. I was uncomfortably aware that there were no parachutes.

As we approached the landing-zone our pilot cast off from his tug and pushed the nose straight down. There is no point in floating around when it is plainly open season for gliders. We were lucky. We landed undamaged, but the LZ was chaotic. There was a glider up a tree with the pilot dead in his seat. There were gliders broken in half and others that had crashed into each other. Fast and ordered activity was going on all around me; guns and mortars and jeeps were being unloaded and driven away. I had no idea what to do or where I was. A sergeant came hurrying by, so I asked him. 'Why, Arnhem, Sir, of course.' Apart from a vague memory that it was somewhere near Arnhem that Sir Philip Sydney, close to death, had given the last of

his water to a wounded soldier with the remark, 'His need is greater than mine', I had never heard of the place.

Wg Cdr Brown's last shouted orders as we climbed into the glider had been, 'Meet me at the northern edge of the landing zone.' So I made my way cautiously to the hedge that marked this line. I was not to know that he had got on to the wrong glider and had been landed at Nijmegen from where he had gallantly hitched a lift on a tank. The tank was destroyed and all its occupants with it. The other Flight Lieutenant was already dead. His glider had been hit by flak and had disintegrated in a ball of flame. When I got to the hedge I met up with one of the Squadron Leaders, Dicky Wheeler. His glider had been machine-gunned on the way down and half the occupants were dead before it reached the ground. The others were nowhere to be seen.

I had managed to retrieve the beacon from my glider. Not surprisingly Dicky had not been able to retrieve anything from his. The beacon would have led our night-fighters to Arnhem, though they could have done that for themselves anyway. Just as well, because the beacon would not have functioned without its generator. More to the point we had no means of tracking the fighters or of talking to them. As a GCI unit we had ceased to exist.

So I decided to join the army. I found the nearest HQ and explained our predicament to the Company Commander, Major Cousins, who agreed we could be attached to the Border Regiment. With them we started on the march to Arnhem.

We moved steadily down a tree-lined avenue until we were found by some Me 109s. Bullets thudded into the trees and the earth. The troops started to dig themselves shallow trenches with their 'entrenching tools'. Dicky and I, less well-equipped, dug with our bare hands. It was soon clear we were not going to have much success so we chose a tree each and pressed ourselves rigidly at attention against its down-fire side until the '109s departed and we started off again down the road. At Oosterbeek, a western suburb of Arnhem, the Company Commander requisitioned the cellar of a house for his headquarters and there we stayed for the next eight days.

I had found some of our airmen nearby and used to go across to see them. I doubt that my efforts to reassure them met with any success and as a morale booster I was nowhere near the quality of our Brig. Hicks who spoke to them every morning, wearing his beret rather than

a tin hat. Wholly untrained for the situation they found themselves in the airmen were even more at sea than I was. I asked Major Cousins if I could put myself in charge of them but he refused. 'They are under the command of a Lieutenant. If you were there they would expect to take orders from you. The Lieutenant knows what he is doing. You obviously would not. Your presence would merely increase their danger.' I started to argue. 'You have placed yourself under my command', he said. Those are my orders.' I know nothing of the fate of those men. All my later enquiries drew a blank. Some may have been killed, some wounded, and some made prisoner. Many I hope may have returned across the river. I just do not know, and sometimes, still, I feel ashamed that I was not with them.

Dicky and I borrowed entrenching tools and dug ourselves a trench. It was cold and wet during the Dutch autumn nights and the trench gave no shelter against the rain but adequate shelter from high explosives. As the German strength around us grew our perimeter shrank and the weight and frequency of shells and mortars around us increased. It seemed there was never as much as a five minute break between the whistling of shells, the crump of mortars or the staccato rattle of heavy machine guns.

A line from *All Quiet on the Western Front* sprang to mind. A German soldier on leave from the trenches disappoints those expecting to be regaled by his experiences by saying:

'Every day a year, every night a century. We live, and eat, and sleep with death.'

I am not suggesting that the Battle of Arnhem was in any way comparable to the prolonged horror of the trenches in World War 1. But my own war up to then had been fought in comparative silence. Here at first I was bemused by the constant explosions and the screaming of shells. I soon got used to it. The sounds at night were more muted but more sinister. Crouched in my trench I would hear the grinding rumble of a German tank approaching, and sometimes the horrifying roar of a flame-thrower.

I spent my time between my trench and the cellar. By this time I had acquired a Sten gun and two grenades from a soldier who would have no further use for them. I kept the grenades in the pocket of my smock. When I stooped to pick something up in the cellar they both

fell out and rolled on the floor. My ineptitude astonished the soldiers and embarrassed me. On 23 September the order was given. 'We remain here and fight to the last man and the last round.' On the 25th the order was changed. We were to attempt a break-out, through the enemy and across the river.

It was a dark night and pouring with rain. We tied sacking around our boots to deaden the sound and followed the white tape the Engineers had laid to mark the route to the river. There were sporadic bursts of fire as we ran into enemy patrols and had to take cover. On one of these occasions I threw myself to the ground and landed in a bank of mud. I had been advancing with my revolver in my hand and now contrived to fill its barrel with soil. So I re-holstered it and unslung my Sten.

We arrived at a place in the woods where tracks crossed. There was a great deal of shooting going on and we were halted. I spotted a vacant slit trench, pushed Dicky in and threw myself in after him. Somehow in my military ineptitude I got my Sten caught up in my airborne smock. It was a clownish Charlie Chaplin situation and if I could have seen myself trying to free it I would have been convulsed with laughter. I tried lifting it but it stuck on some immovable object. I tried pulling it downwards and it came smoothly – until the butt reached the ground.

It was at this moment that I became aware of the approach of heavy boots. I froze. But the boots, instead of passing on, came to a halt by the trench. The night was dark but by now XXX Corps was sending up tracer shells as signposts to our escape route. Against the light of one of these the occupant of the boots was silhouetted. He was a black cut-out in the classic pose of a soldier at a bier – head bowed and arms reversed. The shell had cast a gleam on his bayonet. It was directed downwards and the point was about six inches above my belly. Then he spoke – in German. I was flat on my back. My revolver was choked and my Sten was still inextricably entangled. I hissed at Dicky, 'Shoot the bastard!' The bayonet was withdrawn and its owner spoke. 'Oh, it's you. Right, we're moving on.' It was Major Cousins and he probably never knew how much he owed his life to my military incompetence.

At length we emerged from the trees on to the broad mud-flats of the river bank. There in a long, quiet, patient queue the remnant of the

1st Airborne Division waited for places in the few boats that plied from bank to bank. From time to time the flats would be mortared or swept with fire from heavy machine guns. At these times the queue would go down like a row of dominoes, each man pressing himself into the mud. It was there that I discovered that when bullets pass very close they crack like whips.

My turn came for a place in a boat. I reached the far bank and walked about four miles to a tent where we were given a cup of cocoa before being loaded onto a truck to Nijmegen. We were hungry and exhausted. We had arrived at Arnhem eight or nine days before, each man carrying 48 hour's worth of rations. Some of the men who had swum the river were now clad only in a blanket. The next morning there was a re-kitting session. I no longer had a hat. I asked the redoubtable Brig. Hicks if I may wear a red beret with the Border Regiment badge. Without hesitation he gave his permission. From this came the uniform I was to wear for the rest of the war, to the occasional bewilderment of both airmen and soldiers, but nobody ever questioned it. It comprised an army battledress with Pegasus flashes on the shoulders and neat gaiters at the ankles. There were my RAF wings and badges of rank, and all topped off with the red beret and the Border Regiment badge.

From there we went by trucks to Brussels where we boarded an American Dakota for the flight home. I was sitting in the back with a compass in my hands and watched unbelievably as the needle swung from west through north to east. Three hours later we were back on the ground at Brussels. The pilot apologised. 'I didn't have a navigator you see', he said. I told him that had I known I would have come up to the cockpit and done the navigation myself. I think I was a bit harsh with him but I had 20 Border Regiment soldiers with me and I worried that his incompetence could result in our being reported missing, to the great distress of our nearest and dearest back home. At least I was able to buy the lads some well-deserved beer in Brussels that night, using a quantity of currency I had found in my survival pack.

The next morning we were flown to Selby and thence by bus to Woodhall Spa where the battalion was based. Instead of driving into the base the NCO stopped the bus about 100 yd outside. All the troops disembarked and formed up on the road, leaving me the sole remaining passenger. I was wondering what this was about when the

NCO re-boarded the bus. Coming down the aisle to where I was sitting he saluted and said, 'Sir, the lads want you to march us in.' I have never felt more greatly honoured.

I was pressed to stay on for a while at Woodhall, but apparently I had been recalled urgently to Fighter Command. There was already a Lancaster in the circuit sent to collect me. I walked up the steps to Bentley Priory, tired and nearly two stone thinner, clad in my filthy uniform and red beret. I was sent to see a Wing Commander Craig, the Command Fighter Control Officer. He asked me what had happened. I told him. He asked me if I would now volunteer for a similar operation in the Japanese theatre. I told him I would not.

10,095 men had been sent to Arnhem. The count at Nijmegen on 26 September showed that 2,263 had made it back across the river. Some 7,000 were accounted killed, wounded or missing. How many of these last returned home I do not know. I only hope that some of our airmen were amongst them. These events were all of 60 years ago. For me every single day since then has felt like a bonus and a blessing.

Geoff Richards was at Cambridge when the war started. He volunteered for the RAF and became a fighter pilot, flying Hurricanes and Spitfires. His postings included one as a Liaison Officer with the Soviet Air Force, test-flying Hurricanes, newly assembled from their crates after being shipped out by sea. On demob he became a teacher but soon found the life frustratingly narrow after the wartime years. In 1948 he returned to the RAF, into the recently formed Education Branch where he served until his retirement in 1969. In 1979 he moved to Australia, following his son and daughter who had already emigrated there, and where he now lives with his wife Miki, whom he first met in 1943 in the Sector Operations Room at Middle Wallop.

THE FLIGHT TO THE NORTH

NO 2 SQN – FARNBOROUGH TO MONTROSE IN 1913

Wg Cdr George Wilson

Introduction

When the RFC was formed in 1912 the Military Wing had an authorised strength of one airship squadron and seven aeroplane squadrons. In fact there was only enough men and materiel, mostly inherited from the Air Battalion of the Royal Engineers, to form the airship squadron (No 1) and two aeroplane squadrons, No 2 at Farnborough and No 3 at Larkhill and it was planned that when it became possible aeroplane squadrons would be formed and stationed at Montrose, Gosport, Dover and Orfordness. Only at the end of 1912 were there enough aeroplanes and pilots to start forming No 4 Squadron at Farnborough. But the airfield was much smaller than it is now and it was becoming congested, so it was decided that No 2 Squadron should move to Montrose as soon as possible.

In 1912 the aircraft were small, light and easily dismantled and for long distances it was normal to move them by road or rail and Montrose was a long distance from Farnborough; over 460 miles! However, the radical decision was made to fly the squadron aircraft to their new station. This would, hopefully, not only demonstrate the inherent mobility of the Corps but also give the pilots some practice in cross country flying over unfamiliar ground.

The Plan

By the beginning of February 1913 the plans were more or less complete. The flight was to be in six fairly short legs and a ground support party would travel by road for routine maintenance and any necessary repairs. Six aeroplanes were to make the flight, three BE2s, to be flown by Capts Becke, Darbyshire and Longcroft, and three Maurice Farmans, to be flown by Capt Dawes and Lts Herbert and Waldron. Only Dawes had more than a year's experience as a pilot. Without radios, navigation aids, aeronautical charts or a well defined and easily identified system of main roads, cross country flying at the time relied mostly on following railway lines – navigation by Bradshaw. The railway system covered the whole country and stations had their names in large signs on the platforms and in open country

especially, it was usually possible to fly low enough to read the names of stations en route, subject to weather of course. Oxford, Huntingdon, Newark, York, Newcastle and Edinburgh were considered as possible staging posts because there were suitable railway lines to follow. Becke, who was to lead the flight, reconnoitred the route by car the week before the flight was due to take place and found that heavy rains in January had resulted in badly waterlogged ground at the possible landing sites at Oxford and Huntingdon so they were ruled out. Instead he chose Towcester as the first staging post, to be reached by following lines from Farnborough to Reading, Oxford, and Bicester and thence Towcester. The other staging posts would be Newark, York, Newcastle and Edinburgh, all of them, as well as Montrose, were on the main London North Eastern line.

It was not intended to fly in any sort of formation, if only because the BE2s were much faster than the Maurice Farman's. However, it was planned that they would all do each individual stage on the same day and they would depart at short intervals of around 15 minutes.

There is little detailed information on the ground support party but it is known that a Capt Atkinson was in charge supported by Lt Lawrence, who looked after accommodation. They had at least one, probably two, staff cars, several trucks carrying men and equipment and two motor cycles ridden by mechanics. It appears that the ground party was to be split up so that men would be sent ahead to the next staging post while those who saw the aircraft off would then leap-frog to the next destination but one. Also there would be a mobile element, including the motorcyclists, able to go to the assistance of any pilot who had to come down before he reached his destination. Given the intention to follow the railways it would also be possible to send help by rail and this happened at least once. The main method of communication between the staging posts was by telephone or telegram. When forced landings had to be made there was not always a telephone available but the telegraph service was surprisingly fast. For example, during the flight, Becke left Newark for York at 3 o'clock and force landed at Doncaster about 45 minutes later. The support crew at Newark had a telegram with the news by about 4.30 pm. Longcroft, when he was Commandant at Cranwell in 1920, wrote some notes on the journey in which he says: 'One of the remarkable points in this journey was the wonderful work put in by the personnel



Officers of No 2 Sqn at Montrose in August 1913; those marked with an asterisk were involved in the move from Farnborough. L to R: Capt C A H Longcroft; Capt G W P Dawes*; Capt J H W Becke*; Lt F F Waldron*; Capt A C H MacLean; Capt F St G Tucker; Lt L Dawes. (Bruce/Leslie Collection)*

in charge of the machines and the transport. There were a great number of minor breakdowns both to machines and transport on the roads (the transport being a very mixed collection) and all work had to be done in the open, often in very difficult conditions, but both transport and machines arrived at Montrose in perfect running order. On several occasions the mechanics working on the machines spent the entire night working in the rain with no form of shelter, to enable their Pilot's machine to get off the next morning.'

Stage 1. Farnborough – Towcester

The flight was scheduled to start on Wednesday 12th February but on Monday 10th, Darbyshire set off from Farnborough in his BE2 to fly to Uxbridge only to lose his way in fog. He eventually found a green space where he landed but it was very tight and surrounded by trees which he narrowly avoided and he landed very heavily. He discovered that he was at Marylebone Green, on the edge of Regent's

Park, in London. *The Aldershot News* reported that the nose of the aircraft ploughed along the turf for about 30 or 40 yards and the propeller was broken but Darbyshire was uninjured. A recovery team from Farnborough eventually arrived and, having dismantled the machine, took it back to base by road. But there was no spare machine for him so the flight was now reduced to five.

Darbyshire's experience of losing his way in the fog was a foretaste of what was to be the main hazard on the flight and the planned starting day on Wednesday was too foggy for a start to be even attempted. The morning of Thursday 13th was just as bad but they managed to leave in the afternoon. But conditions deteriorated shortly after they left and Longcroft and Waldron returned to Farnborough. The other three, Becke, Dawes and Herbert landed near Mapledurham, about 4 miles north-west of Reading. Finding the right railway line to follow out of Reading must have been just too difficult in the conditions. The fog did not lift on Friday and that evening it was found that someone trying to write his name on an aircraft wing had punctured the fabric. Even worse, according to *The Reading Observer*, 'the machinery had been poked by a stick. This damage was repaired by the engineers attached to the Royal Flying Corps with the assistance of a local firm. The officers made inquiries and were quite of the opinion that the damage was accidentally and not wilfully done.' While the repairs were being done on Saturday morning one of the pilots ran into, and killed, a calf while driving from Reading to Mapledurham. The farmer was paid £5 for it. On Monday 17th the fog had lifted but it was replaced by easterly winds, reportedly gusting to 30 mph, which made flying very difficult, especially for the Farmans.

By this time there must have been a great temptation to call the whole thing off but Becke, and HQ at Farnborough, decided to carry on. Longcroft and Waldron left Farnborough about 15 minutes apart but Longcroft had to land at Uttlemore near Oxford because, as he says in his notes, 'my instrument board fell out into my lap' and he lodged for the night in the local asylum. Waldron lost his way and landed at Iffley near Oxford to ask the way. He took off again but had a control problem and landed again almost immediately at Port Meadow. Whether he also spent the night in an asylum is not recorded. The three who took off from Reading were soon widely separated. Herbert, who left first, seemed to be having more difficulty



Capt Becke's BE2a, 217, down at Tiffield. (Bruce/Leslie Collection)

than the others with his navigation and came down near Moreton-in-Marsh, about 30 miles south-west of Towcester. Presumably he picked up the wrong railway line from Oxford and his error would be compounded by drift due to the strong easterly wind. Dawes had engine trouble which was to dog him for the next week and he landed at Bloxham near Banbury where he nearly overturned in avoiding a boy who ran across his landing path. Meanwhile, Becke, the last to leave, was running short of fuel and in the early afternoon had to land at Blakesley about 4 miles from his destination at Tiffield just outside Towcester. However, after refuelling, he made the short hop to Tiffield.

The wind became even stronger overnight so on Tuesday Longcroft and Waldron stayed put. Herbert did set out from Moreton-in-Marsh but his navigation difficulties combined with 30-40 mph winds meant that he finished up at Chinnor near Aylesbury, further away from Towcester than he had been the night before. He later reported that at one stage he took two hours to travel 14 miles. On Wednesday, 19th, Longcroft, having had his aircraft repaired, reached Towcester followed soon afterwards by Herbert. Waldron, after leaving Oxford, had to land at Ardley near Bicester with engine trouble and did not reach Towcester until Thursday. Dawes meanwhile, was having another bad day. A joint in his petrol tank

sprang a leak and he landed at Fosco, still a few miles from his destination, suffering some fabric damage in the process. A rescue team was sent from Towcester to solder the tank but he had further problems with rough engine running so that it was Friday before he eventually reached the landing ground at Tiffield.

Everywhere they stopped the pilots were surprised at the number of people who turned out to see the aeroplanes which were not a common sight in that part of the country even singly let alone several at a time. According to newspaper reports the crowds were numbered in thousands and keeping them at a reasonable distance was difficult at times. At Towcester an attempt by Suffragettes to paint 'Votes For Women' on Longcroft's machine was only narrowly averted but *The Newark Advertiser* reported that when it arrived at Newark it was covered with signatures, presumably not all those of suffragettes.

Stage 2. Towcester – Newark

On Wednesday evening, with three aircraft at Towcester and the other two not far away, Becke decided that the flight could restart next day. At mid-morning on Thursday Longcroft and Herbert left for Newark where the landing ground was a 100 acre field at Kelham Bridge, supposed to be easily identified by being close to the river and having a large tree in the middle. A large white cross was also laid out. *The Newark Advertiser* claimed that the airmen said the field was ideal except for some dry drainage dykes running across it; and, presumably, the tree! Longcroft, in the faster BE, arrived first to be greeted by an enthusiastic crowd including several reporters. The *Advertiser* man wrote: 'Thursday was a bitterly cold day. The wind went through the warmest clothing, and up in the sky, 2500 feet, the temperature was more than chilly. Captain Longcroft made light of it. He alighted in a nonchalant manner, and busied himself getting his machine to the hedge side as if he had stepped simply out of a train, and seventy-mile non-stop flights, 2,000 feet in the sky, were ordinary, every day occurrences. His *sang froid* was amazing.' Longcroft told the reporter that he had had 'a pleasant journey, free from 'experiences''. Keeping east of the towns he had passed over, he missed the smoke and fumes and variations in currents, particularly at Market Harborough. Near Melton Mowbray, travelling was a bit 'bumpy' owing to the hilly nature of the ground affecting the currents

above. He said, 'The wind, striking the hills, appeared to get an upward direction imparting a jerkiness to it. I promptly rose higher, getting, as my aneroid showed, 3,000 feet, where it was all plain sailing.' He clearly enjoyed this hero's welcome and on the next three stages he managed to arrive first to repeat the performance with the press.

Becke waited at Towcester until he was sure that Waldron's and Dawes' aircraft would be ready to fly on Friday. He arrived at Newark in mid-afternoon to be greeted by an even bigger crowd because he was a local man and, in any case, it was half closing day. *The Advertiser* reported that there were hundreds of bicycles parked along the road. He was also interviewed at length by the reporters. Between them the 19th and 26th February editions of the weekly *Advertiser* devoted over 100 column inches to the flight.

Waldron arrived at Newark shortly before ten thirty on Friday morning just as Herbert and Longcroft were preparing to leave for York. Dawes arrived around three o'clock but his run of bad luck had not ended. After landing he was taxiing across to where Becke's machine was parked and, crossing one of the dry drainage ditches rather too fast, damaged his tail skid.

Stage 3. Newark – York

Becke sent Herbert on his way to York about 11 o'clock on Friday morning followed by Longcroft ten minutes later. Waldron was at Newark for only about an hour and took off for York twenty minutes after Longcroft. All three of them had straightforward flights to York, causing great excitement to railway passengers as they flew past Selby station. Longcroft overtook Herbert just before they passed Selby so they were both in sight at the same time and Waldron followed about 15 minutes later. According to *The Yorkshire Evening Press* Longcroft's aircraft was the first ever to have landed at York and it went on to report that after the first two landed, 'The short period of waiting for the third member of the Flying Corps, who was sighted at 12.50, was spent by Capt Longcroft and Lt Herbert in responding to the constant appeals for a specimen of their handwriting, the men being quite as persistent as the ladies.' Longcroft, of course, gave the reporter an interview about his trip.

Becke, was advised that the damage to Dawes machine would only

take two hours or so to repair so he left for York at 3 pm expecting Dawes to fly to York the following morning. Apart from continually reorganising the schedule and generally acting like a mother hen, Becke had enjoyed a successful trip so far but now his luck changed. *The Newcastle Daily Journal* on Saturday 22nd reported: 'He was flying at a great speed, at an altitude of 3,000 feet, when, on approaching Doncaster Racecourse his engine blew out, and he was forced to descend. He expressed great disappointment at the prospect of being delayed a day or two at Doncaster, and stated he would require an entirely new engine for which he had wired to headquarters.'

On Saturday there was again thick mist and anyway, closer inspection had showed that Dawes had bent the axle of one of his landing wheels as well as damaging the tail skid. By the time these had been repaired the weather had improved and he was ready to start for York just after noon. However, his jinx struck again and he only managed eight miles.

The Newark Advertiser of 26th February reported that: 'It was thought at the time by experienced users of petrol engines, that his Renault was not doing all it should do. At any rate, after rising to about 2,500 feet and traversing about five miles, it was seen that he was undoubtedly descending. He came down in a green paddock near Weston Mill, and but for the restricted size of the field would have had a good landing but as it was he cannoned with the hedge and damaged two of his lower planes slightly. On examination of his engine it was found that the petrol pipe had become disconnected and therefore no petrol could get to the explosion chamber. The mechanics who had remained at Newark collecting the stores, proceeded to Weston and commenced repairs. These were concluded the same day but too late to think of going on to York. On Sunday morning Captain Dawes came over from Newark to test the engine and no sooner had it been 'started up' than a valve rocker broke. Amongst all their 'spares' the mechanics could not find another one, but Mr Oxspring of Sutton-on-Trent made one out of a crank and it was fitted on Sunday.'

By the morning of Monday 24th Dawes' locally made spare been fitted and the other repairs to his machine been completed. Meanwhile, Becke's new engine had arrived from Hendon and been fitted and tested. They both set off for York where they stopped only

briefly before leaving for Newcastle at around 1 pm.

Stage 4. York – Newcastle

On Saturday 22nd, excited crowds had begun to assemble at the Knavesmire racecourse at York at 7 a.m. but Longcroft, Herbert and Waldron delayed their departure for a further exchange of telegrams with Becke who decided that they should carry on to Newcastle. They were not ready to leave until mid afternoon and Herbert eventually took off just after 3 o'clock followed at five minute intervals by Waldron then Longcroft. Bearing in mind that it was late February when the sun sets shortly after 5 o'clock in that area they seemed to be cutting things rather fine to make it in daylight even for a flight of just over 80 miles. The Maurice Farmans were only making about 40 mph.

However, the start of the journey went smoothly and *The Yorkshire Evening Press* that evening reported that they had passed over Northallerton at around 3.40 within a few minutes of each other. The football match between Romanby and Ripon City was stopped for the spectators to watch them while they flew over.

The now familiar crowd of spectators that had gathered to meet them at Gosforth Park, Newcastle, had been entertained by Mr B C Hucks who had taken off from the park to fly down the Tyne but the whole area was covered in fog; scarcely unusual for such a highly industrialised city at that time of the year and he soon gave up and returned to Gosforth to the delight of the crowd. Hucks was a professional stunt pilot, flying a Blériot, and he was reported to be the best in the U.K at that time.

In the fog and fading light, the RFC men, strangers to the area, had a major problem finding the landing ground. *The Newcastle Daily Journal* of Monday 24th reported that although they had followed the line of the railway from York by Darlington and Durham, they were often unsure of their bearings, and when they arrived in the neighbourhood of Newcastle they became completely lost.

Longcroft passed over Newcastle shortly before half-past four, and his flight created great interest to large crowds of people in the city. However, he flew several miles too far northwards - beyond Morpeth in fact. He came down to find his whereabouts, and about half a mile from the aerodrome he had to land again. He eventually reached Gosforth Park at 5.7 p.m.

Longcroft in his notes wrote:- 'It was a very doubtful day, with fog and haze about, and the landing ground at Gosforth Park, which was our destination, was almost impossible to find. Only two of us found the ground that night, and then only after landing about 30 times to ask the direction of it. On these occasions one is always given minute directions as to how to get there by 'taking certain turnings, which one cannot miss, at very prominent landmarks' (usually well known Public Houses) and other directions which were very easy to follow on the ground, but did not constitute good landmarks from the air.' Thirty landings to ask the way seems a bit of an exaggeration but it illustrates the problem they had.

The pilots could not help each other, not being in visual contact and having no other means of communication, but Herbert arrived at the Park about ten minutes after Longcroft, having also landed a few times to inquire his way although it is not quite clear where or how often. Waldron did not get to the aerodrome at all. He landed on the outskirts of the city, at Benwell, to check his whereabouts but his machine ran down a slope, and, although he managed to slow it down, he failed to stop it running into a building and damaging the strut of his front elevator fairly badly. *The Newcastle Daily Journal* reported that on Sunday his aeroplane was visited by thousands of people.

On Monday 24th, Becke and Dawes, having just arrived in their repaired machines, left York at about 1 o'clock and so had rather more daylight than the others had had. But the fog was not about to clear even for the flight commander and they had the same problem as the other three in locating Gosforth Park. Dawes reportedly had to come down only once to ask for directions but Becke flew around Newcastle for about an hour and a half trying to locate the landing ground and landed five times to find out where he was. By Monday afternoon the population of Newcastle must have become quite used to the sight of aeroplanes flying in apparently random directions over the city and quite often landing close by. It must have been difficult to believe the newspaper reports that there were only five aircraft involved altogether.

Stage 5. Newcastle – Edinburgh

At 125 miles the leg from Newcastle to Edinburgh was to be the longest of the journey following the main railway line via Berwick.

By the evening of Monday, 24th, four aircraft were at Gosforth Park with the fifth only a very short distance away at Benwell so that on Tuesday morning, for the first time since they had left Farnborough twelve days earlier, all five were declared ready to leave together. However, they were not out of trouble just yet. Waldron took off first at 8.30 a.m. but immediately had trouble with the front elevator he had damaged when he landed at Benwell. He diverted to Gosforth Park, arriving just as the others were about to leave. Longcroft left at 9.15 followed at five minute intervals by Herbert, Dawes and Becke. Waldron's problem was quickly resolved and he was on his way again just after 10 o'clock.

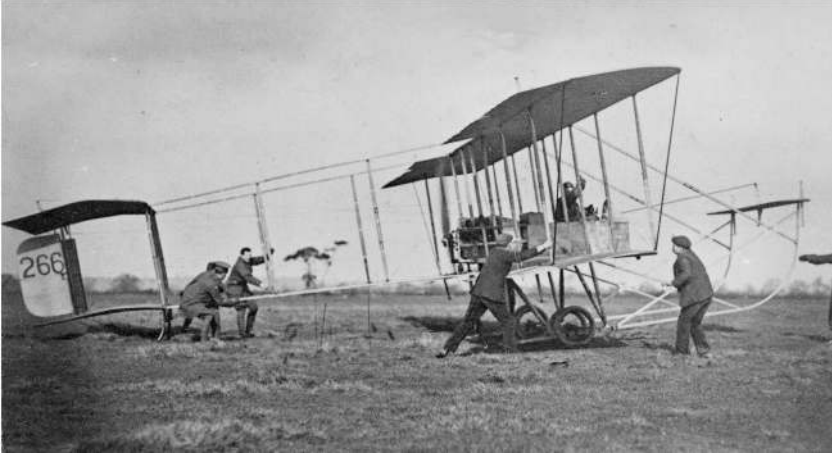
The first four machines flew over Berwick at between ten o'clock and twenty past and Longcroft reached Edinburgh around 11 confirming that, for once, there had been a favourable wind. *The Aldershot News* of 28th February reported that: 'Captain Longcroft reached Edinburgh shortly after eleven o'clock and landed near the new Redford Barracks. He had experienced great difficulty in locating the appointed landing place owing to the thickness of the fog which enveloped the city. He described the flying conditions, apart from this, however, as quite good. His arrival was shortly followed by that of Lieutenant Herbert and Captain Becke. Captain Dawes was first compelled to descend a mile or so away from the barracks, and when he at last reached the appointed landing place his biplane met with a mishap, a portion of the fabric covering the lower plane becoming detached.'

Waldron, after his delayed start, was still having problems and engine trouble forced him to land at Little Mill near Alnmouth. The mobile repair team solved the problem but by that time it was too late to reach Edinburgh before dark so he flew to Berwick where he landed on the Magdalen Field near the barracks.

Longcroft in his notes says they received a tremendous reception at Edinburgh, and were entertained in the evening by the local Aeronautical Club.

Stage 6. Edinburgh – Montrose

The morning of 26th was not very promising for the final leg to Montrose, being hazy with drizzling rain and a gusty wind. That day's *Edinburgh Evening News* reported that in spite of the weather several



*Longhorn 266 was flown to Montrose by Capt P L W Herbert.
(Bruce/Leslie Collection)*

enthusiasts were sheltering beside the barracks by 6.30 a.m. At 9.30 the spectators' patience was at last rewarded when the pilots arrived and the aircraft were prepared for flight. The rain had stopped and the mist was clearing so at about 9.45 Longcroft took off for a weather check.

Meanwhile, Waldron had decided to steal a march on the others and had left Berwick at 7.30 to follow the railway line up past Dunbar before turning over North Berwick to cross the Firth of Forth to Anstruther in Fife. At nearly 15 miles this is one of the widest places to cross and he was naturally somewhat nervous after his engine problems the previous day. *The Edinburgh Evening News* reported that, 'He hoped, in crossing the Forth, to reach a height of 6000 feet, so that in the event of his engine giving any trouble he could voloplane (*sic*) to either bank at an angle of one in six.' However, although he had no engine problems his navigation let him down and he overshot his target, landing at Hillside about three miles north of Montrose. He was soon redirected and took off again. He arrived at 10.25 while the others were still getting ready to leave Edinburgh.

Reports on this stage of the flight from the *Edinburgh Evening News* and the *Dundee Advertiser* are rather confused, except for those about Waldron. The *Advertiser* reported that two aircraft had flown

past St Andrews between nine and ten o'clock although, in fact, Waldron was the only one airborne at that time. It also reported that Longcroft flew the 75 miles from Edinburgh to Montrose in just 40 minutes, which is to say at a groundspeed of 112 mph. To have averaged that in a BE would have required a tailwind component of the order of 50 mph and there are no contemporary reports of such gale force winds.

Taking the reports from the various places en-route into account the details of the flight appear to be that Becke and Longcroft took off just before eleven o'clock and Dawes at ten minutes past. *The Edinburgh Evening News* had reports of them passing Markinch and Kirkcaldy and also that there was cheering when two of them flew over Cupar. One of the aircraft, probably Becke's, flew over Dundee and the other three crossed the Firth of Tay from Tayport to Broughty Ferry, where the schools closed when they appeared. There was similar excitement at the other towns round the coast and *The Advertiser* reported that the first aircraft, which would have been Waldron's, flew over Arbroath at 9.50 when 'most people were proceeding to their work after breakfast, and the majority of the inhabitants were thus enabled to see it.' They obviously had late breakfasts at Arbroath in 1913. The times given in *The Advertiser* for the following aircraft flying over Arbroath are not compatible with the times they left Edinburgh but it appears that Longcroft arrived at Montrose at 12.40, followed ten minutes later by Becke then Dawes after another 30 minutes. Herbert, true to his earlier form, had got lost in fog over the Forth and landed at Queensferry to ask the way and was last to arrive at about 2.30. Naturally there was great excitement at Montrose and the schools were closed for the day so that the children could join with the crowd of spectators at Dysart.

Waldron's arrival at Hillside had created some confusion but his slight delay there meant that the Town Councillors had time to get ready to greet him when he arrived at the aerodrome at Dysart. *The Advertiser* reported that Provost Thomson and every other member of the Council welcomed him. They also waited to welcome all the others when they arrived. Their conversations with the Provost were reported at length in *The Advertiser* and *The People's Journal*, and were mostly about the flying conditions and especially the problems caused by the fog.

The Montrose Review of 28th February looked ahead when reporting a meeting of the Montrose Improvement Association at which it was said that: 'Hangars for the protection of the aeroplanes have already been erected at Upper Dysart and upwards of 100 men of the Corps are located in Panmure Barracks, where a large force will now likely be stationed permanently. This event is bound to have a far-reaching effect on the prosperity of the town, for as the flying machine is still a *rara avis* in this country the presence and evolutions of these army aeroplanes are sure to attract an extraordinary number of visitors to enjoy the interesting sight, combined with the healthful pleasures of a holiday here.' The RFC's reasons for the relocation of No 2 Squadron had not, as far as can be determined, included being a seaside holiday attraction.

Except for a few minutes at Newcastle two days earlier the five aircraft had not all been together since they left Farnborough on the 13th but somehow they all arrived at Montrose within a space of about three hours. Without the reports from the various places along the way it would be easy to assume from this orderly arrival that the whole flight had been straightforward when it had been anything but.

Success or Failure?

The question, of course, was whether this way of moving a squadron really a practical proposition. Taking thirteen days to move five aircraft 460 miles scarcely seemed to be a worthwhile exercise but the RFC persevered. When new aeroplanes started to become available to build the squadron up to strength pilots went by rail to Farnborough to collect them and then fly back to Montrose. In the space of only three months this became a routine operation, although a flight usually took at least two days. On 19th August Longcroft with Lt-Col Sykes, OC Military Wing who later became the first Chief of the Air Staff, as a passenger flew from Farnborough to Montrose in one day with only one stop en route, flying non-stop from Farnborough to Alnmouth in five and a half hours. A special auxiliary tank had been fitted under the passenger's seat and Sykes must have had a most uncomfortable journey because it raised his seat so high that his head was practically touching the upper wing and his body was exposed to the slipstream from the knees up. The whole journey took 7 hours, 40 minutes flying time.



Charles Longcroft seen shortly before taking off for his notable long range flight in November 1913. The aeroplane is the BE2a that he had flown up from Farnborough in February with its front cockpit now faired over and occupied by an auxiliary fuel tank. (Bruce/Leslie Collection)

Becke and Longcroft, who were on different flights, were having their machines fitted with long range tanks to attempt a non-stop flight to Farnborough. The mechanics in both flights put a great deal of effort to get their respective machines ready first. Leading Air Mechanic Bullock, who was in charge of the work on Longcroft's machine, won the race having designed and made a tank which he estimated would hold enough fuel for at least 8 hours flying and fitted it in the front seat of Longcroft's machine. On November 21st Longcroft left Montrose at 8.55 a.m., flying first to Portsmouth, where he did not land, then back to Farnborough, where he landed at 4.15 p.m., a non-stop run of 7 hours 20 minutes.

The decision made less than a year before to move the squadron by air had been vindicated and from then on this was the normal method of movement for everything from single aircraft to whole squadrons. When war broke out on 4 August 1914, No 2 Sqn was readied to fly south, and was at Dover by the target date of the 9th ready to fly across the Channel. They never went back to Montrose.

THE MALTA AVIATION MUSEUM

Air Chief Marshal Sir Michael Armitage

Of all the museums that are these days restoring and preserving historic aircraft, perhaps the most remarkable one is the Malta Aviation Museum at Ta'Qali, just a few miles inland from the capital, Valetta. The museum stands on the site of the wartime airfield, and at present it is housed in two of the original Romney huts.

The Museum started life in the most basic way, with the rescue from a scrapyards of several major parts of a wartime Spitfire wreck. Restoration began in a local household garage during 1993, and many missing components were gradually collected from well-wishers in Malta and the UK, and from a variety of other sources, including the sea-bed off Malta, which gave up items such as undercarriage legs and wing leading edges from submerged wartime wrecks. At around this time, ten or so different local associations in Malta, all of them interested in aviation, militaria or military history, came together to form the Malta Aviation Society. The old Romney huts at Ta'Qali were identified as a suitable home in which to start a Museum. A huge effort was put in by local volunteers to make the most of the shabby buildings and in April 1996 the doors were opened to the public.

Meanwhile, the Spitfire had been identified as EN199, and its complete wartime history had been traced by a UK researcher. By now a wartime Hurricane had also been located, this time by a local diver who found the wreck at a depth of 43 metres about a mile out to sea near the well-known tourist spot, the 'Blue Grotto'. The remains of this machine were raised and brought to the Museum, where they joined the modest but growing collection. This by now included a purchased Vampire T.11 and a Fiat G.91 donated by the Italian Air Force. Later, a Sea Hawk arrived from Wales, where it had been exposed to the elements for several years, and a Tiger Moth fuselage was also acquired. A great deal of work was undertaken from the start by the many volunteers engaged in the museum project, not only to restore the aircraft from their very basic condition up to presentation standard, but to clear out and restore the rest of the space in the Romney huts in which everything was to be displayed.

It had become clear from a very early stage in the development of the Museum that the old huts did not offer enough room to house the



An early stage in the restoration of the Hurricane that was recovered in 1995 from the seabed near the Blue Grotto where it had lain since 1941.

whole collection, even if those dilapidated buildings themselves survived more than a few extra years. It was therefore decided to purchase a complete new aircraft hangar, and the choice eventually fell on a galvanised steel structure that will be 24 metres long and 21 metres wide when it is erected on site at Ta'Qali. Fundraising for this new purchase began in 2003, and very many contributions, large and small, were gathered over the following eighteen months, including a most generous contribution of £500 from the Royal Air Force Historical Society.

By the end of 2004 the magnificent total of £49,622 had been collected. And, even better, this response has recently triggered the very substantial sum of £61,553 from the government of Malta with the happy result that work can now start on laying the concrete foundations for the new hangar, and the hangar itself can be purchased, delivered to Malta and erected on the site designed for it.

There is still a great deal to be done, and the many supporting facilities such as water, electricity supply and other items have still to be arranged; but we are over the hump and the way ahead is clear. The formal opening of the new hangar will take place on 28 September, to



Much progress has been made with the rebuilding of Z3055, which now sports No 126 Sqn's markings.

coincide with the Malta Air Show, the 'Merlins Over Malta' project and a WW II Veterans' Reunion..

Further donations towards the hangar project are, of course, still urgently needed and they will go towards the cost of services such as laying on the electricity supply, fire equipment, a tarmac surface to be laid in front of the hangar and around it, and towards the many incidentals needed for the hangar such as showcases, pictures, commemorative marble plaques and so on.

As to present progress on restoring the Museum's aircraft, the Spitfire IX, the Vampire, the Fiat G.91 and the Sea Hawk are all maintained in static display condition, while the remarkable volunteer workers at Ta'Qali are actually manufacturing by hand the missing mainplanes for the Hurricane IIA (Z3055). It is hoped to have this work completed in time for the September ceremonies.

The very latest development at Ta'Qali is that the skeleton of a Fairey Swordfish has been delivered from a collector in Canada. The restoration of this remarkable acquisition poses quite a challenge for the local enthusiasts, but if their success with the Hurricane is anything to go by, then we can expect to see even this wreck brought up to display standard in the next couple of years.

POST WAR AIR SEA RESCUE - THE BELL ROCK INCIDENTS

Donald Smith

When the Royal Air Force's wartime Air Sea Rescue organisation was wound up in 1946, search and rescue (SAR) duties were handed over to the Marine Branch. It was thought that as no one was shooting at our aircraft, very few aircrew would require rescuing from the sea. Later, in the 1950s, when the helicopter was beginning to make its presence felt, it seemed that time was fast running out for the SAR remit of the Branch. But, contrary to popular opinion, aircraft still crashed into the sea, either through pilot error or because of mechanical failure. Whenever an accident occurred, RAF launches and their peacetime crews were ready to respond. The Marine Craft Units (MCU) always had a duty launch on standby, waiting for a 'Crash Call' and the boats were still equipped with a 'Crash Kit' which contained the necessary tools for extricating aircrew from crashed aircraft. Comprehensive first aid kits were also carried, and although the medical orderly had been dropped from the crew list; all Motor Boat Crewmen (MBC) were trained in first aid and resuscitation techniques.

On 15 December 1955, whilst on a routine training flight and mail drop to the Bell Rock Lighthouse off the Fife coast, a Sycamore HR 14, XG501 of No 275 Sqn Leuchars-based C Flt, crashed upside down on the rocks and burst into flames, the wreckage subsequently being washed into the sea. Crewed by FSgt Percy Albert Beart and Sgt Edward Francis Hall, the aircraft's tail rotor had apparently struck an instrument cluster on the lighthouse causing a total loss of control.

The 'Crash Call' was received by No 1112 MCU at Tayport and RSLs 361 and 365 responded, along with a pair of helicopters from Leuchars.

At about 1400 hrs, the Coastguard rang the Hon Sec (the designated authority for launching the local lifeboat) of the Lifeboat Station at Anstruther to inform him that the RAF rescue launch had picked up a badly injured airman and that a doctor was required to attend. The life-boat *James And Ruby Jackson* put out with a doctor on board to rendezvous with 361. The tide was on the flood, with a light south westerly breeze causing a heavy swell. The two boats met off



RSL 361, of No 1112 MCU at Tayport, carried out her last rescue mission on 15 December 1955.

Crail, and the doctor, along with an RNLi crew member were transferred to the RSL. The launch made full speed for Anstruther, where an ambulance was waiting, arriving there at 1500 hrs but, sadly, the airman had already died.

The RAF launch then returned to the accident area to search for the other missing airman. She was assisted by the Arbroath life-boat, *Howard, D*, and the Montrose life-boat. After a protracted search and no sign of the missing aircrew the search was abandoned. The official RAF Casualty Record states that one body was recovered from the sea by a helicopter some one and a half hours later, but does not give a name, however, since the only casualty listed is Sgt Hall, the navigator, it is assumed that he was the man who had been picked up by the launch. This was RSL 361's last rescue mission as she was replaced by the new class of 43ft RSLs, No 1662, in June the following year.

Some six months later, on the 10 July 1956, RSL 365 rescued three crewmen from another helicopter that crashed off the Bell Rock after a radio servicing trip to the lighthouse. The aircraft was another of No 275 Sqn's Sycamore HR 14s, XF 265, again operating from Leuchars.



RSL 1651 at speed.

Fortunately it came down only fifty or so yards ahead of the launch, so the Pilot, Flt Lt Hartman, his navigator, FS Griggs, and Cpl. Eckford, the wireless technician, barely got their feet wet. The subsequent inquiry attributed the accident to engine failure. During this incident, another Sycamore was scrambled from Leuchars flown by FSgt G T Manson accompanied by Sgt G R Poulter. This was the last time that radio technicians were taken to the lighthouse by helicopter; in future they were to be rowed across in a 9 foot GRP Dinghy from one of the Tayport MCU's launches. Later that year, on 17 October, RSL 365 was replaced by 1651, another of the new 43ft RSLs.

On 26 March 1957, a Hunter F.4, WV388 of No 222 Sqn, crashed north of the Bell Rock on its approach to Leuchars. RSLs 1651 and 1652 carried out an extensive search through the night and all the next day, but they found no trace of the pilot Fg Off R J Davidson. On the 27 August a memorial service was held in the vicinity of the crash attended by 1651 and 1652.

Acknowledgement.

The author, who is the Secretary of the Scottish and Borders Branch of the ASR/MCS Club, wishes to acknowledge the assistance of Geoff Danieli, Jim Fergusson, the RNLi archives in Poole, and Ken Hunter of the Royal Air Force Museum, in the preparation of this article.

FRATRICIDE — AN OVERVIEW OF FRIENDLY FIRE INCIDENTS IN THE 20TH CENTURY

Wg Cdr C G ‘Jeff’ Jefford

This paper was originally prepared for a Royal Aeronautical Society symposium held at Hamilton Place, London on 17 September 2004. It may also be of some interest to some members of this Society.

Ed

The aim of this paper is to review the main causes of fratricide and to illustrate how these influenced selected incidents that occurred during the 20th Century. While this survey concentrates on aviation, some attention is also paid to friendly fire at sea and on land.

Introduction

We all know, intuitively, that, along with death and taxes, friendly fire incidents in wartime are more or less a given. That said, when I undertook to begin today’s proceedings with an historical overview, I was not entirely confident that I would be able to come up with chapter and verse to support this presumption. I need not have worried – the incidence of incidents has been so high that my problem, rather than being to do with finding examples, became one of selecting which ones to use.

So, how to deal with the topic? I am going to start with a question. What *causes* fratricide?

There are a number of reasons, and I would not claim that my list is exhaustive, but it will be adequate for our purposes.

- Communications – lack of and/or a failure to use them, eg to circulate information within the C2 system.
- Procedures – lack of and/or a failure to adhere to them, eg entering restricted airspace.
- Self Discipline – target fixation – the ‘adrenaline (perhaps even testosterone?) factor’.
- Fear – the self-preservation instinct – the ‘once bitten’ response of the man who has recently been under fire.
- Technology – an overconfidence in its capabilities and, sometimes, a failure to appreciate its implications.
- Serviceability – of that technological equipment.

- Intelligence – if ‘Int’ briefs you to expect to see something, you probably will.
- Misidentification – the safety net is aircraft (and ship and vehicle) recognition – which is difficult in the dark and impossible when you are using Beyond Visual Range weapons.

Writers on this subject have a tendency to start with a quotation from Thucydides describing an infantry night attack in 413 BC during the Athenian Syracuse Expedition; it ended as a hand-to-hand, blue-on-blue, free-for-all. But we really don’t need to go back that far as we can find more than enough examples from the 20th Century.

WW I

On 22 August 1914, less than three weeks into WW I, HQ RFC directed that ‘a squad of marksmen will be detailed for firing at hostile aircraft’; and went on to lay down what they were to do in the event of unidentified aircraft approaching – which was, in essence, to fall in with rifles and await further instructions.

Clearly, the troops must have been a little over-enthusiastic and only a month later, on 26 September, HQ RFC found it necessary to publish another order which said ‘Troops will not fire at aircraft unless ordered to do so by an officer Indiscriminate shooting at aircraft will cease immediately.’

While this may have served to rein in personnel serving on RFC aerodromes, it did not prevent a BE2 of No 4 Sqn from being brought down by rifle fire near Poperinghe on 26 October 1914; both occupants (Lt C G Hosking and Capt T Crean) died in what was probably the very first example of a blue-on-blue engagement in aviation history

One consequence of this unfortunate occurrence was the promulgation of yet another Order on 12 November. This one read:

‘All aeroplanes of the Royal Flying Corps are to be marked on the underside of the wings and on the rudder, with concentric circles similar to those on French machines, but with the colours reversed, that is with the red circle inside a blue ring.’

These ‘roundels’ replaced the Union Flags that had only recently been applied (with effect from 12 October) and would constitute the national markings which British military aeroplanes have worn, in one

form or another, ever since.

National markings, did help, of course, but writing in 1971, Air Mshl Sir Robert Saundby quoted an early RFC Flight Commander who recalled that, 'To this day I can remember the roar of musketry that greeted our machines as they left the aerodrome and crossed the main Maubeuge-Mons road along which a British column was proceeding' – so roundels were clearly not the whole answer.

Nevertheless, instances of aeroplanes being brought down by friendly small arms fire appear to have been rare, although there were several in which aircraft were shot down by artillery. There was, for instance, a remarkable incident in May 1917 when the crew of a Sopwith 1½ Strutter of No 45 Sqn was attracted towards a British anti-aircraft barrage directed at a pair of German aeroplanes. Not unreasonably, the pilot had anticipated that the gunners would cease fire when a friendly aircraft appeared on the scene. But they didn't and the Sopwith was hit twice. Fortunately the shells were not impact-fused (or failed to detonate) so neither exploded but they did sever the control lines to the tail surfaces. The crew (2/Lt H Forrest and Cpl F A R C Lambert) survived the aeroplane's subsequent violent and uncontrolled gyrations and its ultimate crash, although both were severely traumatised.

Three months later, another of No 45 Sqn's Sopwiths, one of a six-aircraft patrol, was seen to rear up violently and shed its wings. There had been no anti-aircraft fire at the time and the aircraft appears to have been struck by an artillery shell, but whether outbound or inbound it was impossible to say. That crew (2/Lts C M Ross and J O Fowler) did not survive.

The squadron re-equipped with single-seat Camels shortly afterwards and was then moved to Italy, but it was no safer there and on 4 February 1918 another of its aeroplanes was hit by a passing artillery shell, killing Lt Donald McLean.

It did not end there either. No 45 Sqn was to suffer a classic blue-on-blue on 16 July when an Italian pilot (*Tenente* Alberto Moresco of the 78^a *Squadriglia*) flying a Hanriot opened fire on the CO's aircraft. After only five rounds the Camel pulled up sharply into a loop permitting the Italian to see the roundels but it was too late; Maj 'Bunny' Vaucour was already dead with a bullet through his head.

I just happen to be very familiar with the exploits of No 45 Sqn,



Having evidently suffered damage to a wingtip in a previous incident, this FK 8 of No 82 Sqn was eventually shot down by Sopwith Camels on 5 October 1918.

but it was certainly not alone in suffering misfortunes of this kind. There was Thomas Littler of No 1 Sqn, for instance, whose Nieuport was shot down by Lloyd Fleming of No 46 Sqn flying a Pup, and the Australian Lt Gregory Blaxland of No 2 Sqn AFC who shot down a French SPAD killing *Adjutant* Henri Renault – and then there was an Armstrong Whitworth FK 8 of No 82 Sqn which was shot down in October 1918 after being set upon by five Sopwith Camels of No 70 Sqn. The Germans were equally capable of shooting each other down, of course, witness Franz Brandt of *Jasta* 19 who, in April 1917, brought down an LVG two-seater of FAA 257 killing its pilot, Vfw Josef Schreiner.

It worked the other way round too – aviators bombing, or being accused of bombing, their own troops. In most cases the RFC/RAF successfully contested these allegations but I have found one case, in July 1918, when we definitely owned up. It involved a Lt Devitt, flying a DH 4 of No 57 Sqn on a formation bombing mission, which required the pilot to release the bombs in response to the leader's signal. Concerned that he might miss his cue – this was his very first sortie – Devitt had briefed his observer to waggle the stick in the rear cockpit when he saw a flare fired by the lead aircraft. In the event the weather was poor and the leader abandoned the mission somewhere over the Lines and turned for home. Sgt Lovesey, in the back seat, thought that the aeroplanes were getting a bit too close for comfort in

the turn and waggled his stick to alert ‘Biggles’ who promptly toggled off the bombs....

This sort of thing was not confined to air forces, of course; navies were just as likely to suffer from self-inflicted injuries. To focus on just one aspect – submarines, specifically U-boats – in December 1917 the UC69 was rammed on the surface and sunk by the U96 as a result of a poor look-out having been kept by both crews. At least eight other U-boats were hoist with own petards either by entering German minefields or while laying mines themselves (UC12, UC32, UC41, UC42, UC44, UC68, UC76 and U59).

But for friendly-fire on an industrial scale we have to look to the armies, particularly to the artillery. Creeping barrages crept at the wrong rate; troops were misidentified and deliberately shelled; gun barrels became worn and shells were imperfectly manufactured so that the charges were unpredictable leading to many well-aimed rounds falling short. It is difficult to quantify what this amounted to but writing shortly after the war, the French General Percin estimated that the French Army alone had sustained something like 75,000 casualties as a result of its own artillery fire.

WW II

The Battle of Barking Creek.

But enough of ancient history, let us move on to WW II. We just have to start with the notorious ‘Battle of Barking Creek’. There are several interpretations of what happened but this short summary covers most of the salient points. At about six o’clock in the morning, a few days after the declaration of war, a searchlight battery reported possible intruders approaching the Thames estuary. HQ 11 Gp ordered six Hurricanes up from North Weald to investigate. Fourteen actually took off, and then six more were scrambled. The Observer Corps, who were aware of only the original notional six, reported a large formation, roughly on the anticipated track of the intruders. The radar station at Canewdon then reported contacts approaching from the east which led to twenty-four Spitfires being launched from Hornchurch. The Spitfires attacked the Hurricanes and two were shot down before anyone realised the error. On their way home the Spitfires were shelled by AAA, one aircraft being damaged.

There had been no intruders. So why did all of this happen?

The original visual sighting, to the east, into the early morning sun, had probably been a flock of birds but, once the ball was in play, practically all of the factors listed previously affected the game.

- Communications – there was poor information flow between the agencies involved, Group and Sector Controllers, the Observer Corps and the Army, who were responsible for anti-aircraft guns.
- Procedures – scramble six, so fourteen take off! – compounded by plainly inadequate (or perhaps a lack of) Rules of Engagement.
- Self Discipline – over-excitement certainly; perhaps an excess of enthusiasm.
- Imperfect (Radar) Technology – Canewdon's report of targets approaching *from the east* will have been the Hurricanes approaching *from the west* detected in the radar's back beam and then displayed as a reciprocal, although there was a technical 'fix' to overcome this known anomaly – and all of this was pre-IFF, of course.
- Serviceability – there was a fault with the modification that was supposed to remove the ambiguity arising from the 'mirror images' detected by the radar's back beam.
- Intelligence – there was a clear expectation that the enemy was present.
- Misidentification – poor aircraft recognition all round.

Other Early Incidents

This incident had occurred on 6 September, only three days into the war, but it was not the first cock-up. The day before, an Anson of No 233 Sqn had attacked a U-boat which it claimed to have damaged; the boat got its own back, however, as the aeroplane was damaged by shrapnel and failed to make it back to Leuchars, finishing up in the River Eden. Nevertheless, the attack was regarded as a victory but, while celebrating his success that evening, Plt Off Yorke was informed that the vessel he had bombed had been His Majesty's Submarine *Seahorse* – which, fortunately, he had *not* damaged. So the Oscar for the first blue-on-blue of WW II went to Coastal Command in the form of an own goal in that one of its aeroplanes had more or less shot itself down.

The Americans were even quicker off the mark. They scored their first blue-on-blue on the very first day of their war. On the evening of

7 December 1941 the USS *Enterprise*, on her way back to a devastated Pearl Harbour, despatched six of her Wildcat fighters to the airfield at Ford Island. Because of the confusion, it seems that it had been impossible to warn everyone of their impending arrival. The once-bitten-twice-shy gunners opened fire. Only two of the aeroplanes landed safely; two were shot down and two more were abandoned by their pilots – three men died.

Air-to-Air Friendly Fire

Sticking with aeroplanes for the moment, there were three major hazards. First, there were other ‘friendly’ aeroplanes. There do not appear to be any contemporary official statistics in this field so we are indebted to the Staff College’s Chris Hobson who has combed through the records to identify 119 RAF aeroplanes that were lost between September 1939 and May 1945 as a result of attacks by friendly aircraft.

That equates to six or seven entire squadrons – at a cost of 135 lives! I have found several more incidents, raising the fatalities to 145 – and I am confident that that will not be the last word on the subject. So how on earth did we manage to shoot down, *at least*, 125 of our own aircraft?

These air-to-air losses are tabulated at Annex A and a study of this list reveals a number of interesting points. First, we can draw the fairly obvious conclusion that it was not a good idea to fly Spitfires, since there are twenty-three of them on the list (or Beaufighters – seventeen, or Blenheims – sixteen). But these types were almost bound to figure large because there were a lot of them about. On the other hand, one might have expected to be reasonably safe driving something as inoffensive and ‘cuddly’ as a Lysander; but there are four of them on the list, and there were few aeroplanes as distinctive as a Lysander – so much for aircraft recognition.

Only one in four of the incidents noted at Annex A occurred at night but I doubt that that is a fair reflection of the reality. There are, for instance, only two cases of mutual shoot-downs by heavy night bombers, on 13 August 1943 and 5 January 1945. The first of these involved a Stirling that was hit by gunfire from another Stirling during a raid on Italy. The crew nursed their damaged aircraft all the way to North Africa where the severely wounded pilot recovered sufficiently

to supervise the landing. Alan Aaron died the next day but was subsequently awarded a posthumous VC for what had, ironically, been a consequence of a blue-on-blue engagement.

What I find difficult to accept is that there were not many more cases involving heavy night bombers. By 1944 it was routine to despatch 500 or 600 aircraft against a single target. They did not fly in formation, of course, but as individual aeroplanes in a stream which was intended to swamp the defences by passing over the target in the shortest possible time – which meant that the aiming point became a virtual lens through which the stream was focused to the notional width of a single aeroplane and through which it passed at a rate of about one aeroplane every five-to-ten seconds. That represents a very crowded sky and if something suddenly loomed up out of the darkness behind your aircraft it could have been another bomber – or a night-fighter. It seems likely that some gunners will have assumed the worst and opened fire. Then again, there are numerous well-documented cases of night bombers making it back to base after having sustained damage as a result of a collision or through being hit by bombs dropped from above. But we only know about the crews who made it back. How many of the hundreds of men who were simply posted as ‘Missing in Action’ were actually the victims of friendly fire of this kind?

Then again, one has to wonder how the American ‘heavies’ avoided shooting each other down in their running air battles over Europe in 1944-45. In the accompanying photograph (*overleaf*), seven B-17s are discernible between the two white lines – and there will be many more aircraft that are just out of shot. The ‘fifty calibre’ machine guns in a Fortress or Liberator were fully capable of inflicting damage on aircraft structures at ranges in excess of 3,000 feet – the white lines are less than 1,000 feet apart. The fact is that a typical USAAF bomber was likely to be within killing range of about twenty other aeroplanes. I have no concrete evidence to back up my misgivings but it may have been fortunate that camera guns were not usually fitted in turrets or used by waist-gunners.

The juxtaposition of that stick of bombs and the lower formation also looks uncomfortably like an accident that is about to happen.

Having mentioned the Americans, there is another interesting feature in the list of air-to-air incidents at Annex A; the way in which



Each one of the B-17s in this picture was within lethal range of the guns carried by all the others.

it came to be dominated by the USAAF. Bearing in mind that they did not become a significant presence until the autumn of 1942, American pilots shot down thirty-three of the sixty-eight RAF aircraft known to have been lost as a result of air-to-air friendly fire incidents between then and the end of the war.

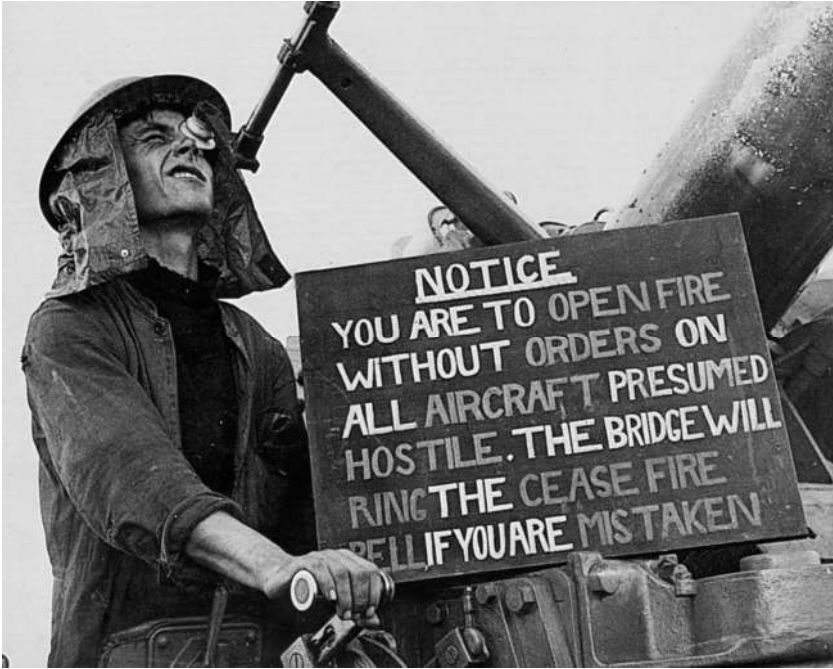
The Americans have a long-standing reputation for being quick on the draw and that certainly seems to have been born out by the RAF's experience in WW II. That said, I have no corresponding figures to indicate how many P-47s and P-51s were despatched in error by the RAF....

The Lysander that was shot down (near Venice) on 22 November 1944 provides a particularly interesting example of American enterprise. No 148 Sqn was a Special Duties unit and the Lysander had been provided with an escort of six RAF Mustangs. Despite their presence, a USAAF P-51 slipped in and did the deed – there's determination for you!

One other specific incident is worth a special mention. On 17 August 1943 a Walrus amphibian was despatched to the Straits of Messina (between Sicily and Italy) to pick up a downed Spitfire pilot. They failed to locate him, but while they were looking one of a pair of RAF Mustangs of No 1437 Flt shot down a Spitfire of No 43 Sqn, so the Walrus picked up the pilot of that one instead (Flt Lt N W Lee). The situation promptly became farcical because the Mustang pilot (Plt Off J L Griffiths) was then shot down by enemy *Flak* so the Walrus picked him up too. One can only imagine the tone of the blue-on-blue debrief that must have ensued 'down the back' during the trip home.

'Friendly' Anti-Aircraft Fire

Other aeroplanes were only the first of my three major 'friendly air' hazards. The second was anti-aircraft fire as reflected by the list at Annex B. Again, I make no claim that this list is definitive but at more than 100 aeroplanes and 129 lives it is quite long enough (although, unlike the aircraft listed in Annex A, most of which were destroyed, some of those in Annex B were only damaged). There are fewer points to draw out in this case. The most obvious one, of course, is, as always, aircraft recognition. Secondly, and unfortunately, one has to point a finger at the Americans again; eighteen of the last twenty-three incidents on this list involved US Army or Navy gunners.



So far as naval anti-aircraft gunners were concerned, this picture says it all.

Prior to that, however, it was the RN that was overly trigger happy and eighteen of the pre-1944 occurrences involved naval gunfire. Mind you the navy always felt extremely vulnerable to air attack and made no bones about it. Aviators were always well-advised not to approach any armed vessel

The position was made all too clear when Adm Cunningham declined – or perhaps felt unable – to guarantee the safety of any airborne assault force overflying his ships during the July 1943 landings on Sicily. Insufficient notice was paid to his warning and the outcome can rightly be described as a tragedy. Various sources provide similar, but slightly differing figures. For our purposes, it will suffice to quote just one authoritative reference, the US official history, which states that the four airborne missions involved the loss of forty-five transport aircraft (not including gliders), more than thirty of which were brought down by friendly fire – mostly on the night of

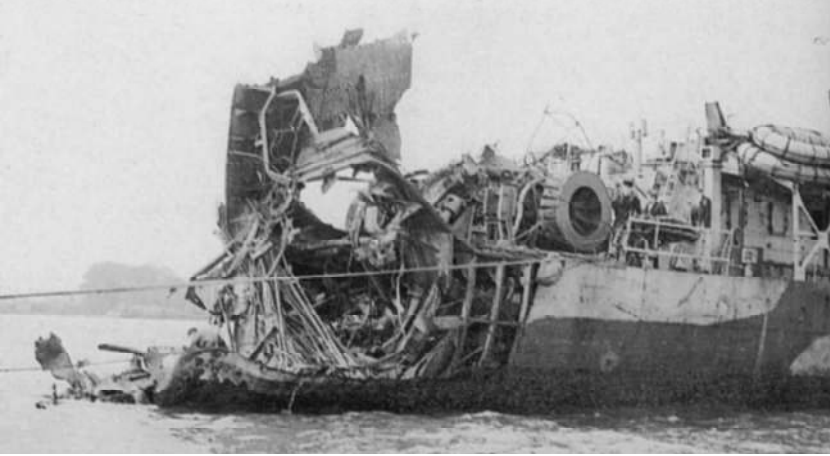
11 July when naval AAA accounted for no fewer than twenty-three of the 144 C-47s despatched – and another sixty sustained serious damage. That was a *self-inflicted* loss rate of about 16%. But that statistic reflects only the machines; in terms of lives lost, more than 300 men died that night as a result of friendly fire.

Despite colours of the day, frantic signalling with an Aldis lamp and other procedures intended to avoid mistakes, sailors could be so prickly that even escorting a friendly convoy could be a risky business. The RAF's frustration with this situation can be sensed in OC 201 Sqn's comments on the loss of one of his Sunderlands with all hands on 31 July 1942. He blamed: 'Carelessness and lack of aircraft recognition and possible disobedience of fire control orders on the part of the merchant vessel.'

There were other incidents of that nature but it could be even worse. How galling must it have been to have been fired off the sharp end of a Catapult Armed Merchant ship on an Arctic convoy to repel raiders and then be shot down for your pains by one of the ships that you were trying to protect – which is exactly what happened to Plt Off A J Hay on 25 May 1942 when he was launched from the *Empire Lawrence*, which was part of convoy PQ16. Since there was no way to land back on, Al Hay was resigned to a dunking in any case, but not by having his aeroplane shot out from underneath him by the American MV *Carlton*. Why did it happen? Mostly because of the trigger-happy syndrome – 'I've already been bombed twice today – the next aeroplane gets both barrels.' And because of probabilities – what were the chances of an aeroplane approaching your ship off the north-west coast of Norway being a Hurricane?

Great Expectations I

Of course, sailors were not the only people who were prone to drawing the wrong conclusion based on false expectations and the probability factor. As we have already seen, it was a significant element in the Battle of Barking Creek but that was not the only occasion. You will all be familiar with the hunt for the *Bismarck* and her eventual sinking but one chapter of this tale tends to be played down. Having lost track of her for a time, when *Bismarck* was relocated Force H was despatched to engage her. The fast cruiser *Sheffield* was sent ahead to make contact and, like the greyhound of



The shattered HMS Salamander after she had been attacked by rocket-firing Typhoons.

the seas that she was, she was soon over the horizon (and thus out of contact) ‘making 38 knots with the paint blistering on both funnels’. Owing to the fundamental limitations of 1941-era communications, and the inadequate handling of messages when they did arrive, when the *Ark Royal* eventually launched her *Swordfish* their crews were unaware of *Sheffield*’s presence. They had been briefed to look for a big ship and sink it. They found one and they had a go – needless to say, it was *Sheffield*. Only three of the fourteen crews spotted the deliberate mistake but skilled evasive manoeuvring (by Capt Larcom) saved the day. As ever, there were a number of contributory causes, not least that one will tend see what one has been told to expect to see – but the final test has to be recognition.

What must surely have been the worst case of naval/air fratricide occurred a couple of months after D-Day. The RAF did it, but it was the Navy’s fault. A minesweeping flotilla was clearing a passage into Le Havre, which was still in German hands. After four days, they were given a rest and then re-tasked. The flotilla’s CO knew that the Le Havre job was not quite finished so he informed the Minesweeper HQ Ship at Arromanches that he would be tying off the loose ends first before proceeding as ordered. All that was necessary was for the staff to notify Flag Officer British Assault Area (FOBAA) so that he could

spread the word. They didn't. Radar picked up a group of warships approaching Le Havre and reported their presence. The naval plot showed no friendly vessels in the vicinity, so it was reasoned that they were likely to be E-boats. An air strike was ordered and Wg Cdr Johnny Baldwin was soon airborne leading eight Typhoons. Baldwin subsequently queried his orders twice but was specifically directed to proceed. Typhoons may have had problems actually *hitting* tanks with their rockets, but a 250-foot long warship was a different matter. Two of the minesweepers, HMSs *Hussar* and *Britomart* were sunk and *Salamander* so badly damaged that she was written off. The casualties amounted to 78 British sailors dead and 149 wounded.

While the root cause of this tragedy was a failure to disseminate critical information within the C2 structure, ship recognition could (should?) have provided the ultimate safety factor – but then, Typhoon pilots were rarely called upon to act in the anti-shipping role.

While I suggested that the minesweeper incident may have been the worst case of air/sea fratricide, there is another awful statistic. At various times during the war in the Far East allied aircraft and submarines sank eleven Japanese ships which were transporting allied PoWs. More than 6,000 of them lost their lives – no one could have known it at the time, of course, but this was surely a blue-on-blue of epic proportions.

While I am dealing with ships, I should perhaps take the opportunity to make the point that sailors were just as vulnerable to gunfire as they were to air attack. Warfare at sea is not my *forté* and I have no statistics relating to the Royal Navy but the table reproduced at Annex E, which provides some idea of the devastation inflicted on the US Navy as a result of friendly fire incidents during WW II, quantifies the scale of the problem and may be of some interest.

Aircraft Recognition/Identification

The teaching of aircraft (and ship, and vehicle) recognition gained momentum during the war and, so far as aircraft were concerned the two main milestones were the appearance of the commercial publication *The Aeroplane Spotter* in January 1941 to be followed in 1942 by the official *Aircraft Recognition Journal*. Always a Joint-Service enterprise, after the war the latter morphed into the more broadly-based *Recognition Journal*, which is, I imagine, still to be

found around the bazaars today in some form or other.

While the ability to recognise aeroplanes was (and still is) an essential skill, there are more technical aids to identification. IFF was conceived before the war and by July 1940 it was a standard fit in Fighter Command. The early, Mk II, equipment merely increased the amplitude of the returned signal so that friendly aircraft produced a larger trace on the screen. The Mk III equipment, which was introduced into service in 1943, worked on a discrete frequency so that friendly aeroplanes showed as a trace on both of two timebases (or on a separate display) whereas non-transponding (and thus *presumably* enemy) aeroplanes produced only one response. It was also possible to impose a fairly crude form of coding on Mk III signals making it possible, for instance, to identify aircraft of a particular command or to indicate that an aircraft was in distress.

Some bomber crews later maintained that it was possible to break lock on a radar-directed searchlight by switching on the IFF. Officialdom condoned this practice and eventually even went so far as to incorporate a ‘J’ switch – ‘J’ for jamming’ – which would permit the kit to transmit permanently, as distinct from as a transponder. With hindsight we know that the Germans did not use radar-laid searchlights to any extent but, even if they had, the frequencies at which IFF operated would have had little (if any) impact on their function. What the ‘J’ switch did do, of course, was to convert an electronically ‘silent’ intruder into one which was permanently transmitting, thus easing the opposition’s task of detecting and tracking it. This must have increased the losses due to interception by night fighters and, as such, represents a blue-on-blue tactic in that we shot ourselves in the foot through a lack of understanding of the implications of our own technology and an inadequate appreciation of the enemy’s capabilities and procedures – an intelligence failure.

Great Expectations II

As I have already pointed out, the whole question of recognition is heavily influenced by ‘intelligence’ in that, if you are briefed to expect to see something, you probably will – permitting the 12,000 ton two-funnel *Sheffield* to be identified as the 47,000 ton one-funnel *Bismarck*. In September 1940, the following notice appeared in the Balloon Command Bulletin:



All nine of the pre-series 'He 113s' masquerading as the equipment of a Luftwaffe fighter squadron in a successful attempt to deceive British Intelligence. (MAP)

'Fighter Command report that a number of Heinkel 113 aircraft have been camouflaged to resemble Spitfires, with similar camouflage on top, duck-egg blue beneath, and one pilot reports similar roundels.

It was the result of an elaborate hoax. There was a single-seat Heinkel fighter but it had failed to secure a production order. The German propaganda machine made use of the nine pre-series aircraft to publish a set of photographs of them painted up in different (but quite spurious) squadron markings. These pictures were released in the spring of 1940. RAF 'Int' swallowed the story whole and warned the chaps that He 113s were out there. The chaps promptly started to see them and shoot them down. Even the designation was a hoax; there never was a He 113; the type was actually the He 100. But, if pilots couldn't tell a Heinkel from a Messerschmitt – could they tell a Hurricane from a Heinkel?

Three years later, in August 1943, the Americans decided to dislodge the Japanese who had established a presence in the Aleutian Islands – in the Bering Sea, between Alaska and Russia. In pretty

awful sub-Arctic weather – snow and poor visibility due to fog – 35,000 US and Canadian troops were put ashore on the island of Kiska. Opposition was not heavy but there were a number of brisk skirmishes, although the situation was completely under control by evening. The cost of the day's fighting had been just twenty-eight Americans dead and another fifty seriously wounded. Japanese losses were nil – the last Japanese troops had been evacuated under cover of fog a fortnight before. But the GIs had been told to expect to see Japanese soldiers on the island – so they did. Clearly, soldiers were just as susceptible to 'suggestion' as sailors and airmen.

Stripes

Going back to the efforts that were being made to teach aircraft recognition – while definite progress was made, the problem of misidentification was never entirely solved and the Typhoon proved to be particularly vulnerable in this respect. 'Is it a Mustang, or is it a Focke Wulf? – better shoot it anyway.' We lost four in ten weeks in the summer of 1942. Aware of the limitations of aircraft recognition, in August of that year the RAF had applied prominent identification markings to aircraft operating over the beachhead during the Dieppe Raid. It seemed to have worked so, with a view to warning off friendly AAA gunners, from December 1942 onwards Typhoons wore prominent underwing black and white stripes. These were deleted in February 1944 but they were back with a vengeance for D-Day when all aircraft, other than heavy bombers, likely to be anywhere near Normandy were adorned with black and white stripes but this time above, as well as below, the wings and around the fuselage. So much for camouflage – but it was a question of priorities and over the Channel in June 1944 the *Luftwaffe* was likely to be less of a hazard than naval gunners and the stripes were mainly for their benefit.

Nevertheless, stripes or no stripes, there was considerable concern over the damage that naval gunners might inflict on our own aircraft during Operation OVERLORD. The lack of confidence in the effectiveness of our recognition training programme was such that for the D-Day landings, and the rest of June while the beachhead was being consolidated, some 800 members of the Royal Observer Corps volunteered to be enlisted into the Royal Navy as Petty Officer Aircraft Identifiers. Assigned in pairs to just about every ship,



For Operation GRANBY in 1991, RAF helicopters, like this Chinook, wore the same inverted V identification marking as friendly armoured vehicles. (MAP)

including American ones, their role was to advise the Gunnery Control Officer when, or more to the point, when NOT to open fire.

Jumping ahead a few years to the Korean War, in July 1950 a flight of Seafires from HMS *Triumph* was vectored onto a radar trace which turned out to be a formation of B-29s. The fighters approached, looking to exchange friendly waves, only to have the gunners open fire obliging one pilot to take to his parachute. What to do? We re-invented D-Day, all FAA aircraft being adorned with stripes. Six years later we went to Suez and we did it again, this time in black and yellow, rather than black and white. Despite all the hi-tech wizardry that had been invented since then, as late as the 1991 Gulf War it was considered prudent to mark armoured vehicles with a prominent inverted 'V' in the hope that this might dissuade Coalition pilots from having a go at them. Since helicopters were likely to be found on the ground with the troops, our Chinooks and Pumas also acquired this marking. It really does make you wonder why we spend so much on camouflage paint.

Balloons

But I need to backtrack to WW II because I have yet to deal with the third of my friendly-fire hazards – barrage balloons. You may consider that this one is a little out of left field but balloons do qualify, on both counts; they were friendly but they were also hazardous. The

purpose of balloons was to oblige enemy aircraft to fly at a height at which they could be engaged effectively by AAA (in practice the maximum altitude of the barrage was 6,500 ft) which, in the process, also denied them the option of carrying out precision low-level or dive-bombing attacks and Alfred Price tells us that there are no recorded cases of an installation protected by balloons being subject to such an attack.

Because they were such a successful deterrent, balloons accounted for relatively few enemy aircraft – and we have to bear in mind that relatively few German aircraft actually operated over the UK. That might sound a bit rich if you lived in London, Plymouth or Coventry during the Blitz but the fact is that penetrations of British airspace by the *Luftwaffe* in 1940-41 were hardly comparable to those of the RAF and USAAF into German airspace in 1943-45.

So far as I have been able to establish, the balloons brought down some fifteen German aircraft (see Annex C), but even these claims may be a little inflated. Two of the fifteen were also credited to fighters, suggesting that the damage inflicted by the balloon cable had not been critical. If it had been, the aircraft should have come down fairly close to the balloon site; neither of these did. A third was shared with gunners of Anti-Aircraft Command and a fourth accredited claim was of an unknown type – making its confirmation somewhat suspect.

On the other hand, between September 1939 and August 1944 *at least* ninety-four British aeroplanes were brought down by flying into balloon cables at a cost of no fewer than 212 lives. I should stress that the incidents listed at Annex C reflect only write-offs; there were many, many more incidents in which aeroplanes sustained damage from which they were able to recover – and even more cases of aircraft flying through a barrage without hitting a cable. In June 1941, for instance, while only four (British) aircraft crashed, three others hit cables and a further sixty-six flew through barrages without touching the sides.

So, why? Basically, poor airmanship – mostly a failure to adhere to procedures. The balloons were not a secret. You can hardly hide a 20,000 ft³ sausage and their locations were, in any case, notified to airmen and it was their responsibility to stay away. There was even a ‘squeaker’ device which broke through on your radio if you got too close – always assuming that you had a radio, of course – not always

the case in WW II.

The last incident on the list, which involved a Defiant target-tug of No 691 Sqn, was a classic instance of poor airmanship. The aircraft was lost after colliding with a balloon being flown at 3,000 ft, in cloud, by a ship off Plymouth. The terse comment on the Flying Accident Card (F1180), says it all: 'Pilot took short cut across balloon area, despite his experience of locality.'

Another significant contributory cause was that 'Bradshawing' was still a common means of navigation but if you followed, for instance, the line to Crewe it would take you into the barrage protecting the important railway junction. The sites that seemed to catch more than their fair share of friendly aircraft were those protecting aircraft factories in the vicinity of Coventry, Langley and Eastleigh.

It might also be worth pointing out that balloons had absolutely no respect for rank, Air Cdre Reginald Pyne, SASO 10 Gp, whose Hurricane crashed near Dartmouth in May 1944, being the senior officer to die after losing an argument with a balloon.

Air-to-Ground Friendly Fire

My last topic is air-to-ground friendly-fire. During the course of WW II, the RAF devised sophisticated methods of providing close air support in the form of accurate strikes delivered at short notice. In Burma, for instance, Vengeance dive-bombers would routinely hit targets within 200 yd of friendly troops and, on occasion, Typhoons supporting armoured thrusts in NW Europe would shave this down to 100 yd. This was a very dangerous business, of course, and its success was crucially dependent upon having a clearly identified target, a well-defined bomb line and close liaison with Forward Air Controllers. Mistakes were sometimes made but with tactical aircraft the casualties inflicted were usually light. Where things could go badly wrong, however, was when heavy bombers were used – or, as the air marshals would have it – *misused* over the battlefield.

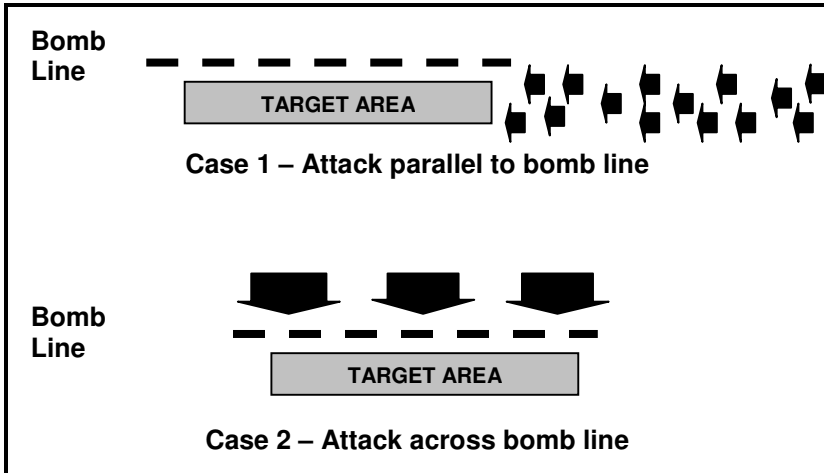
The problem was that 'heavies' were inherently inaccurate. Ian Gooderson's analysis of ten close air support operations flown over Normandy by Bomber Command shows that the average displacement of the mean point of impact from the aiming point was of the order of 400 yards while the average radial dispersal around this displaced point was a little over 600 yards. So some bombs will have fallen

1000 yards from the target – and these are only ‘average’ figures, so 50% will have been even further adrift. It really doesn’t matter whether these results were good, bad or indifferent; they were what could realistically be achieved and the air marshals knew it – as did the air generals; despite their much-vaunted Norden bombsights, the truth is that B-17s and B-24s were little better at this than Halifaxes and Lancasters. If big bombers were going to be used in direct support of a ground assault, it was plain that the troops would have to be at least 3,000 yards from the target.

That was simply unacceptable to the generals. If they ran up against a strongpoint, they wanted it obliterated while they stood their ground and watched. It was simply anathema to a land commander to be expected to relinquish a mile-and-a-half of real estate that he had just fought his way across. Furthermore, he wanted to roll forward as soon as the strike was over while the enemy was still stunned. If the start line was 3,000 yards back it would take the infantry at least half-an-hour to cover that distance *again*; half-an-hour in which the bad guys could regain their composure.

The classic case was Operation COBRA, the American break out from the Normandy beachhead at St-Lô. General Bradley wanted an area about one mile long plastered *within an hour* – and he wanted his forward troops to be within 800 yd of the bomb line. The Air Commander, Air Chf Mshl Leigh-Mallory, wanted 3,000 yd; they compromised on 1,500 – which was plainly not enough. There was another problem. Bradley expected the bombers to come in parallel to the bomb line. The airmen pointed out that it would be impossible to funnel 1,500 large aeroplanes, flying more-or-less in line astern in small groups, across a narrow front in 60 minutes. The only way it could be done *in an hour* was to attack in much larger formations on a broad front, ie attacking the German line at right angles, which would involve overflying the friendly troops before release.

This was a disaster looking for somewhere to happen – and it did. Some formations dropped short and the unprotected American troops, standing out in the open, took about 600 casualties, 100 of them killed. One of the fatalities was Lt Gen Lesley McNair, the senior US Army officer to lose his life in WW II. The German Army, which was supposed to have been the object of the exercise, sustained a total of 700 casualties, not that many more than the good guys.



Options available to heavy bombers required to attack a linear target in close proximity to friendly troops.

This was not the only such incident – see Annex D. There were two more during the break out from Normandy and another in Italy in 1945 – and there had been Cassino before that. You can add well over 1,000 wounded to the fatalities listed at Annex D. One of the incidental consequences of this sort of thing was a loss of faith in air power on the part of some soldiers, indeed within the US Army there was even talk of the ‘American *Luftwaffe*’.

It happened in Korea too. Having captured a significant piece of high ground (Hill 282 on 23 September 1950) the 1st Btn of the Argyll and Sutherland Highlanders was having problems holding its position against a strong North Korean force which was trying to dislodge them. The British called for air support which was duly forthcoming in the shape of three USAF F-51s. The Argylls displayed prominent coloured recognition panels but the American pilots seemed not to understand and they plastered the hill top with napalm. Seventeen Jocks died and another 76 suffered horrific burns.

It happened again at Suez when 45 Cdo requested an air strike shortly after they had landed at Port Said. The task was assigned to a flight of Wyverns whose leader was concerned that the troops he was being directed towards were British. Like Baldwin and his Typhoons

in 1944, he queried his instructions several times but was eventually ordered to attack. The Commandos sustained eighteen casualties, one of whom died.

More Recent Incidents – and Conclusion

Coming much more up to date, we have had the Soviet shoot-down of Korean Air Lines Flight 007 over Sakhalin in 1983, the destruction of Iran Air 655 over the Persian Gulf by the USS *Vincennes* in 1988 and the Ukrainians bringing down a Siberian Airlines Tu 154 over the Black Sea in 2001. There are websites out there which suggest that all of these incidents involved cover ups and/or conspiracies although I suspect that all three cases were primarily cock-ups; but whichever explanation you prefer, the killing of more than 600 civilians *in peacetime* must surely have involved a substantial element of ‘friendly’ fire.

In the strictly military field we have had, to take just two examples, the two British Warrior AFVs hit by USAF A-10s in the first Gulf War (during which some 24% of the fatalities – thirty-five of 148 – sustained by US forces were the result of friendly fire) and F-15s shooting down a pair of UN Blackhawks in the North Iraq exclusion zone in 1994. But all of these, and other recent friendly fire incidents, will be relatively familiar so I don’t propose to try to analyse them.

If I were to do so, however, I am pretty sure that we could find the reasons in my original list of causes. In closing, I would draw your attention to just two items in that list. Technology and Serviceability. The speed at which events may unfold in the modern battlespace is obliging us to rely increasingly on technology which presupposes that it works. When it doesn’t, you may have a tragedy. There could be a number of reasons why an aeroplane may not respond to having its IFF interrogated – *only one of them* is that it is a ‘Foe’. The Inquiry into the shooting down of an RAF Tornado by an American Patriot battery during the second Gulf War recently concluded that the aeroplane’s IFF had not been working – and that there was no way that the crew could have known this.

That said, while any unnecessary loss of life is regrettable, in view of the scale and intensity of the operations conducted in 1991, and in 2003, there is some comfort to be gained from the fact that there were so few friendly fire incidents. We haven’t got it right yet, but we are a

lot better at preventing blue-on-blue engagements than we used to be.

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NB Casualties in Annexes A, B and C, refer only to fatalities.

**ANNEX A — RAF AIRCRAFT LOST TO
OTHER 'FRIENDLY' AIRCRAFT,
SEP 39-MAY 45**

Date	Type	Unit	D/N	Cas
6 Sep 39	2 x Hurricane	56 Sqn	D	1
27 Oct 39	Anson	608 Sqn	D	3
21 Dec 39	2 x Hampdens	44 Sqn	D	1
3 Mar 40	Hudson	2 Cam Unit	D	2
15 May 40	Blenheim	53 Sqn	D	3
16 May 40	Blenheim	53 Sqn	D	0
21 May 40	Blenheim	18 Sqn	D	0
21 May 40	Blenheim	18 Sqn	D	3
26 May 40	Lysander	16 Sqn	D	1
31 May 40	Lysander	16 Sqn	D	2
7 Jul 40	Hurricane	79 Sqn	D	1
8 Jul 40	Hurricane	79 Sqn	D	1
31 Jul 40	Battle	12 Sqn	N	3
11 Aug 40	Hurricane	56 Sqn	D	1
15 Aug 40	Blenheim	604 Sqn	D	0
24 Aug 40	Blenheim	235 Sqn	D	2
28 Aug 40	Spitfire	54 Sqn	D	0
28 Aug 40	Hurricane	56 Sqn	D	0
31 Aug 40	Spitfire	54 Sqn	D	0
3 Sep 40	2 x Blenheims	25 Sqn	D	1

2 Oct 40	Blenheim	254 Sqn	D	0
13 Oct 40	Blenheim	29 Sqn	D	3
26 Oct 40	Blenheim	14 Sqn	D	0
13 Nov 40	Beaufighter	219 Sqn	N	2
4 Feb 41	Blenheim	14 Sqn	D	0
10 Mar 41	Halifax	35 Sqn	N	4
3 Apr 41	Whitley	51 Sqn	N	1
14 Apr 41	Maryland	69 Sqn	N	0
3 May 41	Beaufighter	252 Sqn	D	0
9 May 41	Beaufighter	600 Sqn	D	0
17 Jun 41	Beaufort	3 OTU	D	3
21 Jun 41	Manchester	207 Sqn	N	7
1 Jul 41	Wellington	311 Sqn	N	6
1 Aug 41	Hurricane	242 Sqn	D	1
9 Aug 41	Blenheim	113 Sqn	D	2
6 Oct 41	Hampden	106 Sqn	D	1
15 Nov 41	Blenheim	54 OTU	D	1
20 Dec 41	Tomahawk	250 Sqn	D	0
30 Mar 42	Blenheim	14 Sqn	D	3
4 May 42	Stirling	218 Sqn	N	0
23 May 42	Spitfire	402 Sqn	D	0
27 May 42	Blenheim	1401 Flt	D	3
29 May 42	Beaufighter	236 Sqn	D	1
1 Jun 42	2 x Typhoons	56 Sqn	D	1
14 Jun 42	Beaufighter	604 Sqn	N	0
1 Jul 42	Spitfire	72 Sqn	D	1
23 Jul 42	Beaufighter	25 Sqn	N	1
30 Jul 42	Spitfire	72 Sqn	D	1

30 Jul 42	Typhoon	56 Sqn	D	0
8 Aug 42	Beaufighter	409 Sqn	N	2
14 Aug 42	Kittyhawk	260 Sqn	D	0
19 Aug 42	Typhoon	266 Sqn	D	1
4 Sep 42	Hampden	144 Sqn	D	1
17 Oct 42	Whitley	19 OTU	N	5
28 Oct 42	Whitley	58 Sqn	D	0
8 Nov 42	Hudson	233 Sqn	D	3
16 Dec 42	Marauder	14 Sqn	D	1
18 Dec 42	Spitfire	91 Sqn	D	1
23 Dec 42	Beaufighter	TFU	D	2
27 Dec 42	Hudson	117 Sqn	D	5
13 Jan 43	Beaufighter	153 Sqn	D	0
20 Jan 43	Mustang	400 Sqn	D	1
18 Feb 43	Beaufighter	FIU	N	1
6 Mar 43	Spitfire	601 Sqn	D	0
14 Apr 43	Hudson	500 Sqn	N	4
17 Apr 43	Typhoon	266 Sqn	D	0
5 Jun 43	Beaufighter	29 Sqn	N	0
17 Jun 43	Mustang	414 Sqn	D	1
17 Jun 43	Spitfire	412 Sqn	D	1
13 Jul 43	Beaufighter	46 Sqn	D	0
29 Jul 43	Mosquito	544 Sqn	N	2
13 Aug 43	Stirling	218 Sqn	N	2
14 Aug 43	Hurricane	137 Sqn	N	1
16 Aug 43	Wellington	21 OTU	N	2
17 Aug 43	Spitfire	43 Sqn	D	0
27 Aug 43	Beaufighter	Cal Flt	D	2

10 Dec 43	Beaufighter	68 Sqn	N	1
21 Dec 43	2 x Typhoons	609 Sqn	D	2
21 Dec 43	Spitfire	501 Sqn	D	0
8 Jan 44	Spitfire	225 Sqn	D	0
28 Mar 44	Mosquito	107 Sqn	D	2
1 Apr 44	Ventura	500 Sqn	N	4
7 Apr 44	Spitfire	682 Sqn	D	0
26 Apr 44	Mitchell	320 Sqn	D	0
29 May 44	Mosquito	604 Sqn	N	1
11 Jun 44	Mosquito	333 Sqn	D	1
23 Jun 44	Halifax	76 Sqn	N	7
27 Jun 44	Beaufighter	68 Sqn	D	0
28 Jun 44	Mosquito	192 Sqn	N	0
9 Jul 44	Spitfire	341 Sqn	D	0
14 Jul 44	Spitfire	132 Sqn	D	1
24 Jul 44	Spitfire	453 Sqn	D	1
5 Aug 44	Lysander	161 Sqn	N	1
10 Aug 44	Mustang	122 Sqn	D	0
15 Aug 44	Spitfire	602 Sqn	D	0
17 Aug 44	Spitfire	602 Sqn	D	0
26 Aug 44	Spitfire	602 Sqn	D	0
28 Sep 44	Mosquito	21 Sqn	N	2
2 Oct 44	Mosquito	140 Sqn	D	2
28 Oct 44	Mustang	430 Sqn	D	0
2 Nov 44	Mosquito	219 Sqn	N	0
7 Nov 44	Spitfire	43 Sqn	D	0
11 Nov 44	Spitfire	43 Sqn	D	1
16 Nov 44	2 x Beaufighters	27 Sqn	D	3

21 Nov 44	Mosquito	157 Sqn	D	0
22 Nov 44	Lysander	148 Sqn	D	4
24 Dec 44	Typhoon	439 Sqn	D	1
25 Dec 44	Spitfire	416 Sqn	D	1
1 Jan 45	Typhoon	183 Sqn	D	1
5 Jan 45	Lancaster	419 Sqn	N	0
14 Jan 45	Typhoon	174 Sqn	D	0
14 Jan 45	Typhoon	247 Sqn	D	1
17 Jan 45	Mustang	2 Sqn	D	1
17 Jan 45	Mustang	268 Sqn	D	1
14 Feb 45	Harvard	42 Sqn	D	0
22 Feb 45	Tempest	56 Sqn	D	0
2 Mar 45	Typhoon	198 Sqn	D	1
7 Mar 45	Mosquito	105 Sqn	N	0
31 Mar 45	2 x Spitfires	416 Sqn	D	0
24 Apr 45	Mosquito	409 Sqn	N	0

ANNEX B — RAF AIRCRAFT LOST TO OR DAMAGED BY 'FRIENDLY' AAA

Date	Type	Unit	Cas
23 Apr 40	Hudson	224 Sqn	1
30 May 40	Anson	48 Sqn	0
9 Aug 40	Blenheim	600 Sqn	0
16 Aug 40	Hurricane	1 Sqn	0
18 Aug 40	Hurricane	111 Sqn	1

20 Aug 40	Blenheim	236 Sqn	0
25 Aug 40	Hurricane	73 Sqn	0
4 Sep 40	Spitfire	222 Sqn	0
5 Sep 40	Spitfire	222 Sqn	0
7 Sep 40	Hurricane	249 Sqn	0
29 Sep 40	Hurricane	504 Sqn	0
13 Oct 40	Hurricane	17 Sqn	0
22 Oct 40	Hurricane	257 Sqn	1
5 Nov 40	Hurricane	310 Sqn	0
9 Dec 40	Blenheim	114 Sqn	3
14 Apr 41	Blenheim	113 Sqn	0
27 Apr 41	Blenheim	30 Sqn	0
28 Apr 41	Blenheim	203 Sqn	0
30 Apr 41	Hurricane	274 Sqn	1
9 May 41	Blenheim	18 Sqn	3
28 Jun 41	Blenheim	75 Wg	4
9 Aug 41	Hampden	61 Sqn	0
30 Oct 41	Whitley	612 Sqn	1
28 Nov 41	Blenheim	11 Sqn	3
30 Nov 41	Blenheim	WD CFlt	0
28 Jan 42	Whitley	58 Sqn	5
12 Feb 42	Hurricane	208 Sqn	1
22 Apr 42	Hurricane	185 Sqn	1
25 May 42	Hurricane	MSFU	0
7 Jul 42	Spitfire	249 Sqn	0
31 Jul 42	Sunderland	201 Sqn	12
13 Aug 42	Spitfire	249 Sqn	0
19 Aug 42	Blenheim	13 Sqn	0

19 Aug 42	Blenheim	614 Sqn	2
21 Oct 42	Stirling	7 Sqn	7
22 Oct 42	Anson	7 OTU	0
31 Oct 42	Typhoon	609 Sqn	0
20 Nov 42	Catalina	202 Sqn	10
17 Dec 42	Lancaster	101 Sqn	7
29 Dec 42	Blenheim	18 Sqn	3
15 Mar 43	Typhoon	56 Sqn	0
18 Mar 43	Spitfire	118 Sqn	1
12 Jun 43	Halifax	51 Sqn	1
13 Jul 43	Albemarle	296 Sqn	0
13 Jul 43	Albemarle	296 Sqn	5
13 Jul 43	Albemarle	296 Sqn	0
13 Jul 43	Halifax	295 Sqn	5
20 Sep 43	Halifax	78 Sqn	0
7 Oct 43	Stirling	90 Sqn	1
9 Oct 43	Mosquito	85 Sqn	2
6 Jun 44	Mustang	168 Sqn	1
7 Jun 44	Spitfire	485 Sqn	0
7 Jun 44	Spitfire	443 Sqn	0
7 Jun 44	Spitfire	443 Sqn	0
8 Jun 44	Spitfire	63 Sqn	0
9 Jun 44	Spitfire	41 Sqn	0
9 Jun 44	Spitfire	331 Sqn	1
9 Jun 44	Spitfire	403 Sqn	0
9 Jun 44	Spitfire	403 Sqn	0
9 Jun 44	Spitfire	403 Sqn	0
10 Jun 44	Spitfire	602 Sqn	0

21 Jun 44	Spitfire	401 Sqn	1
22 Jun 44	Spitfire	130 Sqn	0
22 Jun 44	Spitfire	402 Sqn	0
22 Jun 44	Spitfire	402 Sqn	1
22 Jun 44	Spitfire	402 Sqn	0
29 Jun 44	Spitfire	322 Sqn	0
30 Jun 44	Tempest	486 Sqn	0
3 Jul 44	Tempest	3 Sqn	1
12 Jul 44	Tempest	56 Sqn	0
12 Jul 44	Spitfire	501 Sqn	1
12 Jul 44	Spitfire	501 Sqn	1
19 Jul 44	Spitfire	403 Sqn	0
29 Jul 44	Mustang	306 Sqn	1
16 Aug 44	Catalina	240 Sqn	0
21 Aug 44	Mosquito	125 Sqn	1
25 Aug 44	Stirling	570 Sqn	0
7 Oct 44	Mosquito	409 Sqn	2
21 Oct 44	Beaufighter	FIU	0
14 Nov 44	Mosquito	68 Sqn	2
15 Nov 44	Mosquito	25 Sqn	0
4 Dec 44	Spitfire	414 Sqn	1
17 Dec 44	Lancaster	50 Sqn	7
22 Dec 44	Spitfire	130 Sqn	0
24 Dec 44	Spitfire	416 Sqn	1
24 Dec 44	Spitfire	416 Sqn	0
24 Dec 44	Spitfire	416 Sqn	0
24 Dec 44	Spitfire	416 Sqn	0
24 Dec 44	Spitfire	416 Sqn	0
24 Dec 44	Spitfire	416 Sqn	0

31 Dec 44	Spitfire	130 Sqn	1
1 Jan 45	Spitfire	302 Sqn	0
1 Jan 45	Lancaster	15 Sqn	0
1 Jan 45	Lancaster	115 Sqn	8
2 Jan 45	Lancaster	218 Sqn	6
2 Jan 45	Halifax	347 Sqn	1
13 Jan 45	Tempest	486 Sqn	0
13 Jan 45	Tempest	486 Sqn	0
13 Jan 45	Tempest	486 Sqn	0
4 Mar 45	Mosquito	68 Sqn	0
5 Mar 45	Stirling	199 Sqn	1
5 Mar 45	Halifax	432 Sqn	8
14 Mar 45	Mosquito	85 Sqn	0
10 Apr 45	Typhoon	164 Sqn	1
7 May 45	Mosquito	25 Sqn	0

**ANNEX C — ALLIED AND ENEMY
AIRCRAFT BROUGHT DOWN BY BALLOONS;
UK SEP 39-AUG 44**

Date	Type	Unit	Cas
20 Nov 39	Oxford	Brit A'ways	2
12 Dec 39	Walrus	754 Sqn	4
24 May 40	Hampden	106 Sqn	3
4 Jun 40	Hampden	44 Sqn	3
5 Jun 40	Beaufort	22 Sqn	2
13 Jun 40	Hampden	144 Sqn	4
20 Jun 40	He 111	?	?

13 Jul 40	Hudson	220 Sqn	4
13 Aug 40	Spitfire	4 FPP	0
15 Aug 40	Whitley	51 Sqn	5
15 Aug 40	Whitley	77 Sqn	5
15 Aug 40	Hudson	1 OTU	9
19 Aug 40	Hurricane	1 Sqn	0
26 Aug 40	Blenheim	101 Sqn	3
28 Aug 40	Master	5 SFTS	0
9 Sep 40	Wellington	149 Sqn	6
13 Sep 40	He 111 ¹	8./KG 27	4
16 Sep 40	Ju 88 ²	1./KG 54	4
8 Oct 40	Magister	PRU	2
14 Oct 40	Whitley	10 Sqn	5
16 Oct 40	Hurricane	308 Sqn	1
16 Oct 40	He 111	2./KGr 126	4
21 Oct 40	Wellington	75 Sqn	0
23 Oct 40	Anson	6 AONS	1
24 Oct 40	? (German)	?	?
28 Oct 40	Blenheim	3 FPP	1
30 Oct 40	Wellington	115 Sqn	4
7 Nov 40	Wellington	99 Sqn	6
9 Nov 40	Anson	WIDU	5
20 Nov 40	He 111	9./KG 2	?
24 Nov 40	Do 17	KGr 606	?
4 Dec 40	Hurricane	308 Sqn	0
12 Dec 40	Audax	9 SFTS	1
14 Jan 41	Lysander	6 AACU	2
16 Jan 41	Anson	11 AONS	0

4 Feb 41	Wellington	18 OTU	10
12 Feb 41	Hampden	83 Sqn	0
21 Feb 41	Hurricane	501 Sqn	0
22 Feb 41	He 111	4./KG 27	?
4 Mar 41	Master	5 SFTS	1
5 Mar 41	Lysander	26 Sqn	2
12 Mar 41	Master	59 OTU	1
20 Mar 41	Magister	SFPP	1
21 Mar 41	Hampden	144 Sqn	0
22 Mar 41	Blenheim	105 Sqn	3
22 Mar 41	He 111	5./KG 4	2
19 Apr 41	Hampden	25 OTU	1
23 Apr 41	Anson	18 OTU	5
30 Apr 41	Wellington	11 OTU	3
3 May 41	He 111	2./KG 3	?
7 May 41	Wellington	75 Sqn	5
12 May 41	Hurricane	56 Sqn	0
15 May 41	Ju 88	1./KG 54	?
16 May 41	Tiger Moth	9 EFTS	2
22 May 41	Oxford	15 FTS	0
22 May 41	Oxford	15 FTS	1
2 Jun 41	Magister	316 Sqn	1
2 Jun 41	Spitfire	53 OTU	1
10 Jun 41	Spitfire	501 Sqn	0
30 Jun 41	Blenheim	59 Sqn	3
7 Jul 41	Hampden	106 Sqn	2
7 Jul 41	Whitley	10 OTU	6
14 Jul 41	Hurricane	317 Sqn	0

7 Oct 41	Oxford	6 FTS	2
12 Oct 41	Lysander	7 AACU	2
14 Oct 41	Tiger Moth	19 EFTS	0
25 Oct 41	Hampden	25 OTU	4
25 Oct 41	Defiant	125 Sqn	1
30 Oct 41	Hudson	233 Sqn	4
8 Nov 41	Tiger Moth	14 EFTS	0
4 Dec 41	Master	59 OTU	0
15 Jan 42	Do 217E	?	4
24 Jan 42	Gladiator	2 AACU	1
14 Feb 42	Dominie	2 SS	4
20 Feb 42	Blenheim	17 OTU	3
26 Mar 42	Manchester	83 Sqn	6
30 Apr 42	Lysander	6 AACU	2
5 May 42	Anson	1 (O)AFU	4
5 May 42	Do 217E ^d	?	4
12 Jun 42	Blenheim	404 Sqn	2
9 Jul 42	Skua	771 Sqn	2
3 Aug 42	Oxford	1 FIS	2
13 Oct 42	Oxford	15 (P)AFU	1
19 Oct 42	Hurricane	Ferry Tpt Div	1
31 Oct 42	FW 190	?	?
5 Nov 42	Typhoon	609 Sqn	1
18 Nov 42	Spitfire	306 Sqn	1
26 Nov 42	Warferry	Northolt SF	1
7 Jan 43	Hurricane	56 OTU	0
13 Feb 43	Lancaster	49 Sqn	7
12 Mar 43	Auster	653 Sqn	1

20 Mar 43	Wellington	27 OTU	8
20 Mar 43	Oxford	RAFC	4
3 Apr 43	Defiant	515 Sqn	1
27 Jun 43	Typhoon	3 Sqn	1
27 Aug 43	Defiant	1623 Flt	2
30 Sep 43	Mosquito	418 Sqn	2
6 Oct 43	Dakota	512 Sqn	9
31 Jan 44	Piper L-3	US Army	0
11 Mar 44	Mosquito	605 Sqn	0
6 Apr 44	Mustang	2 Del Flt	1
20 Apr 44	Barracuda	830 Sqn	0
2 May 44	Mosquito	107 Sqn	0
4 May 44	Typhoon	440 Sqn	1
17 May 44	Hurricane	10 Gp CF	1
30 May 44	Ju 88/188?	?	?
9 Jul 44	Spitfire	274 Sqn	1
18 Jul 44	Beaufighter	51 OTU	1
29 Aug 44	Defiant	691 Sqn	2

1. Contact with balloon cable over Newport, Mon but also credited to Sgt J H 'Ginger' Lacey of No 501 Sqn over Kent.
2. Contact with balloon cable over Coventry but also credited to a Blenheim of No 600 Sqn (Pritchard, Jacobs & Smith) off coast at Bexhill, Sussex
3. Shared with gunners of Anti-Aircraft Command.

ANNEX D — MAJOR FRIENDLY FIRE INCIDENTS INVOLVING THE USE OF HEAVY BOMBERS FOR CLOSE AIR SUPPORT

Source: Ian Gooderson

Location	Date	Air Force	Killed
Cassino	15 Mar 43	MASAF	96
St Lô	25 Jul 44	US 8th & 9th	101
Falaise	8 Aug 44	US 8th	86
Falaise	14 Aug 44	RAF Bomber Command	112
R Senio	9 Apr 45	US 15th	40
<i>Total</i>			435

ANNEX E — CASUALTIES SUSTAINED ON BOARD US SHIPS HIT BY ALLIED GUNFIRE DURING WW II

Source: Eleanor D Gauker and Christopher G Blood

Ship Type	1942		1943		1944		1945		Total	
	WIA	KIA	WIA	KIA	WIA	KIA	WIA	KIA	WIA	KIA
Carrier	0	0	0	0	0	0	115	16	115	16
Destroyer	8	5	0	0	21	3	80	10	109	18
Battleship	0	0	0	0	0	0	99	21	99	21
Submarine	0	0	0	0	0	83	0	0	0	83
PT Boat	0	0	0	0	23	22	0	4	23	26
Landing Ship	0	0	0	0	0	0	35	3	35	3
Salvage Ship	0	0	18	8	0	0	0	6	18	14
Cruiser	0	0	0	0	0	0	21	2	21	2
Transport	0	0	0	0	0	0	8	1	8	1
Patrol Craft	0	0	0	0	0	0	6	1	6	1
Minesweeper	0	0	0	0	0	0	3	1	3	1
Cargo Ship	0	0	0	0	0	0	1	0	1	0
Totals	8	5	18	8	44	108	368	65	438	186

BOOK REVIEWS

Lightning from the Cockpit by Peter Caygill. Pen & Sword; 2004. £19.99.

The Lightning legend lives on in Peter Caygill's *Lightning from the Cockpit*, quite a big book about a fairly small cockpit. It contains a selection of graphic tales which emerged from that cramped cabin, designed around the stocky frame of Roly Beamont some fifty years ago, told by some of the big names from the League of Little Men, an inaccurate sobriquet as several Lightning men were over six feet tall. The critical factor for ejection was the hip to knee measurement which determined an individual's suitability to fly the beast.

The universal view from the cockpit is that the Lightning was a fine flying machine, within its limitations, with an exhilarating performance but it remained an engineering nightmare until its demise in 1989. That it had entered service some twenty-nine years earlier, the equivalent of retaining Sopwith Camels until the first Meteor squadrons were in service, raises questions about the Service's procurement policy of the day rather than assuming that such longevity was a compliment to the Lightning. Throughout its long career the aircraft was very expensive to maintain; it also lacked fire power, had a relatively low airframe 'g' limit and offered an inadequate look out through a heavily framed canopy from a cramped and poorly designed cockpit with bad ergonomics. These shortcomings were hardly acceptable for the RAF's principal air defence fighter but it remained popular with those who flew it, despite the high cockpit work load with an obsolete analogue avionics package which was never properly modernised. Despite these drawbacks, its pilots were proud of their ability to extract the maximum capability from their elderly steed throughout its long life and many of these accounts confirm their loyalty to the Lightning.

The author does not attempt, perhaps wisely, to analyse why such a large number of marks of the aircraft were introduced into service. There was only one squadron of F1s and two of F1As before the two squadrons of F2s were formed. Within another year the F3 appeared and two years later the F6. Apart from the extended wing outer panels on the F6 and the later F2A which altered the handling slightly, they all exhibited similar flying characteristics so the views from the

cockpit remain valid.

One chapter deals with accidents and incidents and makes the bland assertion that the accident rate 'was no worse than any other comparable fighter aircraft' and goes on to state that seventeen aircraft were lost in 1970-71. Within a force of only some nine RAF squadrons and a loss rate of almost two per squadron per year such a claim seems to be pushing the bounds of credibility. The fly leaf states that over fifty were lost but the true figure is closer to ninety RAF and BAC plus another twenty-three export aircraft from a total build of 333, according to Gordon Moulds' detailed record of the output from the Lightning conversion units. These figures are far worse than those for the much maligned F-104 Starfighter, a fact acknowledged on page 132 by Peter Vangucci. Within this chapter the account of brake parachute failures includes, on page 99, the story of the Central Fighter Establishment pilot whose brake parachute candled when he landed a very new F2 which had been delivered to the Air Fighting Development Squadron only the previous month. What is missing from the story is that the pilot was a senior officer who was briefed to use the coupled auto ILS auto throttle facility for the approach to his final landing. 'It is understood' that he disconnected the autopilot prior to touchdown but failed to disconnect the autothrottle clutch. As the wheels touched the ground the pilot retarded the throttles forcibly and reached for the brake parachute handle so the autothrottles advanced automatically to demand, correctly, a speed of 175 knots. It wasn't surprising therefore that the parachute candled and the new AFDS F2 finished in the barrier!

The author obviously has absorbed the enthusiasm of the several interviewees and the book is written in a positive vein, glossing over the acknowledged limitations of the Lightning, and many of the cockpit tales are memorable accounts of excitement, amusement and high adrenaline factors. Trevor MacDonald-Bennett's perceptive observations about the aircraft make good reading as do Brian Carroll's several accounts of his experiences both in the UK and in Saudi Arabia where one of his stories describes an unusual sortie from an unusual desert base with a 3,000 ft runway.

A further chapter compares the Lightning to its several contemporaries emphasising its advantage in air combat manoeuvring where its high thrust to weight ratio was a distinct advantage.

However the comparisons are selective where its shortcomings against, for example, the Phantom – such as its short range, lack of a worthwhile weapons fit, poor serviceability and inability to perform any role other than quick reaction interception – are overlooked. Furthermore the Phantom and the Mirage were genuine multi-role fighters and the record shows that both types were much more successful in the export market. However Mike Shaw, an experienced man on both the Phantom and the Lightning, claims that the main difference between them was that the Phantom was a far better warrior but that the Lightning was much the better flying machine.

The personal accounts are interesting and very readable, as are several of the abbreviated flight test reports, particularly those from the early days of the aircraft's development programme but the Appendix containing eighteen pages of checks and vital actions from the Flight Reference Cards for the F1 and F1A is superfluous padding. The author obviously has researched the relevant MoD files extensively and the reader is bombarded by data, most of which is of marginal interest, which he has extracted almost verbatim from Boscombe Down and CFE flight test reports. Too much of the book contains such lengthy quotations and, despite being of some interest to those of us who flew the aircraft, *Lightning from the Cockpit* is likely to find a home only on the bookshelves of the Wannabees and Reggie Spotters of this world.

Gp Capt Jock Heron

Beaufighter Ace by Richard Pike. Pen & Sword; 2004. £19.99

This book covers the four months in 1941 that MRAF Sir Thomas Pike, then known around the bazaars as Wg Cdr Tom 'Killer' Pike, spent as OC 219 Sqn. I regret that I have to say that I had problems with both its content and its presentation. Presumably in an attempt to provide some contemporary atmosphere, the author (who is the son of his subject, and an erstwhile Lightning and Phantom pilot himself) has included a lot of incidental information, much of which is anachronistic while some is just plain bad history. For instance, he credits the Beaufighter with a maximum speed of 320 kt, whereas, in reality, I suspect that one would have been lucky to have found one that would have done that many mph. But why provide this, and all other references to speed, in knots anyway? On page 13 Fg Off Duart

is quoted as saying, specifically on 11 March 1941, that he had been reading about the switch from mph to knots in *Tee Emm*. In point of fact, the first edition of *Tee Emm* did not appear until April and, when it did, it made no mention of standardising on knots, because the RAF did not do it for another four years, and Fighter Command dragged its feet even then.

Five pages earlier, in a scene-setting introductory chapter, we are told that, while awaiting take off as a member of the five-man CFS aerobatic team performing at the Hendon Air Pageant in July 1930, Fg Off Pike was worrying about the implications of *Mein Kampf* and the fact that the Commandant had recently expressed concern at the prospect of renewed armed conflict with Germany. Did Gp Capt Baldwin really see that as a likely outcome prior to the German elections in September of that year? At the time, Hitler's NSDAP was a fringe party holding just twelve of the 491 *Reichstag* seats (down from thirty-two at the 1924 election) and the handful of Englishmen who had actually read *Mein Kampf* at that stage must have done it in the original German because the first English edition did not appear until 1933. But, apart from having a problem with this rather dodgy history, would a twenty-four year old junior officer, about to participate in a public flying exhibition, really have been worrying about international politics? I just don't buy it.

Then again, in another unsuccessful attempt to add depth, the author records that a party of No 219 Sqn's aircrew paid a visit to Thorney Island where they were briefed by a recently formed Canadian unit of Coastal Command (clearly No 404 Sqn, although not identified as such) on the way in which they carried out co-ordinated attacks on shipping using their Beaufighters to deliver cannon fire, rocket projectiles and torpedoes. Following the sinking of the *Bismarck*, he then has his characters indulge in a crewroom discussion in which they wonder why such a capable outfit had not been committed to the operation. The answer is because No 404 Sqn was flying Blenheims in 1941, not Beaufighters, and it would be another eighteen months before the strike wing concept would even begin to be realised.

There are several other timewarps of this kind. I very much doubt, for instance, that the Beaufighters of 1941 were plumbed for drop tanks and, having been a standard fit in Fighter Command since July

1940, IFF was hardly ‘new’ in the following spring. Then again, back-seaters are invariably referred to as navigators, an aircrew category that was not introduced until September 1942; when Pike was flying Beaufighters he would have been accompanied by an observer or, and far more likely, an air gunner (like Duart) or a radio operator (air).

This rather wobbly factual basis aside, I found the presentation of the story equally unsatisfactory. I use the term ‘story’, and have previously referred to ‘characters’, because the book feels more like a novel than a biography. Much of the content is dialogue presented as direct or quoted speech. Since we are dealing with real people here, we are, therefore, being told that these were the actual words that they used. It just doesn’t work. Much of the book reads like the script of one of those desperately patriotic black and white wartime movies crossed with that of a contemporary public information film. So we have lengthy discursive exchanges on the beastly Lord Haw Haw, ration books, air raid precautions, cooking recipes and the state of the war (much of this having, I suspect, been provided by randomly dipping into Longman’s *Chronicle of the 20th Century*) all delivered in a somewhat banal style. It all reads so unconvincingly (would a junior officer, let alone an NCO, really have addressed his CO as ‘Boss’ in 1941?), colourless (did no one ever swear in No 219 Sqn’s crewroom?) and clichéd – there is even a French Canadian girl who says ‘*Zut alors!*’ – and my ‘Oxford Concise’ confirmed my suspicion that the word ‘scam’ did not enter the lexicon until the 1960s.

Tom Pike was a successful night fighter pilot who was credited with six confirmed, two probables and one damaged during his relatively brief stint of operational flying. These exploits could have been more than adequately described in no more than ten pages but here they have been expanded to fill 200 – and I’m afraid that it shows.

CGJ

From Biplane to Spitfire (The Life of Air Chief Marshal Sir Geoffrey Salmond KCB KCMG DSO) by Anne Baker. Pen & Sword; 2003. £19.95.

Relatively little is known today about the life and career of Sir Geoffrey Salmond, the younger of two brothers whose surname was prominent in much of the early history of the Royal Air Force. That he

succeeded Sir John Salmond as Chief of the Air Staff in 1933 is certainly remembered, but more often than not in the context of his brief tenure of the office, cruelly cut short by his early death. The brothers played a central role in the birth and childhood of the Service but, whereas Jack Salmond's life and achievements have been well chronicled¹, no such work has been written about the elder Salmond. Now, Anne Baker's biography begins to redress that situation and, indeed, sheds further light upon the careers of both brothers.

In many ways, Anne Baker is uniquely equipped for her task, being the second daughter of her subject. Her unrestricted access to his papers and photographs has clearly been of immense advantage to her and the resultant work is affectionate and extremely well written. Perhaps inevitably, given the closeness of the author's relationship with her subject, one is alert to any hint that the work may be excessively generous or even uncritical of him. It would be unfair to take that view but it is clear that her admiration for her father is total and unqualified and readers will wish to form their own judgement of Anne Baker's objectivity, where her account of Sir Geoffrey's achievements is concerned. Certainly, there can be no doubt whatever of her achievement in portraying the man, as he appeared to his family, in person and through his extensive correspondence from abroad.

This work will not be seen as a completely three-dimensional study of an officer whose greatest years may, in any case, have lain ahead of him at the time of his death. Nor may it be regarded as offering the last word on the part played by Geoffrey Salmond in shaping the Royal Air Force in the Great War and in the politically difficult peace that followed. His career is covered somewhat unevenly and, in particular, one would have welcomed a fuller description of his four years as Air Member for Supply and Research than in the eight pages devoted to them. A more comprehensive account could have provided more by way of collateral for the part played by Sir Geoffrey in supporting the High Speed Flight and Schneider Trophy teams. It could have lent weight to the otherwise tenuous linkage made between his time at the Air Ministry and Mitchell's Spitfire. Sadly, the book is carelessly edited, to the irritation of those who may value accuracy

¹ John Laffin, *Swifter than Eagles* (Blackwood, Edinburgh, 1964).

almost as much as content!

That all said, it is a book much to be valued in its own right as a unique portrait of a great man, viewed through the eyes of a devoted daughter. Anne Baker has had all the benefit of access to family papers, besides her own, inevitably personal memories of her subject. It reads well and sheds light on many aspects of the early RAF that are little remembered today. Most of all, it paints a vivid picture of a much admired leader whose untimely passing was greatly regretted by his contemporaries and those with whom he came into contact.

AVM Sandy Hunter

Dresden And The Heavy Bombers: An RAF Navigator's Perspective by Frank Musgrove. Pen & Sword; 2005. £16.99.

This 120-page hardbacked memoir of a wartime navigator is presented in two halves. The first is an account of his training in benign South African skies and of his subsequent operational tour with No 149 Sqn during which he flew thirty Lancaster sorties, the last of these being the infamous attack on Dresden in February 1945. Now notorious, Musgrove tells us that, at the time, this mission was regarded as routine by those who actually participated in it: at briefing '...no one was shocked when the target was at last revealed' it was 'just another major industrial city scheduled for attack....' This did not remain the case for long, however, and, on picking up the threads of his civilian career (which would be spent achieving some prominence in academia – a variety of university professorships at home and abroad), Musgrove soon found it wise to conceal the fact that he had flown with Bomber Command at all, let alone that he had been at Dresden.

What really rankled was that while 'the entire nation was implicated in the bombers' war' it was 'outrageous that those who carried out the policy and faced the danger should be required to carry the guilt.' Having remained silent for sixty years, Musgrove has written a thoughtful analysis of the Dresden raid and its implications and consequences. In doing so, he sets the operation within the historical perspective of the way in which warfare has been conducted over time and places it within a 'Moral Scale' of his own devising. This philosophical treatise constitutes the second, and very different, half of the book in which the author broadens his canvas considerably

to offer us his appreciation of the whole concept of the bomber offensive, of the scale of the losses sustained by Bomber Command, of the ways and means by which it obtained its volunteers, and much more.

The book is very well written and I found it a real pleasure to read. While the second half is well-researched and cogently argued, it is, by its very nature, a personal opinion with which the reader may or may not agree. If you do, Musgrove's slant will provide you with much useful ammunition in any subsequent debates. If you do not, marshalling your thoughts to counter his quite persuasive arguments should provide some stimulating mental exercise.

My personal preference was for the first half of the book. This is far from being the only first-hand account written by a bomber navigator that I have read, but it is among the best. I was impressed by the writer's professional expertise and by his frankness. For instance, practically all wartime navs will inevitably provide their readers with a brief description of the techniques employed and the electronic aids that became available, but they very rarely have much (often nothing at all) to say about the Air Position Indicator (API). Interestingly, even Webster and Frankland provide only one indexed reference to the API, compared to the scores devoted to GEE, G-H and H2S. In describing the significance of the introduction of GEE and the API, Musgrove has the insight to rate the latter as being the more important of the two, which it undoubtedly was. As to his honesty, there are no mock heroics here, no grand illusions about saving the world or reflections on the contemporary war situation. What motivated Musgrove was a sense of obligation, and fear; not fear of death (although that was always a factor) but fear of 'getting it wrong – the sheer harassment of obtaining a fix and a wind.' That said, he tells us all about the very few occasions on which he did get it wrong.

There is a great deal more in this first section of the book, including some refreshingly frank observations on the way in which the wartime RAF conducted itself, which may serve to correct some misconceptions that we have unquestioningly taken for granted. He offers, for instance, some telling insights into, what he clearly regards as, the illusory concept of 'leadership' in the context of RAF-style heavy bomber operations, offers some rather puzzled asides on the RAF's rather curious aircrew rank structure – 'as a senior NCO and as

a commissioned officer I never gave an order and never received one' – and dismisses the cohesiveness between ground staff and aircrew on a wartime bomber squadron as being 'essentially a myth of post-war films.' Contentious, even critical, as some of this stuff may be, I only occasionally sensed any bitterness in Musgrove's observations. Having been written by one who was actually there, however, rather than after-the-fact by an historian, they do resonate with the ring of truth.

Musgrove's interesting and very readable account of his experiences represents a valuable and informed contribution to the history of the wartime RAF and he goes on to provide a well-founded appreciation of the implications of the bomber offensive in general and Dresden in particular. Strongly recommended.

CGJ

The Price of Peace by Colin Cummings. Nimbus Publishing (PO Box 3, Yelvertoft, NN6 6ZE); 2004. £22.

As a succinct description of its content, it would be hard to improve on the subtitle of this chunky, 688-page, A5 paperback, *A catalogue of RAF aircraft losses between VE-Day and the end of 1945*. It opens with a brief summary of the events of the period covered, which serves to set the losses in perspective, and a short description of the sources from which the data were drawn. The bulk of the book provides details of the loss of virtually every RAF aeroplane which was involved in an accident, or which failed to return from a sortie, anywhere in the world during the last eight months of 1945. I did not actually count them but at least 3,000 incidents have been described ranging from a Liberator that was reported missing in action from a mission over Sumatra, through a Baltimore running into soft sand after developing a swing on take off from an airfield in Egypt, via an Auster which ran out of fuel in northern Italy, to a Harvard that crashed while indulging in an unauthorised dog fight over Spalding. In each case (apart from a very few gaps where records appear not to have survived) we are given: the date and location of the incident; the type of aircraft involved, identified by serial number and unit; and details (generally full name, rank, age and, where appropriate, aircrew category) of fatalities, all of this raw information being amplified by a brief narrative account of what happened. There

is a useful index entered chronologically by aircraft type, eg all Hurricanes are listed together in date order (with serials). Typos? One could take issue with the rendering of the occasional place name, eg Deyrne (for Deurne on p168), Don Maung (for Muang on p530), one 'n' in Hanover on p539 but two on p635, and the 'm' omitted from Vizagapatam on p397, but, considering the size of this book, and the fact that it is a one-man effort, such occasional oversights are almost inevitable.

Although this is the first one to have been reviewed for the Society, members may wish to know that this volume is actually the fifth in a series which now covers every RAF aircraft lost between VE-Day and as recently as 1996. If you are an 'anorak' (and I am certainly one myself) this sort of authoritative compilation is almost irresistible in its own right, but Cummings' work is more than that. By collating and publishing all of this information he has provided us with a reliable secondary source, a useful and accessible research tool which will, for instance, break the back of many routine inquiries and/or assist in unearthing details of incidents to support a unit history. Oh yes, one other thing – the profits from the sale of the books in this series have been donated to a variety of Service charities, including the RAF Museum and the RAF Benevolent Fund. All in all, a remarkable achievement wrapped up in a generous gesture. Recommended.

CGJ

No 230 Squadron Royal Air Force by Guy Warner. Colourpoint Books; 2004. £18.

No 230 Sqn established its reputation as a flying boat unit before switching to short range tactical transport operations in the late 1950s. Since it had its origins in the RNAS, the author has staked a claim to the aeromarine activities at Felixtowe prior to April 1918 and presented an account of these as a pre-history chapter to the annals of No 230 Sqn proper. Not an unreasonable argument, I suppose, although this first section of the book does contain some notable errors, probably due to the use of unreliable or dated secondary sources – and several of the photographs illustrating this section are incorrectly captioned.

Thereafter, the narrative is based on the ORB and the recollections of veterans and its accuracy improves accordingly. Nevertheless, there

are still a few problems with geography and/or spelling, eg Pamanzi is in the Comoros (not at Aldabra); the AOC AHQ East Africa was AVM Philip Wigglesworth (not Wrigglesworth) and too many place names are rendered incorrectly. Then again, in 1991 a wing commander would have been made an OBE (not an MBE); there is a reference to a Bristol Beverly and did No 846 NAS really fly Hunters? Most of these errors are surely slips of the pen and superficial mistakes of this kind do not, of course, detract substantially from the core content of the book but they do induce an uncomfortable incidence of double-takes in an informed reader and must inevitably misinform an uninformed one. Most of these oversights should have been spotted by a competent independent proof-reader.

But enough of my cavils. The book is a very nicely presented 192-page hardback with a laminated cover. Coated paper is used throughout which, along with frequent use of the full page width (at 10½" × 8½" the book is a shade under A4 size), means that the 175-odd photographs, all of which are inset within the text, have been reproduced with the greatest possible fidelity. The publisher has not stinted on the use of colour and many of the pictures taken since the 1970s are given the full treatment. There is no index but most of the customary annexes are there, although rivet-counters may be disappointed to find that the one identifying aeroplanes used by the unit offers only representative examples, rather than a comprehensive listing – which ought not to have been too difficult to provide, since, despite No 230 Sqn's longevity, the nature of its activities has meant that relatively few airframes have been carried on its books and most of those that were are of well-documented types.

Many members will be aware of the bare bones of No 230 Sqn's story but these are amply fleshed out here with a detailed account of the squadron's distinguished career. It is very apparent that the author, who lives in Northern Ireland where the squadron has been based since 1992, has been able to work closely with both the unit and its Association. The latter has permitted him to provide some interesting anecdotes; I was particularly taken by Cpl Manfield's description of his journey to Singapore by sea in 1938 and by several first hand accounts of the unpredictable existence that passed for routine on a wartime flying boat squadron operating from the rudimentary facilities offered by island bases scattered across the Indian Ocean. Once

commonplace, it is timely to be reminded of a way of life that used to be lived in an RAF that is rapidly fading from the corporate memory.

Where this book scores most heavily, however, is in the prominence that it gives to the post-war years. There is a natural tendency for us to focus on the more glamorous, hi-tech, high-priced end of the aviation spectrum but the fact is that our combat aircraft are actually used relatively rarely whereas much of the transport force, and not least its short-haul element, is more or less permanently earning its keep. Guy Warner's book provides an illuminating account of No 230 Sqn's exploits, initially with Pioneers and Twin Pioneers before switching to Whirlwinds followed by its current Pumas. Apart from routine activities mounted from its various permanent bases in the UK and Germany, this period has seen the unit, or elements of it, operating from locations as far afield as the Cameroons, Cyprus, Sabah, Belize, Rhodesia, Saudi Arabia and Iraq, not to mention Ulster which has been a fairly constant operational commitment since the early 1970s – and not without incident.

Despite some incidental, but annoying (because most were avoidable) inaccuracies, this is another valuable contribution to the slow accretion of RAF unit histories. It is comprehensive, pleasant to handle, easy to read and very well illustrated. Recommended.

CGJ

Air Arsenal North America by Phil Butler with Dan Hagedorn. Midland Counties; 2004. £40.00.

Some of the ground covered by this book has been ploughed before, notably by Arthur Percy, who produced a book that dealt with Lend-Lease as it benefited the British air services, and, more recently, by Air Britain who published a detailed account of the work of the British Air Commission. As its sub-title, *Aircraft for the Allies 1938-1945 – Purchases and Lend-Lease* indicates, however, this one spreads its net much wider to consider the overall contribution made by North America. Thus, while the narrative deals with the early orders placed by the British, it also covers those placed by other nations, including the Netherlands, Norway and, especially, France, and explains what subsequently happened to the many aircraft that were delivered too late to stem the tide in 1939-40. The political and economic background to these, largely pre-war, activities is explored,

highlighting the way in which the building of extensive new production facilities in the USA, a programme which had been directly financed by the British and French governments, would provide the American aviation industry with the capacity that permitted it to respond so rapidly in 1941-42.

Lend-Lease is described in similar detail, but, while it covers the more familiar US-to-UK arrangements, it gives equal space to the aircraft that the Americans supplied to the USSR, to the various Commonwealth governments and to many 'minor' air forces, notably those of Latin America. The authors use the term 'North America' in the book's title deliberately, because they also consider the aircraft built by the USA's northern neighbour under the Canadian Mutual Aid programme and the enormous contribution to allied victory that Canada made through the provision of flying training. The writers go on to exceed their brief by covering British aircraft supplied to the USSR under the 'Anglo-American Protocols' and even British aircraft supplied to the Americans under 'Reverse Lend-Lease', and then there are the US aircraft purchased or donated, as distinct from being supplied as aid (eg the Fairchild 91 used as an air ambulance in North Africa), impressed US-built aircraft (eg civil-registered Stinson Reliants) and 'field transfers', (eg the borrowed P-38s flown experimentally from Coningsby as potential mounts for Master Bombers).

Both writers have well-established reputations as aviation historians and we can safely assume that this latest attempt to address a most complex subject will also be the most accurate. That said, it is not flawless and I did spot one or two errors. The UAS Harvard illustrated on page 60, for instance, belonged to Cambridge, not Oxford, and I could find no mention of the handful of USAAF A-36s and A-20s that the RAF acquired as field transfers in the Mediterranean theatre in 1943. In connection with the Canadian-run training system, I would also have to take issue with a statement on page 63 to the effect that 'the actual agreements always referred to it under the BCATP title'. That term certainly does not appear in the original document, the Riverdale Agreement of 17 December 1939, which, rather inconveniently, assigned no formal label to the enterprise; although in Riverdale's subsequent report to the UK Government on his negotiations, he calls it the Dominion Air Training

Scheme.

The book runs to some 320 A4-ish pages, a little under half of them providing a descriptive account of the way in which the various arrangements were negotiated and exploring the procedures governing the actual placing of orders for aircraft and equipment and the ways in which those orders were subsequently handled. The bulk of the remainder of the book is devoted to ‘aircraft biographies’ which provide a description of each type (some of them, especially those supplied to South America, being relatively unfamiliar varieties) and information on the specific airframes involved, including a lot of detail on serial numbers, order references and the like. The nature of the subject matter does make the book a bit heavy going but it is not really intended as bedtime reading; it is a work of reference and, as such, it presents an immense amount of information in a logical and easily accessible format. Words aside, there are some 600 – yes 600! – black and white photographs and another twenty-three contemporary pictures in colour. Many of the illustrations will be familiar but many will not and, this being a Midland publication, the reproduction, on coated paper throughout, is of the highest standard.

The asking price is a bit steep, but it is the going rate for a book of this size and quality. An interesting browse for the casual reader and an essential reference work for those studying related aspects of air power in WW II.

CGJ

Naught Escapes Us by Peter B Gunn. No 206 Sqn Association, (via Wellhead Cottage, Fountain Road, Selborne, GU34 3DA); 2004. Cheque for £18.00 (inc p&p) payable to ‘206 Sqn Association’.

Taking its title from the unit’s motto, *Naught Escapes Us* is a new history of No 206 Sqn and, I believe, the first to be made available to the public, previous versions having been in-house affairs. As such, this roughly 10" × 7" book, with its 240 coated pages presented between a set of, the increasingly fashionable, laminated hardback covers, is another very welcome addition to the annals of the air force. The story opens with an account of combat in France during WW I, originally as an RNAS fighter squadron and subsequently as a DH 9 day bomber unit. Reformed within Coastal Command in 1936 and initially mounted on the technically advanced, but operationally

inadequate, Anson, No 206 Sqn has been almost exclusively employed on maritime duties ever since, operating in turn the Hudson, Fortress, Liberator, Shackleton and Nimrod. The only deviation from this pattern occurred in 1945-50 when the squadron was assigned to Transport Command with Liberators, Yorks (with which it participated in the Berlin Airlift) and Dakotas. All of this activity is very well covered, especially the Shackleton/Nimrod years, the only place where the tale gets a bit thin being the Dakota era which, while it lasted for only three months, probably deserved more than a mere two lines.

The book is well-illustrated with about 170 pictures, twenty of those from the Nimrod period being in colour. The shot of a York on page 105, captioned as being at Wunstorf, was actually taken at Gatow and, presumably because of gaps in the squadron's archives, one or two pictures show aeroplanes of other units. The Nieuport 17 on page 2, for instance, belonged to No 29 Sqn (not No 6 Sqn RNAS as claimed by the caption) and the Anson on page 29 was being flown by No 502 Sqn. Beyond one or two typos, I spotted relatively few errors within the narrative, eg the DH 9 had only one forward-firing gun (not two) and I suspect that the 'RD6' on page 123 was more likely to have been an R6D. The only really significant howler I came across is a description of DECCA as a hyperbolic navigation system that works on measuring time difference; that was GEE, of course – DECCA is based on phase comparison. The story is supported by the usual annexes, COs, bases, aircraft flown, decorations and awards, roll of honour (presented by location of last resting place, including Arras and Runnymede for those with no known grave) and there is an excellent index. That said, the list of aeroplanes on charge looks a little threadbare in places and the observation that the Yorks probably carried no markings is belied by the photograph referred to above which clearly shows the aircraft to be coded MOYGX, which positively identifies it as belonging to No 206 Sqn. There is a problem with the list of bases too, in that it omits a *de facto* disbandment at Lyneham on 31 August 1949 and a re-formation at Waterbeach on 1 December 1949 – it's that rather obscure Dakota period again.

None of these minor defects do more than cause the odd ripple in a smooth-flowing, entertaining and comprehensive account. There is, however, a degree of irony in the timing of this book's appearance.

The chronicle ends on a particularly high note, with the squadron's Nimrods returning to Kinloss after their successful participation in Operation TELIC and the last page looks forward with enthusiasm to a future in which the current aircraft will soon be replaced by the even more capable Nimrod MRA4. Sadly, it was not to be. By the time these words appear in print No 206 Sqn will have been disbanded to join the ever-increasing ranks of distinguished flying units that are being rendered redundant by changes in foreign/defence policy and/or the Treasury's inability to underwrite a budget that can keep pace with the spiralling costs of sophisticated defence equipment.

Recommended.

CGJ

Coastal Command 1939-45 by Ian Carter. Ian Allan; 2004. £19.99

This 160-page hardback is very well illustrated with Imperial War Museum photographs. Indeed the text, including the captions to the photographs, amounts to only some 25% of the contents. It is, therefore, to all intents and purposes a pictorial record of Coastal Command's WW2 aircraft, personnel and operations.

Carter sets the scene for the book with a resume of the Command's readiness for war, particularly its ability to counter the submarine threat, prior to 1939. The assessment concludes, as did its then Commander-in-Chief, Air Marshal Bowhill, that 'his Command was nowhere near ready to face it'. The photographs of the aircraft of the period – mostly antiquated biplane flying boats – emphasise the lack of preparedness.

Each of the war years is covered by a single chapter which summarises contemporary activities, achievements, successes and failures. This text includes descriptions of newly introduced aircraft, weapons and equipment and is amplified by photographs (all dated) for the corresponding period. The captions are based on original information contained in Air Ministry files which helps the reader form a better appreciation of the progress of the war.

Not surprisingly the author majors on the Battle of the Atlantic and the U-boat threat. He has made use of new information that has come to light in recent years concerning the fate of individual U-boats and this has enabled him to corroborate, and in some instances correct, established printed sources. This is of particularly interest to those

who have read older histories of the Battle but may raise some eyebrows. That said, Carter does not neglect the anti-shipping role and there is very good coverage of the strike squadrons' operations.

Overall the book represents a well put together, balanced and unbiased pocket history of Coastal Command in WW II. It might be seen as a 'coffee table' publication but it is well worth a browse and there is plenty to interest the serious reader. Recommended.

AVM George Chesworth

Lettice Curtis. Her Autobiography by Lettice Curtis. Red Kite; 2004. £19.95.

Aerial biographies offer the reader two points of interest; aeroplanes and the aviator or in this case aviatrix. Eleanor Lettice Curtis, or ELC as she refers to herself throughout, was one of the first female pilots of the Air Transport Auxiliary (ATA) and has written about that organisation earlier (*Forgotten Pilots*. Documedia;1998). Nevertheless, Chapters 7 to 20 of this book refer to her time with the ATA so a brief résumé of that organisation is appropriate. The ATA was a civilian organisation set up in 1940 to ferry aircraft from factories to Maintenance Units and also to RAF and FAA squadrons. Its aircrew comprised male pilots who were unfit for operational duties with the RAF, often because of age – they referred to themselves as the Ancient and Tattered Airmen – or for aptitude reasons. They were joined by female pilots, who proved themselves capable of dealing with anything the RAF threw at them. The ATA contribution to the war effort was substantial, they delivered over 300,000 aircraft and although they did not fight they flew into dangerous places at times and took their share of casualties. Some non-operational RAF pilots flew with the ATA but around 90% of its aircrew were civilians. The majority were British but pilots also came from America, the Commonwealth, European countries and elsewhere.

The British component, both male and female, included WW I veterans and some commercial pilots but generally speaking they were drawn from the stratum of 1920s and '30s society who could afford private flying – representatives of the upper middle classes and of the aristocracy in fact. ELC was such a person who, after an education which included Benenden and Oxford, found herself in a position

familiar to many educated women of her generation with few opportunities available for her talents. Like her compatriot Amy Johnson she was rescued from such frustration by taking up flying. She comments that with the advent of light aircraft and flying clubs in the '30s 'aviation for all' was born. Well, not quite all but certainly for those like herself who could afford it and there were not very many of those. ELC set her sights on becoming a commercial pilot and after gaining her B Licence worked on aerial surveys before joining the ATA. Her account of the ATA period is interesting both because of the light it throws on the general work done and the specific role of women within it. After the ATA ceased to exist in 1945 she continued her career as a professional airwoman at Boscombe Down where her attempt to become a test pilot fell foul of Ministry of Civil Aviation views about appropriate roles for women but where she was accepted to fly as test observer in the Civil Aircraft Test Squadron, recording performance figures for such aircraft as the Ambassador, Hermes, Marathon and Tudor. As the aircraft industry took over more responsibility for its own clearance testing she went to Faireys as a test observer, moving on to work with the Civil Aviation Authority in the Air Traffic Control Experimental Unit and to the Flight Operations Inspectorate. Throughout this career she maintained her flying licences, sometimes using them in the course of her work and also in private flying, which included participation in air racing. After retirement she obtained a helicopter licence in 1992.

What we have in this book is the story of a remarkable person who proved herself capable of jobs which, in the climate of her times, were unusual for a woman. ELC comes over as a very determined and competent character who lived life to the full in professional activities, sport and social affairs. Her story is presented anecdotally but does throw interesting lights on the milieus in which she worked and the personalities she encountered. The book is nicely produced and illustrated with good quality photographs of both aeroplanes and people. Should you buy it? As is the case with many privately published books I think the price is a bit steep. Try your library first and decide for yourself about purchase.

Dr Tony Mansell

The Other Few by Larry Donnelly. Red Kite; 2004. £29.95.

Most writers dealing with the Battle of Britain tend to include an observation to the effect that we should not forget the contemporary contributions to success that were being made by Bomber and Coastal Commands, but in many cases, the author has little more to say on the subject. This book sets out to put the record straight and it does so very successfully. As one of the oft-overlooked 'other few' himself, Larry Donnelly, was well-qualified to undertake this task as he had flown forty-one Whitley sorties as a WOp/AG with No 10 Sqn by the time that the battle ended. For the record, he went on to complete a second wartime tour on Halifaxes and a third on Sunderlands; as a pilot, he was to remain in uniform until 1966, flying mostly in the transport role.

The bulk of his book chronicles the operational activities of the RAF between 1 July and 31 October 1940. The entries for each day comprise: a brief narrative summary of enemy air activity, reflecting, in the main, the confrontation between Fighter Command and the *Luftwaffe*, and noting the numbers of aircraft lost by each side; a more detailed account of Coastal Command activities, highlighting particularly notable operations; a similarly detailed account of Bomber Command operations, broken down by day and night and noting numbers of aircraft, by type, despatched to various targets; and, finally, details of bomber and maritime aircraft lost on operations (type, serial number, unit, brief details of the incident, crew names – where known – and fates). The book is rounded off by a Roll of Honour which serves as a *de facto* index.

Much of this information, particularly that relating to losses, can be found elsewhere, of course, notably in the published works of Bill Chorley and Ian McNeill (whose books are acknowledged in the bibliography) but Donnelly's narrative, as distinct from tabulated, presentation renders it far less clinical. The raw facts are also amplified by the insertion of numerous panels providing first-hand accounts of events (some of them anecdotes drawn from the author's personal experience) and the whole production is further enhanced by more than 250 photographs of aeroplanes, people and incidents, an average of almost one per page, and all, allowing for the quality of some of the originals, well reproduced. Many of these pictures will be familiar but some will not and there are one or two gems among them – an Anson escorting a French Latécoère 523 flying boat across the

Channel, for instance, and a series of shots of a downed Blenheim of No 101 Sqn being recovered by *Luftwaffe* personnel.

To quote the publisher's blurb, this book is 'long overdue', and Red Kite's 288-page A4 hardback does the subject full justice. Clearly, a labour of love on the part of its author, it is sad to have to record that he died a few weeks after publication and before he was able to savour the credit that was certainly his due. Recommended.

CGJ

ROYAL AIR FORCE HISTORICAL SOCIETY

The Royal Air Force has been in existence for over 80 years; the study of its history is deepening, and continues to be the subject of published works of consequence. Fresh attention is being given to the strategic assumptions under which military air power was first created and which largely determined policy and operations in both World Wars, the inter-war period, and in the era of Cold War tension. Material dealing with post-war history is now becoming available under the 30-year rule. These studies are important to academic historians and to the present and future members of the RAF.

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

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

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

THE TWO AIR FORCES AWARD

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

- 1996 Sqn Ldr P C Emmett PhD MSc BSc CEng MIEE
- 1997 Wg Cdr M P Brzezicki MPhil MIL
- 1998 Wg Cdr P J Daybell MBE MA BA
- 1999 Sqn Ldr S P Harpum MSc BSc MILT
- 2000 Sqn Ldr A W Riches MA
- 2001 Sqn Ldr C H Goss MA
- 2002 Sqn Ldr S I Richards BSc
- 2003 Wg Cdr T M Webster MB BS MRCGP MRAeS

THE AIR LEAGUE GOLD MEDAL

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

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

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