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SELECTED GLOSSARY

ACA	Agile Combat Aircraft
ACAS(OR)	Assistant Chief of the Air Staff (Operational Requirements)
ACDS OR(Air)	Assistant Chief of the Defence Staff Operational Requirements (Air)
ACRC	Air Crew Recruiting Centre
ACSB	Air Crew Selection Board
ADGB	Air Defence of Great Britain
AEAF	Allied Expeditionary Air Force
AHB	Air Historical Branch
ANR	*Aeronautica Nazionale Repubblicana* (National Republican Air Force)
AST	Air Staff Target
ASTOVL	Advanced Short Take-Off and Vertical Landing
ASR	Air Staff Requirement
CEP	Circular Error Probable
CHODS	Chiefs of Defence Staffs
DASS	Defensive Aids Sub System
DGA1	Director General Aircraft Systems 1
EFA	European Fighter Aircraft
ESR	European Staff Requirement
FCA	Future Combat Aircraft
FEFA	*Futur Avion de Combat Européen*
HMSO	His/Her Majesty's Stationery Office
ITW	Initial Training Wing
JARIC	Joint Air Reconnaissance Intelligence Centre
MoD/PE	Ministry of Defence/Procurement Executive
MU	Maintenance Unit
NAD	National Armament Directors
NAFAG	NATO Air Force Armaments Group
NEFMA	NATO European Fighter Management Agency
OEST	Outline European Staff Target
OR	Operational Requirement
ORB	Operational Record Book
OST	Outline Staff Target
RS	Radio School
STOL	Short Take Off and Landing
STOVL	Short Take-Off and Vertical Landing
VT	Variable Time (fuse)

Our Guest Speaker, following the Society's Annual General Meeting at the RAF Club on 8 September 2021, was

Chris Pocock

whose topic was

THE RAF AND THE U-2 – PROJECT OLDSTER FROM THE INSIDE

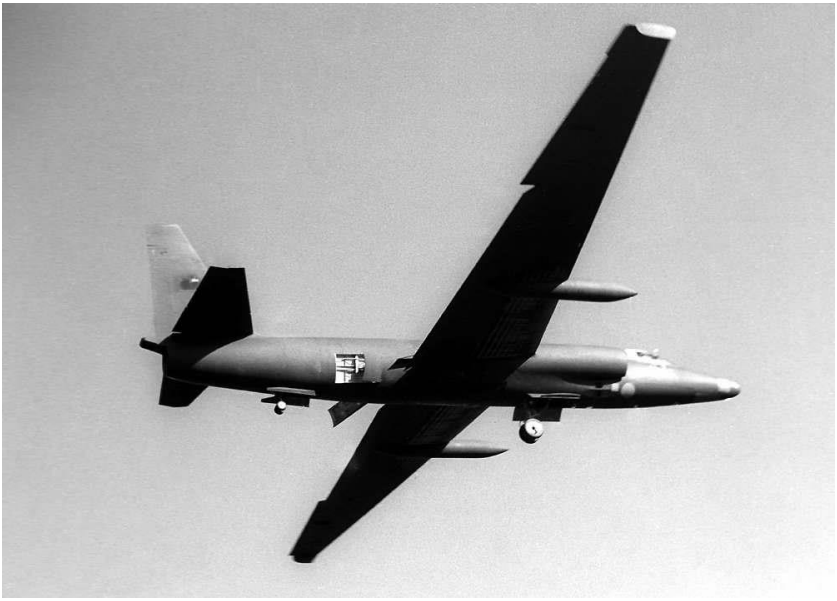
Following my previous article, in Journal 77, tonight I am going to provide some personal perspectives from the RAF pilots who joined the US U-2 project to overfly the Soviet Union in the mid-to-late 1950s. These perspectives come from selected AIR40 class files, now declassified and available for inspection at The National Archives, plus some autobiographies and interviews.

First, though, a short introduction to the unique aircraft that was developed under CIA sponsorship as Project AQUATONE, and built by the Lockheed Skunk Works. The go-ahead was given in November 1954. A new airfield was constructed in the Nevada desert so that test flights could be conducted in total secrecy. The first flight was in August of 1955 and CIA pilot training began in January 1956. The US Air Force airfield at Lakenheath was chosen for the first overseas detachment, however, the British government withdrew permission after the Buster Crabbe incident. But Germany granted permission, and the first overflights of the Soviet Union were staged from Giebelstadt in June 1956.

The vital statistics of the early U-2s were:

Length 50ft; Wingspan 80ft
Aspect ratio 11:1
Maximum take-off gross weight 19,665lb
P&W J57 – 11,200lb st
Range 4,175nm on 1,335gal
Endurance 10 hours @ max alt 72,500ft
B-camera, focal length 36in
ELINT + COMINT
Dedicated SIGINT

Over the next two years, there were 19 overflights. But, contrary to expectations, some of them were detected by Soviet radars, although the MiGs could not reach the U-2's cruising altitude. President



A U-2 with the slipper tanks. (Hiroshimi Komiya)

Eisenhower took heed of Soviet diplomatic protests, and became increasingly reluctant to sanction more overflights. However, US intelligence detected a gap in Soviet early warning radars along the southern border in Tajikistan and Kyrgistan. The second CIA detachment was at Incirlik, in Turkey, with more successful overflights being made via deployments from there to Peshawar in Pakistan.

The US Air Force provided vital support to the CIA detachments, and bought its own fleet of U-2s. It established a training squadron at the remote Texas base of Laughlin, where pilot training began in November 1956. The Air Force then flew high-altitude air sampling missions over friendly airspace, monitoring worldwide stratospheric fallout from Soviet nuclear tests but also collecting debris for weapons diagnostics purposes.

The US invited the UK to join the CIA project after its Director, Richard Bissell, suggested that 'British' overflights might be approved by the British Prime Minister, rather than the US President. Of course, Eisenhower had to agree to this scheme. Some complicated negotiations followed about the practicalities.

Four RAF pilots, Sqn Ldr Chris Walker, Flt Lt Mike Bradley, Flt Lt David Dowling and Flt Lt John MacArthur, were recruited, all of them A2 flying instructors with jet experience. They were sent for training at Laughlin in March 1958. British participation in the programme was codenamed Project OLDSTER and the RAF established a small, and top secret, organization to manage its involvement. Initially headed by AVM Ronnie Lees, ACAS(Ops), who was succeeded by AVM John Grandy in October 1958, other early key players included AVM Sid Bufton, ACAS (Int) and, as DD Ops (Recce), Gp Capt Stuart Wise, Gp Capt Thomas Bingham-Hall and Wg Cdr Colin Kunkler; Wg Cdr Norman Mackie was attached to CIA Project HQ.

David Dowling, who was serving as an instructor pilot on Canberras, recalled:

> 'In March 1958 I took some leave and was at home in Wales when I was called to the telephone; it was the Adjutant at Bassingbourn. He asked if I could make the Air Ministry at eleven the next morning for an interview with the Assistant Chief of Air Staff (Operations), Air Vice-Marshal Lees. I looked at my watch; it was already past mid-day, if I left by road, I could make it. I said, "Yes," but what was it all about? He had no idea but said, "Be there." I packed my bag, said goodbye to my parents and left for London where I stayed the night at the RAF Club. The next morning, I reported to the office of ACAS (Ops). There were two other officers waiting. One I knew, Flt Lt John MacArthur, who had been on my entry at Cranwell. The other, Flt Lt Mike Bradley, I did not know. None of us knew why we had been called, nor did the office staff know. We went in for interview one at a time. I was last. The other two, when they came out, looked rather sheepish and said they would wait for me. I went in and was told to sit down. I was asked some general questions about my life interests. Was I courting any girl seriously, to which I said, "No." He then told me I was to go to the United States for two weeks or perhaps longer. I would have to have a medical that afternoon in London. If I passed that, I would be given more instructions when I was in the States. If I had any reason why I did not wish to go I should say so now. I had none; the interview was over.'

According to Mike Bradley, the CIA requested that four British

pilots be sent for training, because they expected only two to pass the medicals. These were rigorous, especially at the renowned Lovelace Clinic in New Mexico. David Dowling recalled:

> 'It was horrific; we were each given a card with our schedule for the week. We had tubes pushed down our throats and up our backsides, samples taken, stuff injected and had to drink and eat many different kinds of liquid and food. We were X-rayed in every position and had brain scans. Doctors and psychologists interviewed us. At night we had to take back to our motel whole batches of enemas and test medication to take for the next day's sessions. We had books of questions to answer for the psychologist. We had not come across this breed of doctor before and found, to our minds, some of the questions insulting and perverse.'

The four pilots also took an escape and evasion course at the CIA's Camp Peary in Virginia. David Dowling again:

> 'We were given general survival training on how to live off the land; we caught or shot our food, learnt to prepare and cook the catch. We did firearms training… Much of our training was centred on escape. We were taught the art of lock-picking and were shown several pieces of equipment that James Bond might use… Perhaps the highlight was how to cross defended borders, such as that between the Soviet Union and Western Europe with its minefields and complicated fencing with watch towers and booby traps.'

Then it was off to Laughlin for the pilot training course. The RAF trainees had still not been told what aircraft they were to fly. They arrived at the remote Texas base in the evening, and were introduced to their instructor pilots. John MacArthur recalled the meeting at the 50th Anniversary reunion of the Dragon Lady Association in 2010, perhaps slightly embellishing the story to amuse his audience of U-2 veterans:

> 'Tony and Pat said to us, "What's been your average mission time?" I said, "In the Meteor about 45 minutes, and in the Hunter 55 minutes." And they fell about laughing. Drawing myself to my full 5ft 9in, I haughtily asked, "What's wrong with that?" Then they asked, "What's been your longest mission?" I remembered ferrying an airplane from the UK to Germany, so I told them one hour and a half. And they all fell about laughing

The military Cessna Model 310, the L-27 (later U-3), was used to introduce pilots to the unique landing technique demanded by the U-2. (AirHistory.net).

again. They said, "How does nine hours grab you?" I said, "Nine hours? On my own?" "Yes." "And I can't scratch my nose?!" I thought, this had better be a hot ship! Next morning, on the ramp, there she was. We looked at this thing. I remember saying, "Is that it? You mean nine hours in *that*?" "Yes", they said, "Nine hours – in that!"'

The ground school especially included polar and astro navigation, since the U-2's 'navaids' were limited to an ADF, visual reference to the ground through a drift sight with magnification or, if cloudy, time and distance. More about this later. There was no U-2 dual trainer, so the pilots' first flight would be his first solo. David Dowling recalled:

'Because the U-2 had some peculiar and dangerous handling characteristics, our instructor would take us up in a Cessna 310 light piston twin aircraft and demonstrate a simulated U-2 circuit pattern. The U-2 had very good gliding characteristics and with the engine at idle it would glide for miles. The main difficulty was to position the aircraft on the approach path low enough and at exactly the right speed for a touchdown in the first third of the runway. This sounds easy, but for the first time you did not quite know what to expect and it was sweat-making. It would float and, if touched down too early, would bounce and leave you on

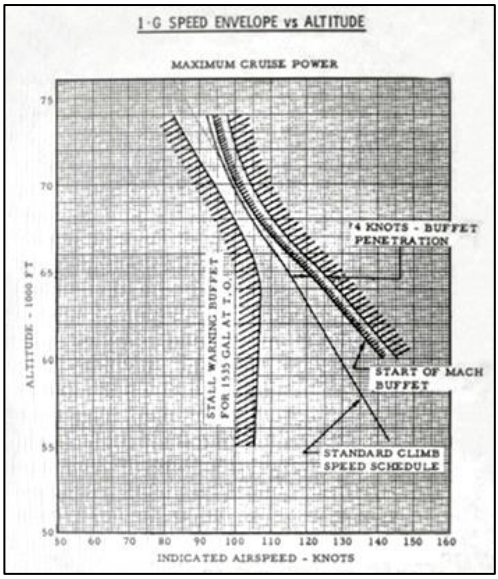


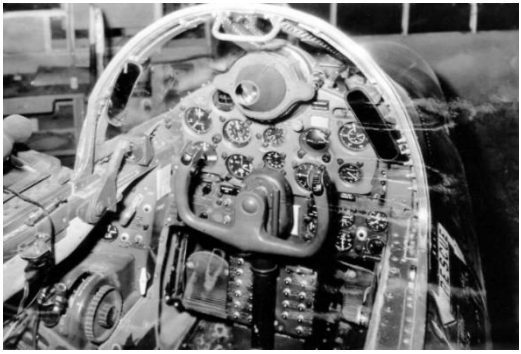
Fig 1. Extract from the C-model flight manual.

the stall with no power available some feet off the ground. You could not accelerate the engine from idle quickly; it would cough and cough as it gulped for more air, the whole airframe would shudder. The engine would slowly accelerate through the first 40 per cent of power and then come on full power with a mighty rush. If you bounced, the likelyhood was that you would stall and crash. I did three flights in the Cessna to simulate the U-2 approach and landing. We used a quarter flap down and about 40 per cent power so that a very flat approach and landing was made. With these conditions set the Cessna would float for a long way as you eased it onto the runway. I had three further flights in a T-33 before my first flight in the 'U-Bird' on the 4th of June 1958.'

Flying to altitude posed another set of challenges, as can be seen from the graph at Figure 1, which illustrates the very narrow margin between stall and Mach buffet at high altitude. David Dowling said:

'You flew on autopilot and every few thousand feet you had to adjust speed to a strict schedule and keep within a knot or two. If you were the least bit inattentive the autopilot would wander or go out of trim, both conditions being dangerous, as you only had ten knots in balanced flight between the high and low speed stall. A two knot divergence from plan and you were within three knots of the limit . . .

To stay alive, you had to watch the airspeed needle like a hawk . . . The major problem was that the autopilot was never



The U-2 cockpit.

designed for these altitudes or fine limits. It was frightening at times as you looked back at the instruments after looking through the 'scope and see that the airspeed had gone up two or three knots and was accelerating. You watched the needle for a second or two to see if the autopilot was reacting; if not you had to manually re-trim the autopilot or disconnect and reset. One problem you could encounter was when the autopilot trim had not adjusted the aircraft trim and was holding the elevator force. If you released under these conditions the elevator would snap up or down and cause an upset, putting you out of control.

Turns at altitude were another delicate manoeuvre. If you used more than fifteen degrees of bank, the aircraft might tend to sink slightly with the nose going up or down, but once again you had to hold the speed exactly as any change was dangerous. There were three additional factors to take into account in the turn, the stalling speed increases, drag increases and the inside wing is moving slower.'

On the afternoon of 8 July 1958, Chris Walker was killed when his aircraft went out of control at high altitude and crashed in the Texas panhandle near Amarillo. He was found dead on the ground, still in his ejection seat. The next morning, a US Air Force trainee pilot, Capt Al Chapin, crashed in similar circumstances less than 100 miles away. The USAF grounded all its U-2s while accident investigations were carried out. Walker's autopsy revealed that he had become hypoxic; it was soon suggested that both accidents could have been the result of the pilots being starved of oxygen, after the supply was restricted by ice formation at the reducer valve. There was evidence of a fire in Chapin's oxygen supply.

On 25 July, a U-2 caught fire on the ramp at Laughlin while a 'Tech Rep' was checking a new oxygen pressure reducing valve. On

2 August, while investigations continued, the U-2s were cleared to fly again, but only as high as 20,000 feet. Four days later, another USAF pilot was killed on his first U-2 flight when the aircraft stalled on final approach, rolled rapidly to the left and struck the ground in a near-vertical attitude.

The USAF insisted that the ejection seats be disabled until Lockheed could assure their reliability. As another precaution, the radio leads to the pilot's helmet were re-routed so that they no longer ran alongside the oxygen tubes: a short-circuit in that wiring could have caused a fire in the cockpit.

Chris Walker was buried in a cemetery at Montgomery, AL, alongside 78 RAF airmen who had been killed during flying training in the Second World War

The US had been sharing much of the imagery from U-2 flights with the UK. The arrangement was working well, so Wg Cdr Bob Abbott, a senior photo-interpreter at JARIC was sent to the CIA's Photographic Interpretation Center in Washington, codenamed AUTOMAT.

Training completed, the three surviving pilots returned to the UK. They still did not know their final destination until they were briefed by Wg Cdr Kunkler in London. Here they were joined by a flight surgeon, Flt Lt John Clifford. The briefing included their cover story. They were to pretend to be civilian meteorological officers, deployed to help organize weather reconnaissance flights by the U-2. MacArthur thought it was a very thin veneer.

They flew on to Turkey in mid-November, and were soon joined by a British mission planner, Flt Lt Mike Collingwood. At Incirlik, they found Detachment B to be a slick operation of some 50 people, led by a USAF colonel, with a CIA officer as his executive. The CIA also provided the communications and security personnel. Other USAF officers and airmen performed operations and logistics functions along with 'Tech Reps' from Lockheed and contractors for the sensors, pressure suits and so on. There were seven American pilots, all former USAF officers who had signed contracts to join the CIA, with a promise that they could subsequently return to the service.

Those pilots were paid more than three times that of their equivalents in the USAF. There was a debate in London on whether the RAF pilots should be similarly recompensed. In the event, they were, and this was out of MI6 funds, according to Robbie Robinson, who was selected as

Walker's replacement. 'As a lowly squadron leader, I was paid more than the Chief of the Air Staff!' he said.

The first of three deployments from Incirlik to Watton were made in December 1958. Genuine weather package flights were flown from there, to support the cover story. The deployment also served as a test of the 'Fast Move' procedure that had been devised to make U-2 deployments as covert as possible.

Robinson had been one of the test pilots on the experimental Scorpion rocket-boosted Canberra, which had reached just over 70,000ft in 1957, which became the official world record height. Robinson flew missions that collected fallout from British nuclear tests, and he was flying the Canberra back to the UK from Christmas Island when he was summoned to the Air Ministry, which had selected him as the replacement for the unfortunate Walker. He completed his U-2 checkout and joined the Detachment in January 1959.

Robinson brought a questioning and sceptical mindset to the CIA operation, which was by now renamed CHALICE. The CIA U-2s did not have ejection seats. He challenged Col Stan Beerli, when the Det B Commander noted that an ejection seat would add weight and therefore reduce altitude, and claimed that, 'My pilots don't want them.' In fact, an ejection seat was added to the CIA aircraft in mid-1959.

Robinson also questioned the positioning of the destructor in the Q-bay, a cyclonite charge that was intended to destroy the vital workings of the B-camera. It was right behind the cockpit bulkhead, at the level of the pilot's head, and therefore would certainly kill him if it was mistakenly or prematurely activated.

The detachment's living quarters were trailers, located separately from other USAF airmen, who were also deployed there, and from Turkish Air Force personnel. The presence of the British officers was particularly sensitive, because of the strained relationship between the UK and Turkey over Cyprus. At first, they were not allowed off base. Robinson described their situation as, 'Turkish without too many delights.' But the rule on travelling off base was later relaxed, provided that the Brits were part of a larger group of Americans, so that they would not stand out.

Contrary to his original orders, David Dowling had got married. After a couple of months, his wife was allowed to join him, along with Mrs Clifford. David Dowling recalled:

'Ethel must have found it all very strange. We caught a BEA flight from London to Frankfurt. On arrival we were met by one of those CIA men in the inevitable fedora hat and raincoat. We spent the night in a US military hotel and left the next morning in a bus for Wiesbaden Air Base. We were taken straight out to a C-54 and departed for what was an unknown destination for Ethel. Once airborne I was able to tell her that we were on our way to Turkey.'

Robbie Robinson said:

'We kept ourselves to ourselves. We were allowed to use the officer's mess, but there was concern that we could be identified on base by our British accents. We played a lot of card games, and there was a lot of drinking.'

Mike Bradley reported:

'All of us are finding the civilian way of life and approach to the job a bit strange and rather pleasant. Leisure is abundant, since when we are not preparing for a mission or actually flying, we are not encouraged to just hang around. We are finding living in caravans rather fun, and we are developing our talents with saucepan and grill'

But these attractions soon paled. Robinson reported that:

'The absence of a flying crew room where the normal interchange between pilots usually occurs is a disadvantage. The problem of boredom in off-duty hours is being resolved by the individuals in their own way, and various hobbies are being undertaken.'

The overall security was very tight, and 'need to know' was a guiding principle. Doc Clifford reported:

'On arrival here, our main adjustment was to the pseudo-undercover life. We considered the US pilots to be somewhat fat, dumb and happy. Then it was realized that such an attitude to many things was not unreasonable.'

David Dowling described the physical security:

'The operations section of the building was kept separate from the administrative part by a door to prevent unauthorised entry. No papers were allowed to be left out; every piece had to be accounted for. We, as pilots, did not have an office or even a locker. In effect, if you did not need to know you had no access.

> We pilots were told nothing of other pilot's flights, nor about any electronic equipment that we were using. We were merely switch operators. Aircraft would come and go of different variants and unless we flew that particular one, we would not even know it was there.'

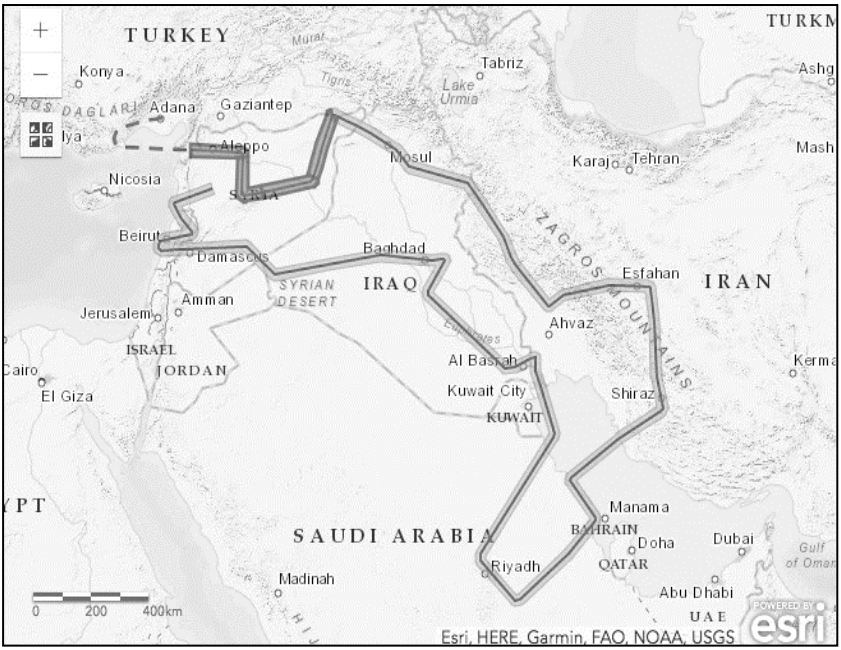
In late 1958, the Air Ministry decided to train two more pilots. Flt Lt Bunny Austin was ex-Canberras and Flt Lt Brian Cox ex-Hunters. They reached Laughlin in January 1959 and, because there was no room in the Bachelor Officers' Quarters, they were billeted in the nurse's quarters. That soon led to Austin developing a serious relationship with one of the female residents. They were married in a 'quickie' ceremony across the Mexican border in Cuidad Acuna, that Cox facilitated by driving them there in a car borrowed from one of the American navigators. It is not recorded in the MOD files, how the news of Austin's unexpected marriage was received in London!

Despite two flameouts, Cox completed his U-2 checkout with flying colours. So did Austin. But by the time that they returned to the UK, it had become obvious that political approval would never be given for the regular series of Soviet overflights, that the RAF leadership had originally envisaged. Cox and Austin were released to general duties, with the promise that they would eventually be deployed for U-2 operations. That never happened, thanks to the May Day 1960 shootdown of Gary Powers.

The only operational flights for the British pilots for most of their first year, were over the Middle East. Nineteen were flown in all, including mission B8638 on 10 September 1959 over Syria, Iraq, Iran, Saudi Arabia, and Lebanon.

David Dowling recalled one of these missions:

> 'After about forty minutes you were out of radio contact with base and usually across a border into another country. You were now completely on your own flying an illegal flight. In other words, you were a spy with no legal rights in the event of your capture. It has never ceased to amaze me that we did not lose a plane nor have a forced landing in the nearly two years that we flew with the Incirlik detachment. It was only when Frank Powers was shot down that we had to face up to the inevitable.
>
> I often wondered what was going on down below, as sometimes we over flew our own bases in Cyprus and at Masirah



The route flown by Mission B8638 on 10 September 1959.

Island in the Gulf. They were probably sitting drinking coffee after a satisfying lunch, or still in the bar, while we were struggling to breathe, and with every nerve taught.'

Detachment B had three T-33s for training, as well as its four U-2s. David Dowling recalled:

'The T-33 training flights were over Turkey, and initially also Greece until it was declared off limits by London. These flights helped to ensure that the four pilots remained proficient, especially in navigation, for which only basic provision had been made in the U-2. The primary instrument was a drift sight offering different levels of magnification looking down. The optical path could be switched to look up, thus becoming a sextant. Otherwise, there was only a radio compass. That was not much use when flying over desolate areas with few stations.

It was essential to carefully study the maps and make annotations to help identify turning points, maintain the desired

The medieval Citadel of Aleppo taken from a U-2 during an overflight of Syria – RAF mission B8652 on 15 November 1959. (Society for American Archaeology)

tracks, and understand where to turn the main camera on and off. To obtain the best imagery, flight line deviations of no more than a quarter mile were required. In variable crosswinds, it was difficult to fly to such fine limits. The detachment navigators provided the pilots with map charts cut into strips and pasted onto up to ten double-sided boards. In the cramped cockpit, these were not easy to handle.'

But it wasn't all hard work. David Dowling again:

'The T-33 flying was great fun as there were virtually no restrictions to our flying over Turkey. The local people were not encouraged to complain of low flying.'

Robinson reported a visit to the Det by Gp Capt Bingham-Hall, during which he was flown in one of the T-33s, evidently with some vigour:

'We trust that any injuries inflicted on his health will not be long-lasting, and will not deter future visits from the Air Ministry!

Some training and ferry flights were not without incident. MacArthur was over the Bay of Biscay, *en route* to Watton, when his hydraulics failed. That would mean a tricky, no-flap landing. There

was a crosswind at Watton, so he diverted to Brize Norton which, being a USAF B-47 base, had a longer runway. His first landing attempt was too fast: 90 knots crossing the threshold instead of 75 knots. He went around, made a flatter approach, and as soon as the wheels hit the runway, he shut off the engine.

Two upgraded U-2C models arrived at Det B in August 1959. The P&W J75 replaced the J57, boosted power by 4,800lb to 16,000lbst and altitude by 4-5,000ft, to a theoretical maximum of over 76,000ft if the cruise-climb was performed at max power. However, this reduced the range. Henceforth, flights were planned to cruise-climb at lower thrust, to restore the range. They were also levelled off at 70,000ft to increase range, since the latest intel was that the new Soviet surface-to-air missile was not effective above 65,000ft. External wing slipper tanks followed in March 1960, adding 200 more gallons.

In late October 1959, the Air Ministry decided that the British pilots could join the Americans in flying along the Soviet southern border, usually at night, to intercept telemetry from the ballistic missile test flights from Tyuratam. A special sensor replaced the big B-camera in the large bay behind the cockpit. These missions, codenamed HOT SHOP, were alerted when SIGINT from ground stations or other aircraft indicated that a missile launch was imminent.

Political permission to mount a Soviet overflight, by either the British or the Americans, proved difficult to obtain. There were months of fruitless planning in London and Washington. Finally, an American mission was authorised and flown in July 1959, codenamed TOUCHDOWN.

Robinson reported with some frustration:

> 'Naturally, the OLDSTER personnel were keenly disappointed that they were not participating in the operation. A temporary drop in morale was apparent. We had always felt that, in spite of the politicians, this mission would be flown by us. A certain loss of face was inevitable.'

Finally, Prime Minister Harold Macmillan approved a British overflight. It was codenamed Operation HIGH WIRE, and took place on 6 December 1959, flown by Robbie Robinson. As in the 1957 series of overflights, and the recent Operation TOUCHDOWN, the take-off was from Pakistan, to exploit the Soviet early-warning radar gap. Peshawar was the departure point, and the landing was at home base,

Incirlik.

In Journal 77, along with a map of the route flown, I explained the intricate planning, fine calculations, and provision of multiple options that was undertaken for these overflights. So I will not repeat them here, except to note that a back-up pilot was always prepared, suited and pre-breathing oxygen, in case the primary pilot became sick at the last moment. For this mission, it was John MacArthur. Mike Bradley flew a simultaneous roundtrip deception flight from Incirlik, designed to confuse Soviet air defence radars.

The targets were the Kuybyshev bomber factories, the Kazan and Saratov/Engels bomber bases, the Kapustin Yar and nearby Vladimirovka missile test ranges, and rail lines that might lead to new and as-yet unknown missile bases. Robinson said:

> 'A lot of people think that flying a single-engined aircraft at that height, all the way over Russia, sounds fraught with danger. In fact, we had great faith in the equipment (…) the Pratt & Whitney engine was magnificent. I mean it never hiccupped; it just kept on going.'

But although Robinson described the flight as relatively uneventful, there were a few problems that he described:

> 'The initial stage of the flight was over 700 miles of undercast (*so*) the navigation (…) was virtually pure dead reckoning. The celestial was only of use for checking ground speeds, and there were no radio aids. A 40 mile track error resulted, which was corrected 100 miles prior to point E.'

On flights over denied territories, contrails were a dead giveaway. A small rearwards-facing mirror was mounted just outside the cockpit, so that pilots could monitor them. On this flight, Robinson said:

> 'Although they ceased at 55,000ft on the climb, as the flight progressed, I noted that the outside air temperature decreased to below minus 41 degrees, where contrails appear. Finally a light trail with occasional puffs was observed. At that time, I was maintaining 70,000ft per the flight profile, so to try and clear the contrail layer, I started to climb. At 73,000ft the trail persisted only intermittently, so I maintained that altitude until later in the flight, where the temperature started to rise and I returned to 70,000ft.'

But this action, together with strong headwinds, resulted in higher

fuel consumption. So Robinson was obliged to take a cut off to the most northerly part of his route, which had been pre-planned as an option. Unfortunately, this meant that he missed one vital target – Kazan.

The progression of the deployment, the mission, and the recovery was, of course, keenly followed in the Air Ministry and Project HQ. As Robinson recalled: 'During my overflight, CAS Sir Dermot Boyle stayed up all night in the Air Ministry.' Robinson's flight took 8 hours 15 minutes. David Dowling described what it was like after a long overflight:

> 'You are absolutely exhausted. It catches up with you once you leave the compound. You are far too tired to sleep or sit still. A drink may help; two do not. Even food is difficult to face. It will be about three days before you are re-hydrated and feeling anything like normal.'

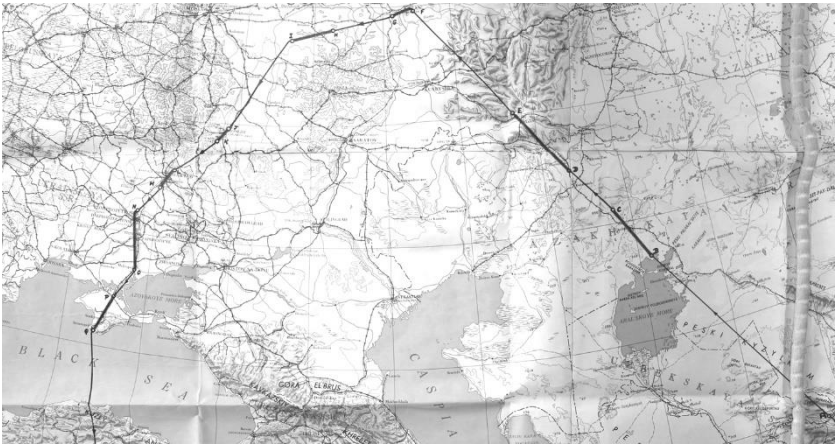
The second British overflight was alerted in early January 1960. It would fly north to cover Kazan, the suspected strategic bomber factory that had been missed on HIGH WIRE, and then go west to survey aircraft factories and missile facilities. Like the previous British overflight, it would take off from Peshawar and land at Adana. But poor weather over the target areas delayed the mission until 5 February. It was codenamed Operation KNIFE EDGE. The pilot was John MacArthur. Mike Bradley was the back-up, and David Dowling flew the deception mission.

The deployment to Pakistan was troubled. The first two attempts to ferry the mission U-2 from Incirlik to Peshawar were aborted by their American pilots due to unserviceabilities after take-off. The second attempt involved Article 360, which had a bad reputation, as MacArthur noted:

> 'I flew it on a training mission. I could feel it wasn't right through my backside. "I'm sure that it's yawing", I told one of the most experienced American pilots. He agreed, laughing. That autopilot never flew right.'

In fact, the autopilots remained a cause of concern throughout 1959 and into 1960. As Robinson noted:

> 'Hand-flying the U-2C at maximum altitude requires undivided attention, and it cannot be visualized that a pilot would be able to hand-fly the aircraft and also maintain accurate flight



Operation KNIFE EDGE – the route flown by John MacArthur.

line coverage.'

(Incidentally, the autopilot on '360' continued to give trouble, and it failed again on Gary Powers' ill-fated overflight three months later).

A second substitute jet was hurriedly made ready and ferried to Peshawar. It arrived with not much time to be prepared for the mission take off. As MacArthur recalled, fuel spilled out during refuelling, because the wings were still hot. That caused the fuel counter to be wrongly set. Moreover, because of the delay, all the precomputed star settings were out of date. That would mean more dead-reckoning, and eyeball navigation through the drift sight. As he approached the vital target at Kazan, MacArthur realised he had drifted slightly off course:

> 'The terrain was covered in ice and snow; it was all featureless. Per our training, I made a 50-degree turn to the right and then a 270 to the left so as to line up exactly for the target at Kazan. That turn put me behind schedule by about eight minutes. At the end of the flight, my fuel counter showed 180 gals remaining, when in fact there was only 38 gallons. I had never previously seen the red light come on, but there it was, as I put the gear down for landing.'

MacArthur had covered 3,000 miles in a flight lasting 8 hours 40 minutes. His camera captured new Soviet radar and missile sites, missile test and launch facilities, a key military shipyard, arms factories and nearly 100 airfields. The Tu-22 Blinder, a hitherto-unseen jet

bomber was photographed at Kazan (see Jnl 77, p111).

Similarly to Robinson's mission, US ground SIGINT stations reported that Soviet radars had not identified the flight.

There was one more overflight, by an American pilot, in early April 1960. Then came May Day. You can read my books for full coverage of the Powers overflight and shootdown.[1] Dowling said:

> 'It was always clear to us that, sooner or later, the Soviet would shoot one of us down and hopefully we would be able to bail out successfully. Our cover story, that we had lost our way, would not convince anyone unless we had been downed close to the border. Also, the cover story could not be sustained with the type of aircraft we flew and the cameras we carried.'

MacArthur recalled:

> 'We were in the O-Club at Incirlik when Wg Cdr Kunkler arrived in a hurry from London with the news that Frank had not made it to Bodø. We flew out with Kunkler to London the next morning. I didn't even have time to pack.'

Robinson said:

> 'All four of us pilots were summoned to see George Ward, the Secretary of State for Air. "I may have to lie to Parliament," Ward told us. He wanted to know what Powers was like, and whether he would divulge the British participation in the project. I told him that Gary Powers was an honest man, and would tell the Russians everything. So, when he faced MPs who obviously suspected something was up, he chose to be evasive.'

In the event, Powers did not reveal anything about the Brits, because he was never asked by his interrogators! Project OLDSTER remained secret for the next three decades, and was not fully declassified until 2020.

Postscript. The MacArthurs emigrated to Australia, and retired in Toowoomba, NSW. So did Andy Cummings, one of the RAF flight surgeons assigned to the U-2 programme at Edwards in the 1960s, as was well described by Ian McBride in Journal 77. One of the great

[1] Chris Pocock has written several books devoted to the U-2. For a comprehensive account of the U-2 programme, *50 Years of the U-2* (Schiffer; 2005) is strongly recommended. **Ed**

Half a century after their involvement in the U-2 programme, two of its veterans, John MacArthur (left) and Andy Cummings, flanking the author, at Toowomba.

Left – 50+ years after his stint on the U-2 Brian Cox was still flying – in a Tiger Moth. Right, L-R, Mike Bradley, Maj Gen Pat Halloran (USAF Retd), David Dowling and Norm Mackie at an informal reunion at Duxford .

privileges of my being associated with *The Dragon Lady* for all these years, is my role as a sort of clearing house for information about the programme. It was not until I prepared for a trip to Australia in 2010, that I noticed, from my U-2 correspondence file, that they both lived in Toowoomba – unknown to each other! I was able to arrange a meeting at the small museum at Toowoomba airfield.

Another veteran who is still alive and kicking in Scotland, where I met him, is Brian Cox, one of the two RAF pilots that completed U-2 flight training in 1959 but were never deployed. Finally, I offer a photo of a small reunion that I organized at Duxford in 2000. The USAF general was one of the instructor pilots at Laughlin AFB in 1958, who trained the RAF contingent. In the background is, of course, the U-2 that is displayed in the American Air Museum. I was partly responsible for getting it there – but that, as they say, is another story.

SUMMARY OF MINUTES OF THE THIRTY-FIFTH[1] ANNUAL GENERAL MEETING HELD IN THE ROYAL AIR FORCE CLUB ON 8 SEPTEMBER 2021

Chairman's Report.

AVM Baldwin, noted that despite our inability to meet and hold seminars, the Editor had managed to continue producing annual journals, the latest of which, Journal 77, had recently been published. The Chairman expressed his gratitude to the Editor and to all those who had contributed papers and book reviews. He now looked forward to more normal times, beginning on 13 October 2021, when Air Mshl Sir Peter Norris would chair a seminar on the Buccaneer in RAF Service.

The Society's finances remained healthy, especially after the receipt of a legacy of some £350,000 from Mr Douglas Webber. A sub-committee under the Vice Chairman, Gp Capt Heron, had made a number of smaller grants up to £5,000 amounting to £49,000 thus far, while the main committee had disbursed £45,000 to projects including the Aerospace Bristol's Conservation Workshop and the International Bomber Command Centre at Lincoln. £100,000 had been provisionally allocated to the RAF Museum's Research Centre.

Concluding, the Chairman thanked the committee for their continued hard work, and expressed his appreciation of the support and encouragement of the President, Air Chf Mshl Sir Richard Johns.

Secretary's Report.

Gp Capt Dearman reported that since the last AGM, membership had remained stable. Nevertheless, efforts to recruit new members would be most welcome.

Treasurer's Report.

Mr Boyes, reported on the accounts for the year 2020, highlighting the currently miniscule interest rates. The balance in the general fund stood at £29,188 with a further £279,042 in the designated (legacy) fund amounting to a total of £308,230. A proposal by Gp Capt Heron, seconded by Mr Cox, that the accounts be accepted, and that Mr Bryan Rogers be reappointed independent examiner, was carried.

Appointment of the Executive Committee.

The Chairman noted that all members of the committee were prepared to continue serving. A proposal by Air Cdre Tyack, seconded

by AVM Roberts, that the executive committee be so elected was carried. The executive committee members so elected were:

AVM N B Baldwin CB CBE	Chairman
Gp Capt J D Heron OBE	Vice-Chairman
Gp Capt K J Dearman FRAeS	Secretary
Wg Cdr C J Cummings	Membership Secretary
Mr J Boyes TD CA	Treasurer
Wg Cdr C G Jefford MBE BA	Editor & Pubs Manager
Air Cdre G R Pitchfork MBE MA FRAeS	
Wg Cdr S Chappell MA MSc RAF	
Wg Cdr S G Footer MBE	
Mr P Elliott BSc MA	
The *ex-officio* members of the committee are:	
J S Cox OBE BA MA	Head of AHB
Maggie Appleton MBE	CEO RAF Museum
Mr Harry Raffal MA	RAF Museum
Gp Capt P Sanger Davies MVO MPhil MA BA(Hons)MCIPD RAF	DDefS(RAF)
Gp Capt M Jeffries MA RAF	JSCSC

Two Air Forces Award.

The President explained that, because of COVID, there were two presentations to be made for this award, made in association with our USAF sister organisation the Air Force Historical Foundation. The first, for 2019, was awarded to Wg Cdr Bryan Hunt for his paper on *The Defeat of the V-2 and Post-War British Exploitation of German Long-Range Rocket Technology*. The 2020 award went to Gp Capt John Alexander for his paper on the *Decision to Re-organise Air Defence to Counter the V-1*.

The Air League Gold Medal.

Noting that AVM Baldwin, had been the Society's Chairman since 1996, the President commended him for his long and highly successful service and presented him with the Air League Gold Medal.

[1] NB. While all essential formal business had been conducted via *ad hoc* on-line arrangements in 2020, COVID constraints had precluded holding a physical 34th AGM.

In 1996 the Royal Air Force Historical Society established, in collaboration with its American sister organisation, the Air Force Historical Foundation, the Two Air Forces Award, which was to be presented annually on each side of the Atlantic in recognition of outstanding academic work by a serving officer or airman. It is intended to reproduce some of these papers from time to time in the Journal. This one was the winning RAF submission in 2020. ***Ed***

THE WORSTED MANUFACTURER, RODERICK HILL AND 'THE MOST COURAGEOUS DECISION OF THE WAR': THE DECISION TO REORGANISE BRITAIN'S AIR DEFENCE TO COUNTER THE V-1 FLYING BOMB

by Gp Capt J Alexander

Introduction

The first four V-1 flying bombs crossed the Channel in the early hours of 13 June 1944, exactly one week after D-Day; none were engaged and one reached Bethnal Green, killing four people.[1] When overnight on 15/16 June the German Air Force launched 244 V-1s against London, the long-planned British counter V-1 defences, consisting of fighter, gun and balloon belts, brought down only thirty-three V-1s, including eleven shot-down by anti-aircraft (AA) guns, and seventy landed on London. Over three thousand V-1s followed in the next five weeks, some with terrible lethality, like the bomb which killed 121 people in the Guards' Chapel at Wellington Barracks on Sunday, 18 June. Yet only the most modern fighters were fast enough to engage the V-1s and the 1,000 AA guns deployed destroyed less than ten per cent of the bombs they engaged.

On 13 July Air Marshal Roderick Hill, the Air Marshal Commanding, Air Defence of Great Britain (ADGB), ordered, seemingly without reference to his superiors, the complete reorganisation of the air defence scheme: redeploying almost 1,000 AA guns and 23,000 men and women from the Kent Downs to a gun belt on the Kent and Sussex coast. The redeployment reordered and separated fighter and gun engagement zones, allowing the guns to exploit new US gun-laying radars and proximity fuses, increasing the guns' lethality four-fold.

The decision, which Hill's daughter and biographer, Prudence, called the 'most courageous of the war',[2] warrants analysis for a number of reasons. First, it was controversial at the time as it prioritised AA guns over fighters, when all of Britain's previous air defence schemes since 1917 had prioritised fighters over guns, and thus far fighters had destroyed more V-1s than guns. Second, as the official histories note, the Air Staff suspected prime minister Winston Churchill's son-in-law Duncan Sandys, an MP and controversial Territorial Army AA senior officer until appointed a junior minister in 1941,[3] and chairman of the government's CROSSBOW committee, had pressured Hill into the decision. Third, the decision remains contested in the historiography, with Colin Dobinson's recent and comprehensive history of AA Command in Operation DIVER highlighting that AA Command later claimed responsibility for the idea, as did Sandys in Churchill's *History of the Second World War*, both contradicting the official history, which credits an RAF reserve officer with the idea.[4]

Additionally, much of the flying bomb historiography focuses on both the human cost and the Anglo-American CROSSBOW bombing operations to destroy the launch sites. The V-1s were to kill 6,184 people in the UK, out of the 51,509 killed by German bombing throughout the war, including 2,754 by V-2 rockets and 148 by cross-channel guns.[5] Another 8,696 V-1s and 1,610 V-2s were fired at Antwerp killing 3,440 Belgian civilians and 682 Allied servicemen, and a further 314 V-1s at Brussels.[6] The greatest human cost though was to the tens of thousands of slave labourers from occupied Europe forced to make the vengeance weapons in brutal conditions. The 81,000 tons of bombs dropped by the RAF and USAAF on CROSSBOW targets between early June 1944 and the end of August represented three per cent of all the bombs dropped by the British and Americans in all theatres during the entire war.[7] Yet, Hill's decision's complex strategic and operational context of enemy deep attack by unmanned aerial systems requiring the integration of home defence and expeditionary operations in the same time and space across multiple domains and service boundaries, and necessitating the rapid adaptation of new technology into an established integrated air defence system is still relevant today. This article uses unpublished archival sources to examine Hill's decision.

Operations CROSSBOW and DIVER

The Allied counter V-1 operations took place in a complex operational area. The Allied invasion of North West Europe, codenamed OVERLORD, was executed in the same time and space as supporting and concurrent operations, with necessarily complex command and control arrangements. These included the FORTITUDE deception plan, maritime and air anti-submarine and anti-surface operations, and the diversion of RAF Bomber Command and US Eighth Air Force from the Combined Bomber Offensive to support OVERLORD's transportation plan, under the control of General Dwight D Eisenhower, Supreme Commander Allied Expeditionary Force, as well as the amphibious and air assault itself. Moreover, UK air defence operations continued with the defeat of the German mini-blitz in early 1944, the need to protect the OVERLORD invasion force from German air reconnaissance and attack, and the anticipated German V-1 and V-2 vengeance weapons designed to indiscriminately kill British civilians.[8]

Operation CROSSBOW

CROSSBOW was the codename for Anglo-American operations against the German V-1 (codenamed DIVER) and V-2 weapons (codenamed BIG BEN). In April 1943 the British Chiefs of Staff (COS) had recommended to Churchill that his son-in-law, Sandys, should head the CROSSBOW committee of scientific and intelligence advisors to establish the flying bomb and rocket threat and devise counter-measures.[9] The CROSSBOW committee's co-ordination, combining ULTRA intelligence and the RAF's Central Interpretation Unit's (CIU) analysis at RAF Medmenham resulted in the attack by 471 aircraft of Bomber Command on the V-weapon research facilities at Peenemünde on 17 August 1943. In December, Air Marshal Bottomley, the Deputy Chief of the Air Staff, who represented the Air Ministry on the CROSSBOW committee, reported to the COS that the CIU had detected 'ski-sites' in Northern France designed to launch the 'pilotless aircraft' at England.[10] By 2 April 1944, Second Tactical Air Force, Ninth US Air Force, Eighth Air Force and Bomber Command, now under Eisenhower's control for OVERLORD, had dropped 15,936 tonnes of bombs on ninety-six ski-site targets, and a further 3,806 tonnes on 'large sites', a euphemism for V-2 sites.[11] By May 1944 10 per cent of all

Anglo-American air effort was directed at CROSSBOW targets.[12]

The DIVER Air Defence Plan

Meanwhile, ADGB produced contingency plans for both the protection of the OVERLORD concentration areas and the anticipated V-1 offensive. Hill's ADGB had been responsible for Britain's air defence since November 1943 when Fighter Command was split between it and Second Tactical Air Force. Hill reported through Air Chief Marshal Sir Trafford Leigh Mallory, Commander-in-Chief, Allied Expeditionary Air Force (AEAF), to the British Air Ministry, rather than to Eisenhower. Hill, a new three-star in the US parlance of the time, had operational control of all elements of the integrated air defence system including the 250,000 men and women of the British Army's AA Command, under General Sir Tim Pile, General Officer Commanding-in-Chief AA Command, a four-star since 1941.[13]

Hill's assessment was that the V-1 was another aircraft, only pilotless, and therefore the air defence scheme needed to be adjusted, but not radically changed, when the V-1 attack started.[14] Britain's air defence had been a composite of increasingly integrated detection and warning, fighters, guns, balloons and searchlights since the first Zeppelin raids on Britain in 1915. It was first unified under a single commander, Major General E B Ashmore, as a result of Lieutenant General Jan Smuts' first War Cabinet report following the deadly German Gotha bomber raids of mid-1917.[15] Ashmore's first integrated air defence plan for the London Air Defence Area had layers of AA guns, to break up German bomber formations, with aircraft patrol lines behind.[16] The inter-war Steele-Bartholomew, Romer and 1934 Reorientation Schemes had inner and outer artillery zones, but by 1939, with the introduction of faster monoplane bombers and fighters the outer artillery zone was dispensed with, and London and other cities and ports had inner artillery zones only, called Gun Defended Areas, therefore providing fighters with the freedom to engage outside of these.[17]

Pile's AA Command is often overlooked. AA artillery claimed around one quarter of German aircraft shot down in the Battle of Britain and was the sole means of defence against night attack until the radar guided night fighter was developed. AA Command was a relatively static organisation manned by territorials or men unsuitable for the

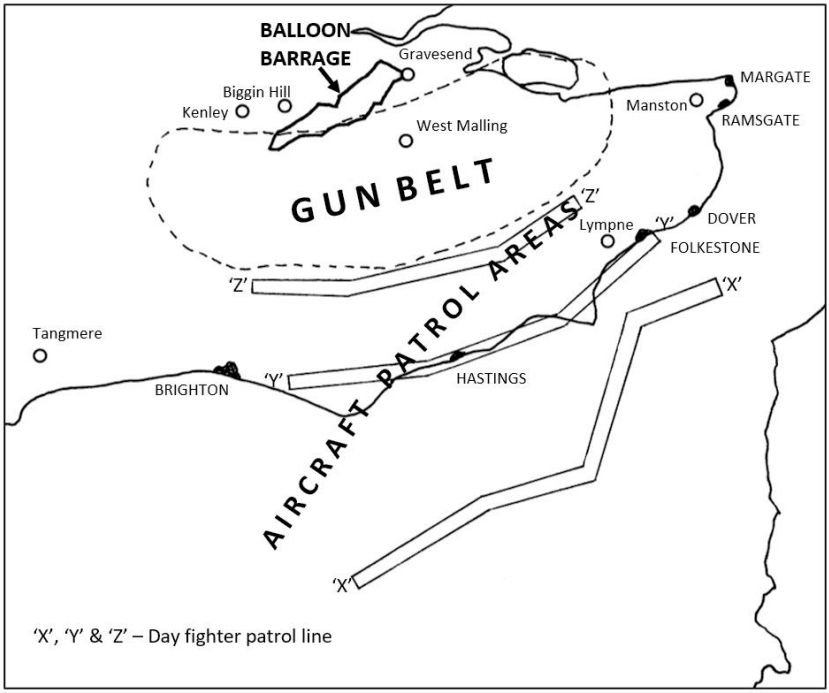


Fig 1. The initial Operation DIVER Defence Plan. [18]

Field Army, and an increasing number of women of the Auxiliary Territorial Service who were employed in all roles except firing the guns, including the Prime Minister's other daughter, Mary Churchill.[19] Pile claimed the technical aspects of air defence had forced his Command to become the most scientific arm of the Army.

It seems likely that the DIVER air defence plan was the result of combined ADGB and AA Command planning, with AA Command providing the AA gun expertise, notwithstanding AA Command's subsequent criticism of the plan. According to Pile's post-war despatch:

> 'The decision to deploy [the guns] well inland was taken in order to reduce enemy jamming of radar equipment; to allow fighter aircraft the maximum area of manoeuvre and to leave the coast defences free to engage attacks by pilotless aircraft. It was not intended to use either static guns or mixed units [with men and

women] in these places.'[20]

It is clear from the maps produced at the time that the guns were sited in the Kent Downs in a belt designed to be as short as possible to cover the arcs between the probable launch zones in France and London. Scientific intelligence predicted the V-1s would approach London at heights of up to 6,000 feet, and therefore siting the AA guns in the Downs would enable them to engage the V-1s while protecting their new gun laying radars (the GL Mk III) from German jamming.[21]

The redeployment of AA Command for the DIVER air defence plan was executed on 16 June after the sustained V-1 attacks started. In three days, 376 Heavy AA guns (HAA), mainly 3·7-inch with some US Army operated 90 mm guns, and 592 light AA guns (LAA), mainly 40 mm Bofors, were deployed from London and other Gun Defended Areas to the gun belt on the Kentish Downs. That the redeployment was achieved in just three days was a remarkable performance, given Pile's estimate that it would take eighteen days to redeploy. Furthermore 560 RAF Regiment LAA guns (192 40 mm Bofors and 368 20 mm Hispano guns) were redeployed from ADGB airfields to the south coast, coming under AA Command.[22] On 18 June Eisenhower directed AEAF that air attacks on V-1 sites had priority over all other targets except a battlefield emergency, following the War Cabinet's request.[23]

Initial Results

From 12 June to 15 July, of the 4,361 V-1s launched, 2,943 were observed by the defences and 1,241 destroyed, with 1,270 reaching London (see Table 1). Fighters destroyed 824, the guns 261 and another 55 hit balloons. The V-1s' speed limited the warning given to fighters and only the fastest fighters, such as the Tempest, could catch the flying bombs. The hazard of shooting down a flying bomb led to fighter tactic of tipping the V-1 over with the wing, probably the iconic image of the V-1 defences, as shown in Figure 2.

It was the AA guns' performance that was most disappointing. Given a target that took no evasive action, the guns were destroying less than ten per cent of the V-1s they engaged. One factor was that the V-1's approach at between 2,000 and 3,000 feet was unexpectedly low; above the effective height of LAA and too low for the mobile 3·7-inch guns to be manually laid onto the target. Electronically-powered, and therefore faster laying, static 3·7-inch guns were redeployed from

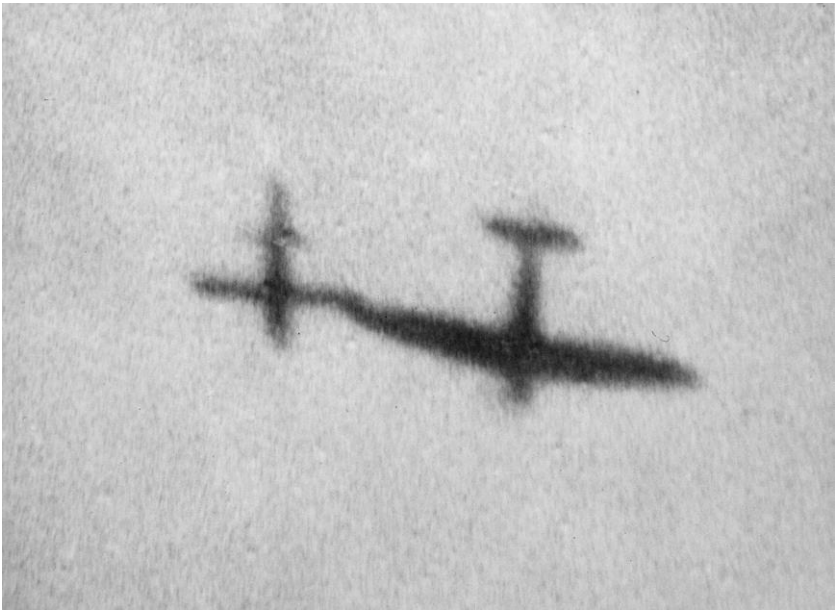


Fig 2. A Spitfire tipping over a V-1 on 9 August 1944.
(AHB CH 16281)

the Gun Defended Areas to the DIVER gun belt, but it took time to build emplacements for them, although Pile's Royal Electrical and Mechanical Engineers devised a platform made of railway sleepers. Furthermore, AA Command's guns, sited for protection from German jamming, had their observation and field of fire blocked by foliage or built-up areas. Many, if not all, the RAF Regiment LAA guns on the coast were prevented from firing at V-1s during this phase because they were in the fighter belt. Furthermore, AA Command believed the method of weapon control which enabled fighters to enter the DIVER gun belt in hot pursuit of the V-1s or in good weather (defined as being able to see the ground) was further restricting gun engagements.

The Redeployment Decision

Roderick Hill was perhaps an unusual choice to command ADGB. Apart from a brief stint immediately beforehand commanding Fighter Command's 12 Group, his background was in test flying and development, with little operational command. A fine arts graduate from University College, London, in the First World War he had proved

himself as an exceptional pilot, being one the few who could master No 60 Sqn's Morane-Saulnier Type N monoplane fighter, before commanding experimental units from 1917. He must have shown potential, as he attended the third RAF Staff Course, commanded No 45 Sqn in Iraq, in succession to Arthur Harris, and in 1936 preceded Harris as AOC Palestine and Transjordan during the Arab Revolt, when he was responsible for introducing a strikingly modern method of close air support.[24] In 1942 Sir Wilfred Freeman told Portal that Hill was second rate, with 'poor judgement of men'.[25] Nevertheless, Hill was Leigh Mallory's choice, first as AOC 12 Group and then to command ADGB.[26]

The Worsted Manufacturer

The decision to completely reconfigure the air defence scheme followed a meeting between Hill and Pile's staff at HQ ADGB at RAF Bentley Priory on 10 July to deconflict fighters and guns. Pile suggested moving all the guns from the coast to the gun belt and keeping the fighters out of the belt to ensure total deconfliction, which Hill agreed to.[27] According to the Air Historical Branch (AHB) narrative, the official history, Hill's post-war classified report and his 1947 Despatch, before issuing the executive order Hill tasked his Deputy Senior Air Staff Officer (SASO), Air Commodore Geoffrey Ambler, to draft a note for Hill to explain to the fighter pilots why they would be excluded from the gun belt.[28]

Ambler had an unusual background for an air officer as he was an Auxiliary, the RAF's inter-war part-time reserve, called up for the war. His civilian profession was running the family's textile mill in Bradford. Furthermore, he had read engineering and economics at Clare College, Cambridge, and after the war he invented the Ambler Superdraft which increased tenfold the speed at which wool was spun and transformed the worsted spinning industry.[29] He had started flying in 1928 and was commissioned into the Auxiliary Air Force in February 1931, commanding first No 608 (North Riding) Squadron from 1934 to 1938, and then No 609 (West Riding) Squadron, both bomber squadrons. From 1939 to 1942 Ambler was a sector commander in Fighter Command, then in 1942 Commandant of the Royal Observer Corps, before becoming Deputy SASO at Fighter Command in 1943.[30]

Ambler wondered whether the proposed redeployment from the

coast to the Kent gun belt went far enough and so, overnight 12/13 July, he produced a formal appreciation (it would now be called an estimate) in accordance with the *RAF War Manual* and realised the best solution was deconfliction, achieved by moving the AA guns to the coast, with fighters in front and behind.[31] On 13 July Ambler discussed the matter with Sir Robert Watson-Watt, the radar scientist, also based at Bentley Priory and a member of the CROSSBOW committee. Watson-Watt agreed with Ambler, and together they quickly convinced Air Vice-Marshal W B Calloway, ADGB's SASO, and all three then convinced Hill. Watson-Watt conferred with Pile, and Hill called a conference to discuss the proposal for 1730 that afternoon, attended by Hill, Pile, Watson-Watt, Calloway, Ambler and other ADGB and AA Command staff.[32]

Hill opened the conference by stating that, following a comprehensive appreciation by Headquarters ADGB, he had concluded that the guns should be redeployed to the coast. Pile agreed immediately. The decision is captured in the minutes, drafted, as usual, by Lieutenant Colonel C D Aarvold, an AA officer on Hill's staff, and these minutes were not subsequently challenged.[33] HQ ADGB's revised Operation Order, issued on 15 July, ordered a new DIVER gun belt of 10,000 yards out to sea and 5,000 yards inland, and restricted fighters to above 5,000 feet when over it, and all other aircraft to above 10,000 feet. Guns outside of the gun belt could engage enemy aircraft but not V-1s. The seaward boundary of the gun belt was to be marked by marker buoys.[34] Furthermore, Hill notified Leigh-Mallory, who suggested starting with a trial scheme, which Hill said time did not allow. Hill informed the Air Ministry in a memo sent on 15 July, copied widely, which stressed the new plan 'was a tactical redeployment of the resources under my control' and forwarded a note from Ambler outlining the rationale for the redeployment.

Ambler's note, almost certainly based on his appreciation of just two days prior, outlined the advantages of the new plan for the 'co-ordination of Fighters and AA Guns', starting with fighters. As most fighter V-1 engagements had been overland, the new plan expanded the fighter zone overland, and allowed night-fighters the use of searchlights. Whereas deploying guns on the coast would, 'in the opinion' of experts, allow the best use of radar, the 'extensive use of

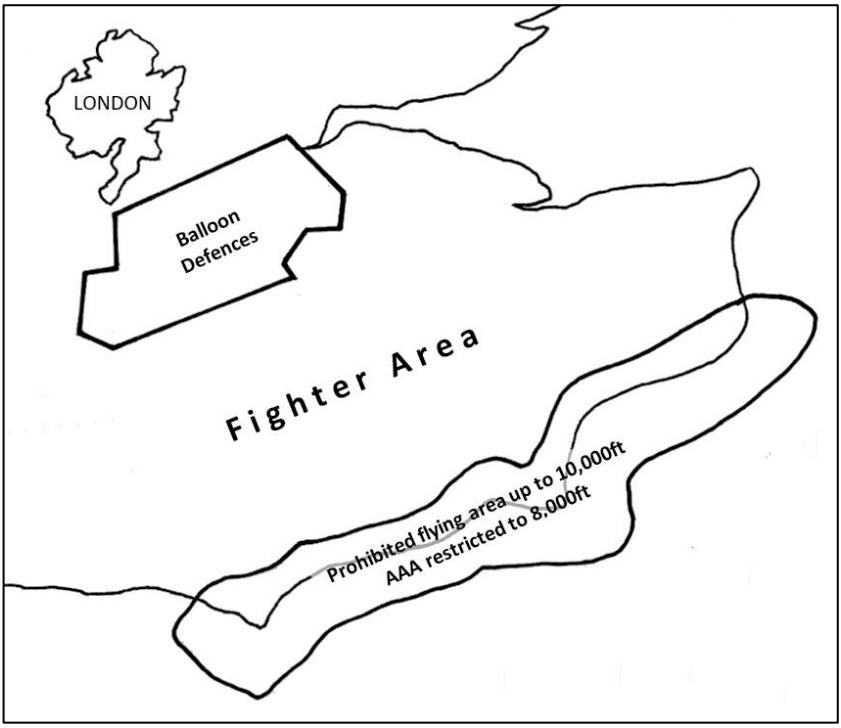


Fig 3. The Revised Operation DIVER Plan, after 13 July 1944.[35]

VT [proximity] fuses', and projectiles will fall into the sea, avoiding damage to property or civilian casualties. Furthermore, the new plan required only one 'rule of engagement' and both guns and fighters had absolute freedom within their zones.[36]

Results of the Redeployment

The new scheme had an immediate impact, broadly quadrupling the guns' lethality. As Ambler predicted, the scheme combined the increasing replacement of mobile manually-laid 3·7 inch guns with the more effective electrically powered static guns (see Figure 4), the use of the new US SCR-584 gun-laying radars, and the new proximity fuses (known as variable time (VT) fuses) in the 3·7 inch and US 90mm HAA guns. The improved results are shown in Table 1 for the two time

Fig 4. Static 3·7 inch anti-aircraft guns emplaced on the promenade of a South Coast resort, 6 August 1944.
(IWM H39807)

periods of the main offensive, both before and after the 15 July redeployment. Phases 2 and 3, the air launched attacks and the limited long-range attacks from the Netherlands, when Hill increasingly relied on guns to bring down launched V-1s and used his fighters for counter-force attack, are beyond the scope of this article.

The move to the coast allowed the efficient use of the VT fuse, which alone was estimated to be seven times more lethal to V-1s than the existing No 208 fuse, which had to be set to the anticipated range.[37]

	Number of V-1s				
	Main Offensive		**Phase 2**	**Phase 3**	**Total**
From **To**	12 Jun 44 15 Jul 44	15 Jul 44 5 Sep 44	16 Sep 44 14 Jan 45	3 Mar 45 29 Mar 45	12 Jun 44 29 Mar 45
From Ramps	4,271	4,346	–	275	8,892
From Aircraft	90	310	1,200	–	1,600
Total launched	**4,361**	**4,656**	**1,200**	**275**	**19,492**
Observed by defences	2,934	3,791	638	125	7,488
Destroyed by fighters	924	847	71	4	1,846
Destroyed by Guns	261	1,198	331	87	1,877
Destroyed by Balloons	55	176	–	–	231
Destroyed by all arms	1,240	2,221	402	91	3,954
Eluding defences	1,694	1,570	236	34	3,534
Reaching London	1,270	1,070	66	13	2,419

Table 1. The Flying Bomb Offensive. [38]

The proportion of V-1s engaged by guns that were destroyed rose from ten per cent before the reorganisation of the defence to 17, 24, 27, 40, 55, 60 and 74 per cent respectively in the weeks following. Furthermore, an improved barrage of 2,000 balloons, now set to the correct height for the V-1s, brought down fifteen per cent of the V-1s that entered it. Although many of the fifty-six RAF Regiment LAA squadrons were now in the gun belt, with their engagements misleadingly recorded as AA Command in the Fighter Command Operational Record Book,[39] their 815 × 20 mm Hispano cannon, whose estimated 412,000 rounds fired accounted for only seven V-1s, were increasingly withdrawn from the operations, though its 40 mm Bofors LAA guns remained.[40] As the RAF Regiment squadrons on the coast were often deployed forward of the Army's HAA guns, their tents were sometimes shredded by malfunctioning 3·7 inch VT fuses. The RAF Regiment's contribution to DIVER, just one paragraph in the authorised history, is a subject ripe for further research.[41]

Duncan Sandys

The reason for the Air Staff's suspicion of Hill's decision was that Duncan Sandys had given Marshal of the Royal Air Force Sir Charles Portal, the Chief of the Air Staff (CAS), the impression that he was making military decisions as Chairman of the CROSSBOW Committee. Sandys, Joint Parliamentary Under Secretary at the Ministry of Supply, was, from April 1943, Chairman of the CROSSBOW Committee and reported personally to the War Cabinet. He co-ordinated V-weapon intelligence, counter-force and defensive operations but he had no operational control. Hill and Pile attended the defensive operations element of the CROSSBOW Committee only, although Bottomley as DCAS attended throughout. When Sandys reported to the War Cabinet on 15 July, he was reporting Hill's decision of 13 July:

> 'In the light of the operational experience gained to date the layout of the defences have been reviewed. As a result, it has been decided to make a number of important changes in our deployment plan for guns and fighters.'

Sandys listed AA guns before fighters, although at this date fighters had destroyed four times as many V-1s as the guns, and his use of 'it

has been decided' may have implied to Portal that it was his committee, as Sandys was later to claim.[42] Sandys sent a more detailed report on the V-1 defences to the War Cabinet on 17 July and again referred to the decision in the passive, and therefore ambiguous, tense. Sandys was either implying his responsibility or, if not, circumventing Hill's chain of command by reporting directly to the War Cabinet, rather than through AEAF, the Air Staff and the COS Committee.

As a result, several acrimonious exchanges between Portal and Sandys followed. When Portal reminded Sandys at the COS Committee on 18 July of the constitutional responsibilities of the Air Ministry for air defence, Sandys admitted the new plan was 'settled' by Hill in consultation with Pile. The COS chairman, Field Marshal Sir Alan Brooke, evidently decided the military responsibilities needed clarification; hence the minutes stated the COS:

> '. . . agreed that the constitutional responsibility of the Air Ministry for the ADGB, and the responsibility of the COS Committee for advising the Government on the military aspects of defence measures, remained unchanged by any of the special machinery set up to deal with CROSSBOW.'

This presumably is the 'first class row' and a 'tremendous beating of the drums' that Pile referred to in his later book *Ack Ack*. In Pile's reading, Hill was in trouble because he had sided with Sandys (and Pile), hence Portal's statement that the responsibility must rest with Hill.[43] Another reading is that Portal is reminding Sandys (and Pile if he had a back channel to his former AA comrade Sandys) not to circumvent the military chain of command. Hill was the operational commander and had told the Air Ministry he was responsible for the decision in his 15 July memo.

Notwithstanding Portal's intervention on 18 July, Sandys on 25 July sent another report to the War Cabinet recommending a military decision, this time the desirability of increasing the number of fighter squadrons.[44] At the COS Committee on the same day Portal, it seems, saw this as another attempt by Sandys to circumvent the chain of command. Portal reminded Sandys that it was the Air Marshal Commanding ADGB's responsibility to judge whether he had sufficient fighters, for C-in-C AEAF to reallocate resources as appropriate, and in any case, Hill had stated he had enough fighters. Sandys responded,

Fig 5. Duncan Sandys', Press Conference Ministry of Information, 7 September 1944. (IWM CH 13827)

saying he thought more fighters were necessary, to which Portal responded by telling Sandys that if Leigh-Mallory needed direction he should seek it from the COS. Sandys was subsequently forced to change the wording of his report.[45]

Sandys held a lengthy press conference on 7 September after the first, most serious, phase of the V-1 offensive ended, when Allied forces overran the launch sites in France, after which he was credited in the press for leading the successful counter-V-1 operations.[46] The photograph of the press conference at Figure 6 is illuminating, with Sandys standing, with Pile prominent to his right, Air Vice-Marshal William Gell, AOC Balloon Command, giving the impression, by cleaning his glasses, of someone who would rather be somewhere else, and Hill almost invisible in the background, far right, on Brendan Bracken, the Minister of Information's, left.

Sandys' surviving transcript of the press conference focuses on the

role of the guns, quoting the statistics that before the redeployment guns destroyed ten per cent of V-1s observed, and in the weeks after had increased to 17, 24, 27, 40, 55, 60 and 74 per cent, which got a cheer from the press. Sandys' credited both Hill and Pile for the 'bold step' of the redeployment to the coast.[47]

In the questions and answers after Sandys' address, Hill reminded the conference that fighters had to-date destroyed more V-1s than the AA guns, giving the overall figures up to 5 September of 1,900 V-1s destroyed by fighters, 1,560 by guns and 249 by balloons, and that the Tempest Wing alone had shot down 578 V-1s. The press was interested in the names of the fighter aces, such as Squadron Leader Berry who alone had destroyed 59½ V-1s in a Tempest, and the role of the women on the guns, and whether they had had leave. Pile gave a figure of 392 LAA guns for the RAF Regiment, which was the number of Royal Artillery LAA guns, whereas the RAF Regiment had provided up to 600 guns.

Post War Accounts

Pile's Claim: 'Fighter Command evidently thinking along the same lines'

After the war Pile countered the RAF version of the decision when he claimed in his 1947 Despatch that the redeployment of the gun belt in July 1944 was AA Command's idea:

> 'Lt Col H J R Radcliffe MBS, at that time my Technical Staff Officer, suggested that we should re-examine the plan of locating the guns on the coast. This plan had always seemed to us to have great advantages from the gun point of view.'[48]

In this Despatch Pile goes on to state 'Fighter Command [sic] were evidently thinking on the same lines' as Hill announced his decision on 13 July.

Pile's disagreement is surprising, given that he appears to have been highly regarded by Fighter Command. He joined the Royal Horse Artillery after getting into the Royal Military Academy at Woolwich (where Royal Artillery and Royal Engineer officers trained) at the second attempt, had a good First World War, after which the radical military strategist Colonel J F C Fuller convinced him to join the Tank Corps. Pile took part in the mechanised experiments, served at the RAF's School of Army Co-operation at Old Sarum, and when the Government, through the Inskip Review of 1937, decided to massively increase Britain's AA defences, and when Sandys joined, Pile was appointed to command the force, taking over from the future Chief of the Imperial General Staff, Alan Brooke. Pile's success meant he was the only Commander-in-Chief to remain in appointment throughout the war. Lord Dowding and Hill, who both had operational control of AA Command, complimented Pile in their Despatches.[49]

Radcliffe, as the AA Command Technical Staff Officer, would have understood the advantages of redeploying the guns to the coast as he knew the potential of the forthcoming US SCR-584 radar and VT fuses through representing AA Command on Watson-Watt's CROSSBOW scientific sub-committees. The benefit of using VT fuses on the coast had been raised at the Inter-departmental Radio Location Committee on 20 June and on 28 June Radcliffe had undertaken to consider how AA Command would make best use of the SCR-584 and VT fuses.[50] Radcliffe may have therefore raised the advantage of redeployment with Pile but there is no record of an AA Command request to Hill.

Pile's account, in his 1949 book *Ack Ack*, is subtly different to his official Despatch, skimming over the decision and instead focusing on the Air Ministry's reaction, where he believed Hill had sided with Sandys and himself to prioritise AA Command's guns over the RAF's fighters.[51]

Ambler and Hill's Account: 'certain persons have decided to compete in order to gain credit'

The RAF historian T C G James seemed aware that Pile might make contradictory claims when, in late 1945, he wrote to Hill, Ambler and Watson-Watt to verify their accounts while drafting the AHB narrative. James asked Ambler for 'a significant minute or paper' to address 'the constitutional issues it raised with the Air Staff' and 'the wrong-headed notions the public have of who was responsible'. In his reply Ambler told James:

> 'It is important to note here that this was the first approach to [ADGB] Command on this matter and at no time (to my certain knowledge) previously had any suggestion come from AA Command that the guns should be moved to the Coast. There is no doubt whatever that the proposal to move the guns to the South Coast came from Fighter Command [sic] and not from AA Command. […] I have always felt that the decision to redeploy the guns in the heat of the battle and with politicians standing on hind legs and yelling was a most courageous and gallant act.'[52]

Furthermore, Hill supported Ambler's account of the decision when he replied to James and noted that AA Command was always keen to be seen as separate. Although neither Hill nor Pile mention it, Air Marshal Hill was a recently promoted three-star in operational control of the four-star General Pile's command. Hill, forever the test pilot, also sent James his log book entries for the 62 counter V-1 sorties he flew during DIVER in his personal Tempest V.

The James-Ambler correspondence continued into early 1947 when, in Ambler's final note, he wrote 'certain persons have decided to compete in order to gain credit', and again states that AA Command had never previously raised the suggested move, the 13 July meeting was organised by Hill to direct his decision, and though Pile and Radcliffe may have discussed it 'what a man states he had in his mind at a particular time is not accepted as evidence in any court.' He concluded that Pile's account was part of a single service ploy to ensure Army AA was not placed under RAF control in the future.[53] It is worth noting that Ambler had by now been demobilised and was once again a worsted manufacturer, and possibly therefore less tainted than others by service politics.

Sandys: 'the facts are the exact opposite'

Meanwhile Sandys had convinced his father-in-law of his leading role in countering the V-1 and the decision to reorganise the defence. According to the historian David Reynolds' account of the writing of Churchill's *History of the Second World War*, Sandy drafted the 'Pilotless Bombardment' section of volume 6, first published in 1953.[54] Churchill's history credits Pile and Sandys for pressing for the move, and Hill and Pile for deciding on the move, with Sandys' approval.[55] Sandys' view was clear when he had earlier chastised Sir Archibald Sinclair, the Secretary of State for Air, for praising the role of the fighters: 'You have no grounds to claim that the RAF frustrated attacks by the V weapons. The RAF took their part but, in my opinion, their effort ranges definitely below that of the AA artillery.'[56] Yet, during the main V-1 offensive fighters destroyed 1,771 and guns 1,459, and overall guns destroyed just 32 more V-1s than fighters in all phases, as Table 1 shows, including March 1945 when Hill's fighters were attacking the launch sites and not flying defensive patrols.

When, in 1956, Basil Collier drafted the V-1 chapter of the Cabinet Office official history, *The Defence of the UK*, he followed James' 1947 AHB narrative and Hill's classified report and despatch, and James' correspondence with Hill, Ambler and Watson-Watt.[57] When Collier sent his draft to Sandys for comment, adding that 'General Pile has since told us that a similar plan had been discussed at AA Command but thought unlikely to get Hill's approval', it provoked an extraordinary response. Sandy said he could not understand Colliers' 'extraordinary insistence on proving exactly who was responsible for what'. Nevertheless, Sandys questioned the 'impression' that Hill was the person who initiated and inspired the plan for the reorganisation of the defences and that Pile merely 'assented to it'. Sandys wrote he was 'in a position to exercise quite considerable influence upon the policies of the commanders concerned' and furthermore:

> 'To the best of my knowledge, the facts are the exact opposite. Pile, with my knowledge and support, had been badgering Hill for quite a while to make this change. […] I get the impression that he was resisting this change, not on operational grounds, but because he was afraid of offending the feelings of his pilots. I was so dissatisfied with the position that I went to the Secretary

> of State for Air [Sir Archibald Sinclair] and asked him to consider the removal of Hill from his command. (I mention this last point as background information only. I have no wish for it to be made public).'[58]

Yet there is no mention of any proposal to move the guns to the coast in the minutes of the CROSSBOW Committee or Hill's ADGB conferences, other than on 10 July when Pile asks for the reverse, that is for all the guns to be moved to the Kent gun belt, and 13 July when Hill directs the move to the coast.[59] Furthermore, there is no record of Sandys seeing Sinclair to get him to remove Hill from command of ADGB. That does not mean he did not, but if he had it would have been an interesting meeting, with Sandys, a junior minister, asking Sinclair, a Secretary of State, leader of the Liberal Party, and Churchill's devoted friend since before the First World War. Furthermore, Sinclair had an excellent relationship with his CAS, the longest serving of the chiefs of staff, and the only one who was, like Sinclair and Sandys, a member of Churchill's 'other [dining] club'.[60] In these circumstances it would have been a brave call to remove an air marshal from command because Army guns had been poorly sited, and presumably it would have fallen to Churchill to decide between Sandys and Sinclair and Portal. Furthermore, Sandys was 'being economical with the truth', as his father-in-law might have said, either when telling Portal at the COS meetings in 1944 that he had not sought to influence Hill or when telling Collier in 1956 that he had. Collier, who in 1944 was an RAF intelligence officer working on the V-1s threat in HQ ADGB, noted in pencil on Sandys' response that Hill's account was 'certified by everyone but Mr Sandys as correct; where is the evidence to back his claim?'.[61]

Conclusions

Portal soon realised Hill had made the right decision. Bottomley reminded him of his scepticism of Hill's decision on 1 September and Portal replied in a hand-written note 'I think we had better send him an Air Council letter when we are confident that the FB [flying-bomb] is a thing of the past for London'.[62] The Air Council then sent thanks to ADGB, AA and Balloon commands. In late 1944 Portal asked Hill to chair the technical branches committee while still commanding ADGB. Hill, agreed on the condition Ambler replaced Calloway as his SASO.[63]

After the war, Hill was appointed Air Member for Technical Services where he established the RAF engineering branch, before retiring to become Rector of Imperial College and then Vice Chancellor of the University of London. Sandys is perhaps best known now as the Secretary of State for Defence whose 1957 Defence Review decided the RAF's fighters should be replaced by surface-to-air missiles.[64]

Hill's decision was courageous, not just because it occurred at a critical time in the V-1 offensive, but also because of the political pressure implied by Pile and Sandys' subsequent accounts. Fighter engagement was to remain critical after Hill's 13 July 1944 decision to reorganise the air defence scheme. Nevertheless, the effectiveness of the AA guns markedly improved when redeployed to the coast, as it allowed not just deconfliction, which had been Pile's concern, but also the use of the US SCR-584 radars and VT fuses as they became increasingly available. By August the guns were shooting down more V-1s than the fighters, the static 3·7s averaged just 100-150 rounds per kill, down from 600 with the older fuses and radars. Hill thus achieved the best integrated air defence available against the threat, integrating across service and operational domain boundaries and sensitivities, using the advice of Ambler, Watson-Watt, Pile and the gunnery experts like Radcliffe. The archival evidence supports Hill and Ambler's accounts of the decision, while Pile's despatch and book are factually accurate though somewhat misleading. Sandys' account is not supported by the archival evidence.

Notes:

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6 Churchill, *The Second World War, Vol 6*, p49.

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[9] Churchill; *The Second World War, Vol. 5, Closing the Ring* (London; Cassell; 1952) p204.
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[11] TNA CAB 80/82; Memoranda (O) Nos. 306-390, DCAS 14th Crossbow Progress Report to COS (44) 313 (O) dated 2 April 1944.
[12] O'Brien, *How the War Was Won Air-Sea Power and Allied Victory in World War II*, p344.
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[18] Map redrawn from an original within TNA's AIR 20/10155; V1 Flying Bombs: Operation DIVER and Related Papers.
[19] De Groot, Gerard J; 'Combatants or Non-Combatants? Women in Mixed Anti-Aircraft Batteries during the Second World War' in *The RUSI Journal* 140, No 5 (1995) pp65–70.
[20] Pile, General Sir Frederick; 'The Anti-Aircraft Defence of the United Kingdom from 28 July 1939 to 14 April 1945', Supplement to the *London Gazette*, 16 December 1947, col 5989.
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[33] TNA AIR 24/618; Fighter Command ORB.

[34] TNA AIR 16/458; Defences against Flying Bombs (September 1944), Op Order 15/1944.

[35] Map redrawn from an original in TNA AIR 16/458; Defences against Flying Bombs.

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[57] Collier, *The Defence of the United Kingdom*.
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[60] Christ Church College Oxford, Portal Archive 2, Box B, Pamphlets, The Other Club Rule Book, 1941.
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AUXILIARY AIR FORCE MANNING IN THE RUN-UP TO WAR

by Wg Cdr Jeff Jefford

This short essay may be seen as a (very late) supplement to a seminar hosted by this Society in 2002, the proceedings of which were published as a hardback, *Royal Air Force Reserve and Auxiliary Forces*. It became evident, during the discussion periods on that occasion, that some Auxiliary Air Force (AAF) veterans were a little sensitive about, what they perceived to be, criticism. It really wasn't criticism; it was simply an unbiased reflection of the reality, rather than the myth. That, in no way, belittled the AAF's contribution, but it did sharpen the focus. Without embarking on a thesis, the following tables, drawn from contemporary records, are offered as further amplification, and for future reference.

Annex A is largely self-explanatory and illustrates the steady growth of the Special Reserve (500 series numbers) and AAF (600 series) which were constituted differently. The former approach proved to be less successful, and in 1936-37 all five squadrons were reconstituted as AAF units, while retaining their original numerical identities.

Annex B is a snapshot of the available RAF/AAF manpower as at 31 October 1938. It reflects only 54% manning with respect to AAF officers, essentially pilots, and 80% for airman. Note that the airmen establishment (col *g*) called for an RAF:AAF ratio of 1:3·7 (at the time it was actually only 1:3 – col *h*) and it would have been the regulars, the RAF tradesman, who tended to provide the more advanced skills. NCO pilots had only recently been introduced into the AAF so the figures at cols *e* and *f* are meaningless at this early date.

Annex C reflects the aircraft available to a, still 100% biplane-equipped, force in October 1938.

Annex D updates Annex B to reflect the manning situation on 31 July 1939. In just nine months the rather disappointing figures for AAF manning had been transformed to become a far more satisfactory 98% for officers and 91% for airmen. Note, however, that the ratio of RAF to AAF tradesmen had now fallen to 1:2·6 (col *h*), reflecting the increasing complexity of the more advanced aeroplanes that were now becoming available to the squadrons. Aircraft featuring stressed skin

construction, retractable undercarriages, variable pitch propellors powered gun turrets and the like, required many more of the more highly skilled regulars to look after them. Relatively little progress had been made with respect to recruiting sergeant pilots, possibly reflecting some class prejudice among the old guard.

Annex E updates Annex C to July 1939 and it is evident that a major re-equipment programme was under way. Only six squadrons were still flying biplanes and three of those had been upgraded to Gladiators.

Annex F presents the manning situation with respect to representative technical trades in February 1941.[1] The last four columns reflect the pattern observed in Annexes B and D in that they are examples of the more specialised trades which had always tended to be handled by regulars rather than reservists, hence the latter's relatively low, often nil, representation in these fields. Overall manning would have been close to 100% in all cases, of course, any vacancies being filled by RAF and/or RAFVR men. Indeed, it is evident that by this time, it was not unusual for there to be no AAF personnel in some trades.

Note.

[1] Only a representative selection of the more skilled technical trades feature in Annex F. The complete range embraced other specialists, such as wireless mechanics, torpedo fitters, meteorologists, balloon operators, etc plus less technical trades like clerks, cooks, dental orderlies and sanitary assistants. During the war, however, it was found that the increasing complexity of equipment led to an increased degree of specialisation, which meant more trades and sub-trades. But it was not sensible to spend long periods training 'for the duration only' conscripts to become multi-skilled, apprentice-grade tradesmen (although, in point of fact, and in marked contrast to the suspension of the Cranwell cadet scheme, apprentices continued to be trained at Halton throughout the war). It was far more practical to provide the majority of airmen, as quickly as possible, with just sufficient training to enable them to function productively in a relatively narrow field. They could then be progressively remustered to higher qualified trades as and when their expertise increased through experience and, where appropriate and/or necessary, post-graduate courses, their progress being validated by examinations administered by the Central Trade Test Board. The inevitable result of this pragmatic approach was a gradual proliferation of trades and sub-trades; the fifty which had sufficed at the beginning of the war had become 235 by VJ-Day.

Annex A

Sqn	Jan 30		Aug 36		Jan 38		Oct 38		Mar 39		Jul 39	
	AAF	RAF	AAF	RAF	AAF	RAF	AAF	RAF	AAF	RAF	AAF	RAF
500	–	–	13	4	15	2	16	2	14	3	17	4
501	4	4	8	2	15	2	12	2	10	3	14	2
502	12	11	10	4	14	2	15	2	13	2	16	3
503	10	8	8	2	6	1	6	2	–	–	–	–
504	4	6	10	2	14	2	19	2	21	2	21	2
600	20	1	20	2	23	2	24	2	17	2	25	3
601	18	2	20	2	28	2	24	2	23	2	26	2
602	13	2	16	2	15	2	16	2	15	2	16	2
603	18	2	12	2	17	2	17	2	18	2	19	2
604	–	–	19	2	21	2	22	2	21	2	25	3
605	16	2	18	2	21	2	21	2	21	3	21	3
607	–	–	15	2	18	2	22	2	19	1	22	2
608	–	–	13	2	15	2	16	2	16	2	16	2
609	–	–	6	1	13	2	15	2	16	2	18	2
610	–	–	2	1	12	2	15	2	14	1	13	2
611	–	–	3	1	11	2	16	2	15	2	18	2
612	–	–	–	–	8	2	10	2	11	3	15	3
613	–	–	–	–	–	–	–	–	–	–	1	3
614	–	–	–	–	9	2	15	2	13	2	16	2
615	–	–	–	–	6	2	14	2	14	2	22	2
616	–	–	–	–	–	–	–	–	5	3	10	2
Total	**115**	**38**	**193**	**33**	**281**	**37**	**315**	**38**	**296**	**41**	**351**	**48**

Headcount of commissioned pilots on the strength of SR/AAF Sqns on six random dates, excluding GD officers earmarked for admin duties and/or officers of the Stores, Accounts and Education Branches. (AIR20/403)

Annex B

Sqn	Role	Personnel					
		GD Officers RAF + AAF		Airman pilots RAF + AAF		Airmen RAF + AAF	
		Estab	Strength	Estab	Strength	Estab	Strength
a	*b*	*c*	*d*	*e*	*f*	*g*	*h*
500	B	3 + 17	2 + 16	0 + 14	—	71 + 285	52 + 135
501	B	2 + 32	2 + 12	—	—	57 + 164	55 + 175
502	B	2 + 32	2 + 15	—	—	37 + 164	33 + 113
503[1]	B	2 + 32	2 + 6	—	—	37 + 164	28 + 6
504[2]	B	2 + 32	2 + 19	—	—	37 + 164	35 + 165
600	F	2 + 32	2 + 24	—	—	41 + 140	36 + 188
601	F	2 + 32	2 + 24	—	—	41 + 140	39 + 141
602[3]	B	2 + 32	2 + 16	—	—	46 + 164	36 + 158
603	B	2 + 32	2 + 17	—	—	37 + 164	73 + 196
604	F	2 + 32	2 + 22	—	—	41 + 140	39 + 164
605	B	2 + 32	2 + 21	—	—	51 + 164	70 + 151
607	F	2 + 17	2 + 22	0 + 11	—	50 + 194	42 + 175
608	F	2 + 32	2 +16	—	—	44 + 147	43 + 141
609	B	2 + 32	2 + 15	—	—	47 + 164	54 + 129
610	B	2 + 32	2 + 15	—	—	47 + 164	52 + 139
611[4]	B	2 + 32	2 + 16	—	—	47 + 164	49 + 149
612[4]	AC	2 + 34	2 + 10	—	—	50 + 164	40 + 70
614[4]	AC	2 + 34	2 + 15	—	—	50 + 164	42 + 64
615[4]	AC	2 + 34	2 + 14	—	—	38 + 164	32 + 89
Totals		**39 + 584**	**38 + 315**	**0 + 25**	**0**	**869 + 3178**	**850 + 2548**
RAF v AAF Percentage Manning			**97% + 54%**				**98% + 80%**

AAF Personnel Establishment v Strength as at 31 October 1938
(AIR20/403)

Notes:

1 Sqn being disbanded.
2 Converting to fighter role.
3 Converting to army co-op role.
4 Sqn still forming, to be brought up to 16 a/c when manning sufficient.

Annex C

Sqn	Role	Type	Aircraft		
			Estab		Strength
			IE	IR	
500	B	Hind	12	4	12
501	B	Hind	12	4	15
502	B	Hind	12	4	12
503[1]	B	Hind	12	4	6
504[2]	B	Hind	12	4	16
600	F	Demon	14	5	18[3]
601	F	Demon	14	5	19
602[2]	B	Hind	12	4	12
603[2]	B	Hind	12	4	16
604	F	Demon	14	5	19
605	B	Hind	12	4	16
607	F	Demon	14	5	19
608	F	Demon	14	5	19
609	B	Hind	12	4	16
610	B	Hind	12	4	16
611[4]	B	Hind	12	4	10
612[4]	AC	Hector	12	4	4
614[4]	AC	Hector	12	4	12
615[4]	AC	Hector	12	4	11
Totals			**238**	**81**	**268**

AAF Aircraft Establishment v Strength as at 31 October 1938
(AIR20/403)

Notes:

1 Sqn being disbanded.
2 Converting to fighter role.
3 One aircraft (K4523) written off in accident and not yet replaced.
4 Sqns still forming, to be brought up to 16 a/c when manning sufficient.

Annex D

Sqn	Role	Personnel					
		GD Officers RAF + AAF		Airman pilots RAF + AAF		Airmen RAF + AAF	
		Estab	Strength	Estab	Strength	Estab	Strength
a	*b*	*c*	*d*	*e*	*f*	*g*	*h*
500	GR	4 + 16	4 + 17	0 + 12	—	111 + 296	123 + 318
501	F	2 + 17	2 + 14	0 + 13	0 + 5	84 + 182	126 + 181
502	GR	4 + 16	3 + 16	0 + 12	0 + 6	88 + 296	66 + 225
504	F	2 + 17	2 + 21	0 + 13	0 + 2	62 + 182	48 + 181
600	F	2 + 18	3 + 25	0 + 13	0 + 1	74 + 205	57 + 222
601	F	2 + 18	2 + 26	0 + 13	0 + 0	74 + 205	59 + 198
602	F	2 + 17	2 + 16	0 + 13	0 + 0	62 + 182	51 + 166
603	F	2 + 17	2 + 19	0 + 13	0 + 0	81 + 182	114 + 247
604	F	2 + 18	3 + 25	0 + 13	0 + 0	74 + 205	57 + 216
605	F	2 + 17	3 + 21	0 + 13	0 + 6	83 + 182	86 + 176
607	F	2 + 17	2 + 22	0 + 13	0 + 5	66 + 182	65 + 199
608	GR	4 + 16	2 + 16	0 + 12	0 + 0	92 + 296	72 + 274
609[1]	F	2 + 17	2 + 18	0 + 13	0 + 3	83 + 182	79 + 148
610[1]	F	2 + 17	2 + 13	0 + 13	0 + 4	82 + 182	83 + 179
611	F	2 + 17	2 + 18	0 + 13	0 + 0	78 + 182	76 + 197
612	GR	4 + 16	3 + 15	0 + 12	0 + 0	105 + 296	79 + 208
613	AC	2 + 27	3 + 1	—	—	76 + 263	45 + 0
614	AC	2 + 27	2 + 16	—	—	79 + 263	75 + 240
615	F	2 + 17	2 + 22	0 + 13	0 + 3	62 + 182	59 + 193
616	F	2 + 17	2 + 10	0 + 13	0 + 0	83 + 182	75 + 151
Totals		**48 + 359**	**48 + 351**	**0 + 230**	**0 + 35**	**1599 + 4327**	**1495 + 3919**
AAF v RAF Percentage Manning			**100% + 98%**		**15% AAF**		**93% + 91%**

AAF Personnel Establishment v Strength as at 31 July 1939.
(AIR20/403)

Note:
[1] Converting from bomber to fighter role, awaiting Spitfires.

Annex E

Sqn	Role	Type	Aircraft		
			Estab		Strength
			IE	IR	
500	GR	Anson	14	5	14[1]
501	F	Hurricane	16	5	12[2]
502	GR	Anson	14	5	18
504	F	Hurricane	16	5	21
600	F	Blenheim	16	5	19
601	F	Blenheim	16	5	14
602	F	Spitfire	16	5	22
603	F	Gladiator	16	5	17
604	F	Blenheim	16	5	14
605	F	Hurricane	16	5	6[3]
607	F	Gladiator	16	5	18
608	GR	Anson	14	5	14
609[4]	F	Hind	12	4	15
610[4]	F	Hind	12	4	16
611	F	Spitfire	16	5	12[5]
612	GR	Anson	14	5	8[6]
613	AC	Lysander	12	4	0[7]
614	AC	Lysander	12	4	5[8]
615	F	Gladiator	16	5	17
616	F	Gauntlet	14	5	8[9]
Totals			**294**	**96**	**270**

AAF Aircraft Establishment v Strength as at 31 July 1939.
(AIR20/403)

Notes:

1 Still converting from bomber role; 6 × Hinds still on charge.
2 Still converting to monoplanes, plus 3 × Battle.
3 Still converting to monoplanes; 16 × Gladiators still on charge.
4 Converting to fighter role; awaiting Spitfires.
5 Still converting from bomber role, to be 16 a/c when manning sufficient.
6 Still converting from army co-op role; 4 × Hectors still on charge.
7 New sqn, awaiting Lysanders; 4 × Hind on charge.
8 Still re-equipping; 12 × Hectors remain on charge.
9 Still working-up; to be brought up to 16 a/c when manning sufficient.

Proportion of maintenance/technical establishment still filled by AAF personnel in February 1941.
(AIR2/4077)

Sqn	Ftr	Rgr	F/Mech	F/Rgr	WEM	WOp	Arm	F/Arm	Elect	I/R	I/M
500 Sqn	83%	88%	45%	60%	16%	93%	100%	25%	47%	27%	33%
501 Sqn	45%	76%	26%	11%	60%	75%	31%	16%	28%	Reg/VR	Reg/VR
502 Sqn	52%	48%	32%	35%	50%	Reg/VR	83%	13%	50%	40%	Reg/VR
504 Sqn	59%	61%	35%	23%	66%	100%	66%	40%	Reg/VR	37%	Reg/VR
600 Sqn	94%	92%	20%	47%	Reg/VR	100%	64%	16%	33%	Reg/VR	0
601 Sqn	73%	84%	36%	36%	100%	100%	100%	Reg/VR	42%	20%	0
602 Sqn	58%	80%	58%	54%	100%	100%	31%	33%	Reg/VR	0	Reg/VR
603 Sqn	94%	100%	28%	21%	50%	100%	60%	60%	Reg/VR	Reg/VR	0
604 Sqn	82%	85%	31%	36%	83%	100%	40%	100%	13%	11%	Reg/VR
605 Sqn	60%	90%	31%	43%	100%	75%	26%	80%	27%	Reg/VR	Reg/VR
607 Sqn	48%	73%	47%	18%	25%	92%	92%	40%	37%	Reg/VR	Reg/VR
608 Sqn	89%	83%	11%	37%	100%	100%	93%	50%	90%	21%	50%
609 Sqn	89%	95%	Reg/VR	Reg/VR	Reg/VR	83%	56%	Reg/VR	77%	Reg/VR	0
610 Sqn	79%	92%	26%	48%	Reg/VR	75%	50%	Reg/VR	66%	12%	100%
611 Sqn	68%	68%	35%	39%	40%	62%	84%	Reg/VR	55%	60%	0
612 Sqn	50%	47%	51%	33%	Reg/VR	85%	72%	33%	41%	Reg/VR	Reg/VR
613 Sqn	23%	20%	32%	60%	Reg/VR	5%	50%	Reg/VR	Reg/VR	Reg/VR	50%
614 Sqn	18%	10%	84%	95%	50%	37%	60%	Reg/VR	47%	16%	Reg/VR
615 Sqn	45%	66%	59%	76%	100%	100%	63%	Reg/VR	18%	66%	Reg/VR
616 Sqn	67%	80%	57%	40%	Reg/VR	66%	40%	Reg/VR	55%	Reg/VR	0%
Average	**63.8%**	**71.9%**	**37.2%**	**40.6%**	**47.0%**	**77.4%**	**63.1%**	**25.3%**	**36.3%**	**15.5%**	**11.7%**

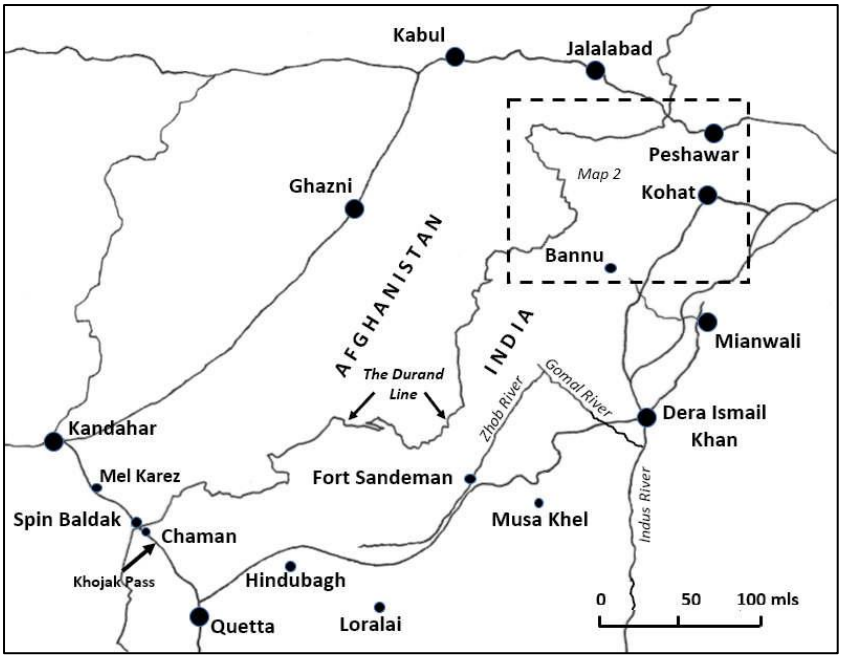
Notes: Reg/VR indicates no remaining AAF strength, all RAF or RAFVR; 0 = Nil personnel strength in this trade; Ftr = Fitter; Rgr = Rigger; F/Mech = Flight Mechanic; F/Rgr = Flight Rigger; WEM = Wireless & Electrical Mechanic; W/Op = Wireless Operator; Arm = Armourer; F/Arm = Fitter Armourer; Elect = Electrician; I/R = Repairer; I/M = Instrument Maker

THE THIRD AFGHAN WAR

by Dr Harry Raffal

In 1919, Amir Amanullah Khan, having only recently become Afghan Amir, and sensing an opportunity to affirm his authority and exploit British weakness after the First World War, fomented a revolt in the North-West provinces of British-controlled India, and despatched Afghan troops over the border. So began the Third Afghan War, known in Afghanistan as the War for Independence. Despite being only a brief conflict (it commenced in May, saw a ceasefire agreed in June, and a peace settlement signed in August 1919) the Third Afghan War represents an interesting point in the Royal Air Force's history. The RAF emerged from the First World War into an environment where its newly won independence was under threat and the Third Afghan War provided the first opportunity for it to demonstrate the value it could offer as a separate service. During the brief campaign, aircraft of the RAF had undertaken long range bombing, close support, artillery spotting, photo surveying, reconnaissance and communication missions. By the time that the war was officially concluded, the RAF had begun to develop the tactics it would use on the North-West Frontier for much of the inter-war period and was beginning to introduce the aircraft it would rely on for much of the 1920s.

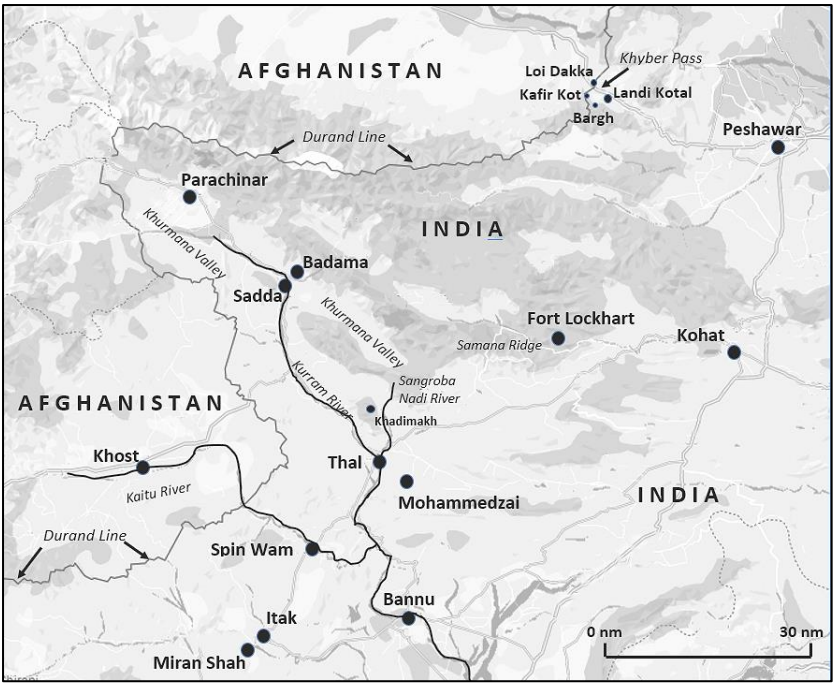
The previous two Anglo-Afghan wars had largely been fought because of Britain's determination to prevent Russian encroachment into Afghanistan and prevent further Russian expansion in Central Asia. The Second Afghan War had established British control over Afghanistan's foreign policy and made the country a British protectorate – effectively making Afghanistan a buffer state between the British and Russian Empires.[1] In 1919 Britain still had slight concerns about foreign influence in Afghanistan. The First World War had, however, demonstrated the difficulty of controlling Afghan foreign affairs and during the war Habibullah Khan, then Amir of Afghanistan, met several emissaries from powers hostile to Britain. By 1919, although no firm decision had been reached, it is evident that control of Afghan foreign policy was no longer considered to be an important issue in either India or Britain. Instead, the main British objective in Afghanistan had become the maintenance of peace along the North-West Frontier and the domestic security of colonial India. It was on this



Map 1. Parts of the North West Frontier Province and Northern Waziristan, showing only sufficient detail to locate places and geographical features mentioned in the narrative.

basis that Britain became involved in, what has been described by some as, the most pointless war it has ever fought.

During the conflict which developed, Afghanistan drew on both its standing army, of some 50,000 men, and a further 80,000 armed tribesmen. The British forces involved were 8 Divisions, 5 independent Brigades, 3 Cavalry Brigades as well as some armoured cars. During the fighting only Nos 31 and 114 Sqns (commanded, respectively, by Maj E L Millar MBE and Maj D E Stodart DSO DFC) were available, other squadrons arriving in India too late to take an active part before the ceasefire was agreed. At the start of May, the aircraft of the two squadrons were widely dispersed, having been involved in the efforts by British forces to deal with protests elsewhere in India. On 3 May, intelligence began to reach RAF units regarding possible operations against Afghanistan where, it was reported, the Amir was likely to



Map 2. Notable locations and geographical features, in the context of this paper, within the North West Frontier Province.

declare a Jihad. On the following day, 31 Squadron received orders to keep two machines in readiness to participate in the suppression of any aggression by Afghanistan. Hostilities were formally declared on 6 May and, with the realisation that air power would play an important part in the war, a meeting was held between Lt Col J R C Heathcote, OC, the recently formed, 52 Wing and the Commander of the North-West Frontier Force, Gen Sir Arthur Barrett, to discuss the potential for air/land co-operation.

There were three traditional invasion routes into, and out of, Afghanistan – the Khyber Pass and the Kurram Valley in Waziristan, and the Khojak Pass in Baluchistan. Each of these routes formed its own, largely self-contained, theatre. British and Indian forces were divided between these three different theatres of operation and the available RAF units were distributed to support them. The aircraft of

A Bristol Fighter somewhere over the North-West Frontier where the nature of some of the terrain could make a forced landing problematic. (Chaz Bowyer)

No 31 Sqn co-operated with forces in the Khyber and the Kurram Valley, whilst No 114 Sqn was to have its headquarters at Lahore, whence it would control detachments across India to deal with the continuing internal situation, while maintaining a flight at Quetta to co-operate with the Army in Baluchistan.

The Khyber Pass

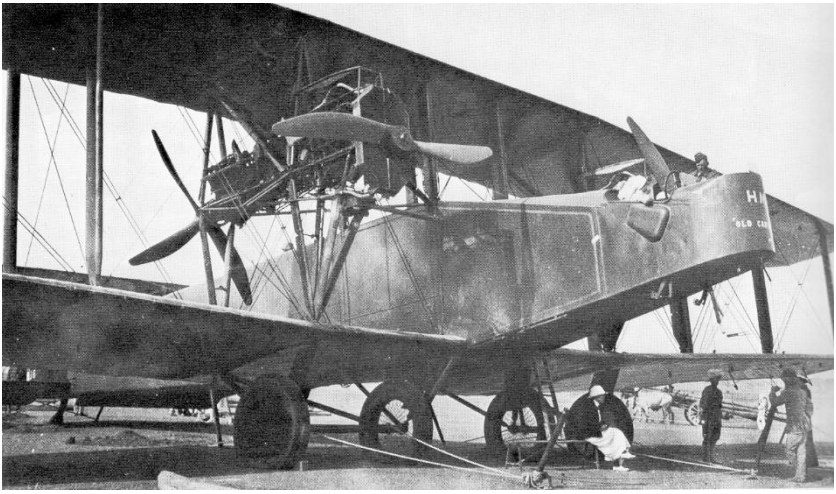
In May 1919 Afghan forces occupied a fort at Loi Dakka, very close to the frontier, and by interfering with the springs at Bargh, had cut off the water supply to Landi Kotal.[2] No 31 Sqn's BE2cs and 2es were able to fly some early reconnaissance sorties, although air operations were hampered by the mountainous nature of the terrain. At this stage, therefore, the air support available to the ground forces was limited. Nevertheless, on 9 May the squadron achieved a notable success when it attacked Loi Dakka. It was a maximum effort, and its sixteen aircraft flew as many sorties as possible between the morning and late evening. Hits were registered on buildings and a number of Afghan officials were killed or wounded. The attack on Dakka also served to disrupt the distribution of supplies to tribesmen and, as a result, many of them

opted to abscond, taking with them large quantities of rifles and stores.[3] In the course of 60 hours flying, more than a ton of bombs had been dropped and 1,151 rounds fired in strafing attacks.[4] Three aircraft had been brought down by rifle fire, but all had crashed behind British lines. To place the effort achieved in perspective, the hours flown and rounds fired during the attack on Dakka in a single day were about a quarter of the totals achieved by the squadron during the period 4-17 May.[5]

The Army advanced on, and took, Loi Dakka on 13 May. While it held no inherent strategic value in itself, its occupation provided a means of preventing the Pashtun tribes from co-ordinating their efforts and offered a suitable site at which a large force could be concentrated. Dakka also offered terrain suitable for a landing ground from which 31 Squadron would be able to cover the army's planned advance on Jalalabad – the main Afghan base in the east of the country and the only major town between the frontier and Kabul, the Afghan capital. The British anticipated that taking Jalalabad would break-up local Afghan concentrations and further divide the regional tribes, as well as cutting them off from Afghan support, supplies and influence. The consequent threat to Kabul, was expected to compel the Afghans to withdraw from the Kurram Valley and Baluchistan in order to provide a covering force for the capital.[6] The advance to Jalalabad was delayed, however, because Afghan operations in the Kurram Valley had prevented the British from redeploying the necessary transport assets and the subsequent ceasefire halted any further movement in the Khyber.

Nevertheless, 31 Squadron had remained active during this period and it had carried out bombing raids on Jalalabad on 17, 20 and 24 May. During these attacks it dropped, on average, more than a ton of high explosives per day. Information received by the British suggested, 'the almost complete demoralisation of Afghan troops and tribesmen as a result of offensive action by aircraft.'[7] Jalalabad was reported as having been deserted by its population and its garrison whilst the whole town was described as having been 'thoroughly punished' with barracks at Fort Sale, the palace and the stables bombed.[8]

The effects of the bombing of Jalalabad were compounded by the long-range bombing of Kabul, on 24 May, by a four-engined Handley Page V/1500.[9] During this attack one 112 lb and three 20 lb bombs fell on buildings within the Amir's palace with a further three 112 lb and



Flown by Capt R Halley, with Lt E Villiers as observer, this HP V/1500, J1936, named HMA Old Carthusian, *bombed Kabul to considerable effect in the course of a 6-hour sortie on 24 May.* (Chaz Bowyer)

seven 20 lb bombs hitting the arsenal and workshops at the fort, the crew observing a large explosion from the latter.[10]

The underlying reason behind the Amir's asking for a ceasefire when he still possessed extant forces in other theatres, and the Khyber itself remained far from being a forced door, lay in a combination of factors. The air raid on Kabul was one, as were British success in the Khyber and the Afghan failure to provoke large-scale uprisings within British India. Significantly, the bombing of Jalalabad and Kabul had been a convincing demonstration of the British ability to inflict a total defeat upon the Amir's forces should it choose to do so.[11] Furthermore, these air raids had undermined the Amir's prestige while increasing discontent among those factions that were opposed to his rule.[12] The Amir himself laid great stress on the bombing of Jalalabad and Kabul's Royal Palace when he asked for a ceasefire. General Sir Charles Monro, CinC India, described these raid as, 'an important factor in producing a desire for peace at the headquarters of the Afghan Government.'[13] Clearly, the RAF's bombing had been of great consequence in the Afghan decision to seek an early peace settlement

rather than continuing hostilities in the hope of embroiling British forces in a protracted campaign.

Although the Khyber was the main theatre for British offensive action, both on the ground and in the air, the RAF also played an important role in the operations in the Kurram Valley.

The Kurram Valley

At the start of May, the Afghan regular forces commanded by General Nadir Khan in the Kurram theatre comprised: sixteen battalions of infantry and two of pioneers; four regiments of cavalry and more than 50 guns. Against this sizeable force the British commander, Brigadier-General Alexander Eustace, could immediately field four battalions of infantry, a regiment of cavalry, three armoured cars, a battery of mountain guns and the local Kurram militia. Two weeks after British mobilisation a further three battalions had arrived to reinforce the forces at Kohat, as had the 22nd Battery, Motor Machine Gun Service, which was deployed forward to Parachinar.

The attack that Afghan forces launched through the Kurram Valley presented a significant threat to the British position in the Kurram agency and in the north of Waziristan. Unable to counter all the potential lines of advance that the Afghan force could have taken through the Kurram Valley, the British had decided to deploy close to a third of their available force forward, to Parachinar, in the Upper Kurram. While deploying forward reduced the risk of a large-scale tribal insurrection, it also risked this detachment being cut off from the main British forces by an Afghan advance from Khost.

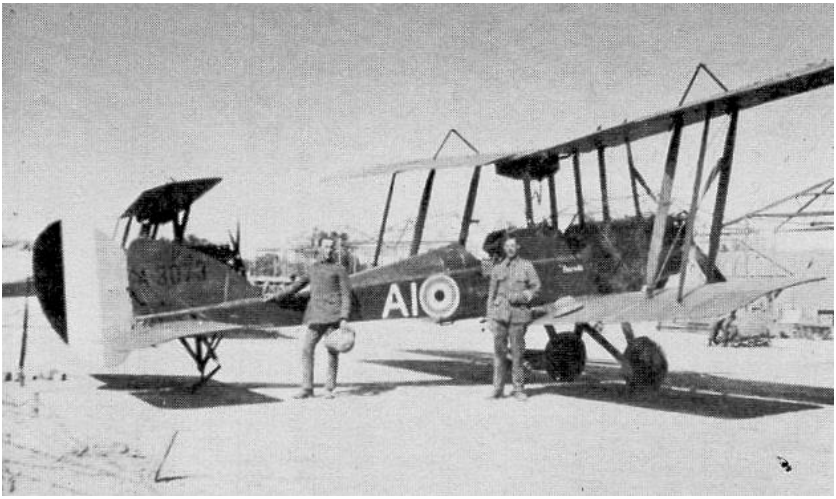
Initial operations in the Kurram Valley saw a series of forward concentrations and feints by the Afghans with the aim of drawing the British forward to the frontier where, given the right tactical conditions, too weak a force might be overwhelmed. In the event that such conditions did not exist, the Afghans would simply withdraw. This created a pattern of behaviour which lulled the British into a false sense of security. As a result, the Afghan army achieved almost total surprise when, on 22 May, it launched a major thrust down the Kaitu river and continued onwards to reach Spin Wam on the 25th. This route had not been considered a practical option for a large a force, accompanied by artillery, and the Afghan advance had obliged the British to evacuate positions in the west of Waziristan which had, in turn, led to uprisings

among the local tribes. The Afghan advance had, therefore, achieved considerable effect, almost from the outset. Furthermore, the Afghans had still given no indication of their intended objective because they now occupied a position from which they could continue south to Idak, south-east to Bannu, or turn north to threaten Thal, all of which were a march of around 20 miles from Spin Wam.

The aim of the Afghan thrust through the Kurram was finally revealed on the morning of 27 May, when Nadir Khan's army of some 3,000 Afghan infantry, seven 7·5 cm Krupp pack guns and two 10 cm Krupp field howitzers arrived at Thal and, supported by large tribal forces, laid siege to the fort.[14] The Afghan advance had divided British forces in the Upper and Lower Kurram, which offered the possibility of defeating the outnumbered and isolated garrisons before British reinforcements could arrive. The Afghan artillery outranged the two sections of British mountain guns and brought accurate and effective fire down on Thal from positions 3,500 yards and 5,000 yards from the fort.[15] While Afghan infantry occupied Thal village, the accompanying irregular tribal forces crossed the Kurram river and took up positions on the hills overlooking Mohammedzai, 3,500 yards south of the fort, on the lower spurs of Khadimakh.

In response to the developing threat in the Kurram, a flight of eight machines from No 31 Sqn had been redeployed to Kohat on 26 May.[16] The operations of these aircraft restricted the tribal support for Nadir Khan's regulars following their rapid march and besieging of Thal. Unfortunately, however, the climate of the North-West Frontier restricted the use of the squadrons BE2s for much of the day. While the BE's RAF1a air-cooled V8 engine produced around 90 horsepower at sea level – on a good day – these were not the prevailing conditions on the North-West Frontier. Kohat is some 1,500 feet amsl where the thinner air produced less 'lift' and reduced power output while the relatively high ambient temperatures (compared to Europe) could cause the engines to overheat. This became an increasing problem towards the end of May and beginning of June when temperatures across the North-West Frontier were considerably above normal.[17]

Despite this limitation, three aircraft were engaged in operations in the morning and evening of 28 May, it 'being of the utmost importance to shake the morale of the enemy.'[18] During the morning, the Afghan army's pair of 10 cm howitzers had destroyed Thal's petrol dump and



A BE2e of No 31 Sqn (via Norman Franks)

the fodder stack outside the fort, set fire to rations stored in the railway yard and put the wireless station out of action for a time.[19] In retaliation, two of No 31 Sqn's aircraft successfully bombed the Afghan artillery emplacements and dispersed the gunners. The relief for the garrison was only temporary, however, and artillery fire on the fort was soon resumed. The air attack on the Afghan artillery illustrates one of the contemporary limitations of air support. Whilst aircraft could be effective when present, their limited loiter time, and the ability of local forces to rapidly disperse and/or to conceal themselves and then resume their activities once the aircraft had left, meant aircraft often exerted only a temporary effect on the battlefield.

That said, No 31 Sqn was able to inflict a significant degree of damage on Afghan forces when it identified and bombed its encampments around Thal, reconnaissance the next day reporting that these camps had been abandoned. The limited influence of air support on the military situation was further demonstrated, however, when Afghan forces occupied the militia post on the north bank of the river Sangroba Nadi, which controlled the water supply for Thal. From there Afghan artillery was able to maintain a heavy fire on the fort and village without meaningful interference by aircraft. Nonetheless, the RAF had contributed to the defence of Thal, the squadron noting that, 'Wherever

A Bristol Fighter of No 20 Sqn in the mid-1920s. The aeroplanes it was flying in 1919 would probably have still been painted in wartime Protective Covering No 10 (PC10), often described as khaki, but more like a chocolate brown. (Chaz Bowyer)

action was taken by aeroplanes the enemy dispersed, often abandoning guns and horses.'[20]

By sunset on 31 May, a British relief column under General Reginald Dyer – infamous for his role in the Amritsar massacre which had occurred only a month earlier – was within striking distance of Thal and had opened communications using the visual station at Fort Lockhart on the Samana Ridge. Arrangements were also made for aircraft to co-operate with the relief force's final advance to Thal on 1 June, which compelled the Afghans to make a rapid withdrawal on the 2nd. No 31 Sqn supported the British right flank, four aircraft successfully bombing and strafing a concentration of 400 tribesmen on the northern slopes of Khadimakh. Having taken Thal, the army paused to consolidate its position, but the RAF continued to make reconnaissance flights one of which located the Afghan HQ which had withdrawn a short distance into the foothills to the west.[21] On 3 June

General Dyer sent a letter of appreciation to the squadron, praising its efforts and noting that, 'but for the excellent information which you gave, and your accurate shooting and bombing, my task would have been infinitely harder.'[22]

After the ceasefire had been agreed, the Afghan forces in the Upper Kurram region continued to be strengthened and the hostile tribesmen remained active. The RAF flew reconnaissance missions: to monitor the situation; to keep an eye on the British outposts that overlooked potential Afghan infiltration routes; and to detect any tendency for tribal forces to concentrate in strength. To maintain the isolated outposts, supplies were brought up by convoys which represented vulnerable targets. The RAF, now strengthened by additional units, notably No 20 Sqn (Maj J C Russell DSO), with its more modern and powerful Bristol F2bs, provided armed escorts for these convoys and these sorties serve to highlight some of the strengths and limitations of contemporary air power on the North-West Frontier.

The British had received reports that a large body of tribesmen was concentrating in the Khurmana Valley to raid the Kurram, and to attack the outposts at Badama and Sadda. Reinforcements of regular troops were sent to Sadda and on 30 July four of No 20 Sqn's Bristols flew armed reconnaissance sorties along the convoy route and over the Khurmana. With their bombs and machine-guns, these aircraft were quite capable of dispersing any concentrations of tribesmen. This incident provides a classic illustration of the RAF's ability to 'see over the hill', to project power at distance, to reconnoitre for ground forces and, if necessary, to provide close support in the event of an ambush.

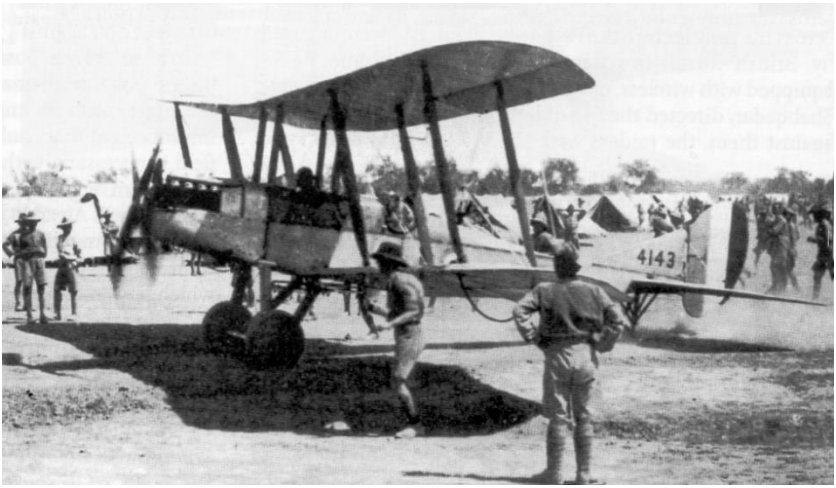
Operations of this nature were not without hazard, of course, and on this occasion ground fire from tribesmen brought down one of the squadron's Bristols near the Badama post.[23] The tribesmen were adept at concealing themselves, even when present in substantial numbers, by simply keeping still and hiding amidst the broken terrain and patches of shade. As a result, crews were frequently obliged to descend to low level in their attempts to locate the enemy which increased their exposure to the rifle fire of the tribesmen, many of whom were excellent marksmen. The loss of the aircraft at Badama illustrates both the vulnerability of aircraft to ground fire and the limits of air observation over terrain within which tribesmen could evade detection.

The fort at Spin Baldak in 1919. Stormed by troops commanded by Lt Gen R Wapshare on 27 May, more than 200 of its 500-strong garrison were reportedly killed. British losses amounted to just 18 killed and 40 wounded. (National Army Museum 2008-07-3-45)

Baluchistan – Spin Baldak

Military operations in Baluchistan differed from those in the Khyber Pass and Kurram Valley. Within Baluchistan, the Afghans were unable to supplement their forces with local tribesmen hostile to the British without first mounting a successful offensive. But a successful Afghan invasion offered few strategic benefits, because Baluchistan was relatively isolated from British India, and there were not many practical invasion routes. The events which occurred within this southern theatre were largely divided between the capture of Spin Baldak – which will be described first – and operations in the Zhob district.

The British, having concentrated the forces they had available in the southern theatre, decided to make a disruptive attack on the Afghans, rather than waiting for them to take the initiative. It was hoped that such a forward strategy would pre-empt an Afghan invasion and dissuade the regional tribes, which the Afghans were hoping to incite, from creating unrest in areas that were only thinly held by the British. By utilising the Indian rail network, the British were able to concentrate



One of No 114 Sn's BE2cs,4143. (via Paul Hare)

an attacking force at Chaman with the aim of taking the Afghan fort at Spin Baldak, before its garrison could be reinforced. Spin Baldak guarded the road that an Afghan invasion of Baluchistan, through Chaman and the Khojak Pass, would have to take and was reputed to be the second strongest fort in Afghanistan.

In the early morning of 27 May, the British force departed Chaman, advanced on Spin Baldak and, by the end of the day it had captured the fort. Aerial reconnaissance helped in the build up to the attack, identifying positions for the guns to be located and reconnoitring the road from Chaman, as well as monitoring Afghan positions along the frontier.[24] During the attack itself, aircraft of No 114 Sqn successfully co-operated with infantry and artillery although its bombardment and strafing of Spin Baldak appears to have had little effect.

The loss of Spin Baldak was a serious blow to Afghan prestige and at the start of June, despite a ceasefire having been agreed, they concentrated a force of considerable size at Kandahar and advanced to Mel Karez, some 32 miles from the British railhead at Chaman. The Afghan force, which now numbered some 12,000 men, occupied positions around Spin Baldak, which gave them possession of the garrison's water supply. Fearing that the Afghans might resume hostilities, the British position in Baluchistan was reinforced and by the

Fort Sandeman today; it is reportedly currently undergoing restoration. (Rafiullah Mandokhail)

time that British troops had been withdrawn, following the signing of a formal peace treaty in August, the operations at Spin Baldak had diverted some 20,000 men and, as importantly, large numbers of transport assets, all of which the British could have employed elsewhere with greater results. Moreover, the decision to withdraw forces from the Zhob, for operations in southern Baluchistan, had left this region unguarded and vulnerable.

Baluchistan – the Zhob

The district of Zhob, located to the north-east of Quetta, is a hot, arid and largely barren desert interspersed with the occasional hill with mountain ranges forming a natural frontier. The principal waterway, the eponymous Zhob River, runs west to east, intersecting the territory before heading north-east, where it feeds into the Gomal River. The Gomal River, in turn, forms the boundary between the Zhob and Waziristan. When large-scale tribal uprisings occurred in Waziristan in late May 1919 it spread into the Zhob and rapidly undermined British regional control. The lack of aerial reconnaissance was acutely felt and the British lacked timely intelligence as to the movement and concentration of tribal forces. Indeed, much of the success that tribesmen operating in the Zhob achieved was a consequence of the general lack of intelligence available to the British regarding the size and location of the opposing force.

On 27 July, the garrison at Fort Sandeman[25] in the north-east of the Zhob, which had been the focal point for much of the trouble the tribes had perpetrated during June and early July, was besieged by large numbers of tribesmen.[26] The siege of Fort Sandeman was characterised by a lack of organisation and co-operation between the various tribes involved. As a result, while they succeeded in capturing 85 horses and 12 mules on the first day of the siege, they failed to follow up with a determined attack on the fort. The siege had not, therefore, presented a serious threat to the garrison and its failure was expedited by one of No 114 Sqn's aircraft bombing the tribal camp on 3 and 4 August. Disorganised and disheartened by these air raids – a manifest demonstration of British support for the garrison – the tribal forces dispersed.

Further west, a force of hostile tribesmen and militia deserters had threatened Hindubagh towards the end of July and had inflicted a sharp loss on the garrison when it had attempted to drive them off. An aircraft from No 114 Sqn bombed and dispersed a small tribal party which had approached within a kilometre of Hindubagh. However, the absence of further air support, encouraged the tribal forces to approach again and they brought the post under fire; this continued at irregular intervals and caused some destruction within the town. It was only when reinforcements from Quetta arrived, on 28 July, that the tribesmen were driven off. Following the relief of Hindubagh and Fort Sandeman serious fighting in the Zhob ceased.

Conclusions

The British still had to supress some small incidents. but none of these compared to those faced in the preceding months. Trouble continued in Waziristan and it would take a separate campaign before the situation was stabilised. Trouble with tribes also continued in the Khyber until the peace treaty, the Treaty of Rawalpindi, was finally signed on 8 August 1919 and the Third Afghan War was officially concluded.

For the RAF, the Third Afghan War had shown what contemporary air power could – and could not – achieve. The greatest limitation it had faced was the limited number of aircraft at its disposal when hostilities began. Nevertheless, if the inevitable limitations this placed on its ability to co-operate with ground forces are recognised, the Third

Afghan War was a significant event in the RAF's early history. The relatively long-range bombing of Dakka, Jalalabad and Kabul had helped operations on the ground and motivated the Amir to seek terms to bring the war to a close. The extent to which British aircraft had impressed the Afghans is demonstrated by the authorities at Kabul creating four dummy aeroplanes and circulating rumours that they had 'arrived' and were now available to attack British troops.[27] Selective bombing and strafing of tribesmen in the Khyber Pass continued following the ceasefire as a substitute for the use of troops which would have breached the terms of the peace treaty and could have led to a formal resumption of hostilities.

Aside from offensive actions, air observation was another valuable aspect of air operations, producing numerous reports on enemy concentrations and movements which had enhanced British understanding of the strategic situation.[28] Operating in Afghanistan had, however, revealed important limitations as to what the RAF could accomplish, particularly when flying the obsolete BE2c and BE2e. Once accustomed to aircraft operations, tribesmen proved adept at concealing themselves within the broken terrain, forcing the crews to fly much lower and increasing their vulnerability to small arms fire.

Nevertheless, the situation which developed as a result of a lack of aerial reconnaissance in the Zhob, or during the early stages in the Kurram valley when Nadir Khan's army made its surprise march, underlined the value of air observation. Elsewhere in Baluchistan, during June, aerial reconnaissance was able to provide reports on attacks by small bands of hostile tribesmen against places such as Musa Khel as well as monitoring the progress of the infantry relief columns for such places.[29] While sometimes limited, the RAF was often able to provide a degree of cover for isolated British picquet posts and ahead of advancing forces sufficient to forestall the Afghans launching surprise attacks. While it is not possible to precisely quantify the impact that the RAF had in deterring Afghan attacks in 1919, these early operations established the procedures that it would develop, and come to rely on, for the next twenty years. Basil Embry, who was OC 20 Sqn during the 1930s, recalled that, to support ground forces, an aircraft would be kept above a picquet during daylight to keep them under general surveillance and to provide assistance as required.[30]

The Third Afghan War had provided the first opportunity to develop these tactics which, to be effective, needed relatively capable and reliable aeroplanes of the calibre of the Bristol Fighter.

The carved inscription reads:
4 Engined
Handley Page
"Old Carthusian"
England – India – Kabul
1919

This bowl, carved from one of the propellors of Old Carthusian, is among the more esoteric items in the RAF Museum's collection.

Notes (TNA – The National Archives; RAFM – The RAF Museum)

[1] Following the Second Anglo-Afghan War of 1878-90, an Indian Civil Servant, Mortimer Durand, established the Durand Line which became the international border between Afghanistan and India, an arrangement that was ratified in 1919 at the end of the brief Third Anglo-Afghan War. It subsequently became the *de facto* border between Afghanistan and Pakistan and was formally recognised as such in 1976.

[2] TNA CAB 24/81/2. Letter from Viceroy to Secretary of State for India: 3 June 1919.

[3] TNA CAB 24/79/81. Letter from Viceroy, 18 May 1919. Robson, Brian; *Crisis on the Frontier: The Third Afghan War and the Campaign in Waziristan, 1919–1920*, (Spellmount, 2004) p48.

[4] RAFM AC 73/23/33. Air Staff, RAF India, Resume of Air Operations: May 1919, p26.

[5] *The History of No 31 Squadron Royal Flying Corps and Royal Air Force in the East from its Formation in 1915 to 1950* (Reprinted by The Naval & Military Press; UK; 2005) p22-23.

[6] TNA CAB 24/80/43. Letter from Viceroy to Secretary of State for India, 23 May 1919.

[7] RAFM AC 73/23/33. Air Staff, May 1919, p28

[8] *Ibid.*

[9] The original intention had been to use the O/400, C9700, which had blazed a trail from Egypt to Delhi at the end of 1918 before being dismantled and stored at Lahore. It was hastily resembled and, on 13 May, flown to Risalpur whence it was to undertake the Kabul mission. That same day, however, the aircraft was destroyed in a freak dust storm. The V/1500 was Plan B.

[10] *Ibid* and TNA CAB 24/80/59. Letter from Viceroy to Secretary of State for India, 25 May 1919.

[11] TNA Cab 24/82/74. Letter from Viceroy to Secretary of State for India, 26 June 1920.

[12] *Ibid.*
[13] Sir Charles Monro, CinC India, 'An Account of the Recent Operations Against Afghanistan', *The London Gazette, Supplement II*, No 31823, 12 March 1920, p3277.
[14] General Staff Branch, Army Headquarters, India; *The Third Afghan War*: Official Account (Government of India Central Publication Branch, Calcutta; 1926) p55.
[15] *Ibid*, p57.
[16] RAFM AC 73/23/33. Air Staff, May 1919, p28.
[17] TNA CAB 24/81/36. Letter from Viceroy to Secretary of State for India, 5 June 1919.
[18] RAFM AC 73/23/33. Air Staff, May 1919, p28.
[19] General Staff Branch; *The Third Afghan War*, p57.
[20] RAFM AC 73/23/33. Air Staff, May 1919, p29.
[21] RAFM: AC 73/23/33. Air Staff, May 1919, p28.
General Staff Branch, *The Third Afghan War*, p57.
[22] TNA AIR 5/1329. GOC 45th Infantry Brigade; letter from Commander Field Force, Thal, to OC RAF Detachment, Kohat, 3 June 1919.
[23] The aeroplane lost on 30 July 1919 was F4626, crewed by Capt G S W Eastwood, who was wounded, and 2/Lt D M Lapraik.
[24] RAFM AC 73/23/33. Air Staff, Appx D, Daily Detail of Operations Carried Out by Machines of No 114 Squadron Engaged in Operations Against Afghanistan, 18-31 May 1919, p57.
[25] Following occupation of the region by the British, and construction of the fort in 1890, the city of Appozai was renamed Fort Sandeman after the first administrator, Robert Sandeman. It retained that name until 1976 when, reflecting its continued status as the administrative centre of the local district, the city was eponymously restyled Zhob.
[26] General Staff Branch, *The Third Afghan War*, p127.
[27] *Flight*, 10 July 1919, p926.
[28] TNA CAB 24/80/7. Letter from Viceroy to Secretary of State for India, 20 May 1919. TNA CAB 24/80/42. Letter from Viceroy to Secretary of State for India, 23 May 1919. TNA CAB 24/80/10. Letter from Viceroy to Secretary of State for India, 20 May 1919.
[29] TNA CAB 24/81/76. Letter from Viceroy, foreign department, 13 June 1919.
[30] Embry, Sir Basil; *Mission Complete* (London; Four Square; 1958) p80.

SEARCH, SHADOW AND STRIKE THE *BISMARCK*

by Air Cdre Graham Pitchfork

With the outbreak of war in 1939, the Commander of Hitler's navy, Grand Admiral Raeder, lost no time in deploying his U-boats and surface fleet to attack commercial shipping. Success came quickly and over the next eighteen months the German Navy took a heavy toll of Britain's merchant fleet. By the spring of 1941 allied shipping losses had reached unsustainable levels and Raeder decided to launch his surface fleet to deal a final blow against the convoys crossing the North Atlantic. At the head of this raiding group, commanded by Admiral Lutjens, would be the new battleship *Bismarck.*

The *Bismarck* was built at the Blohm and Voss shipyard in Hamburg and launched on 14 February 1939. The elegant ship was almost one-sixth of a mile long and it was listed as 35,000 tons in accord with the requirements of the Anglo-German Naval Treaty. However, fully laden, the ship was almost 50,000 tons and her armament of eight 15-inch guns in four twin turrets gave her greater firepower than any British ship. She was also very heavily armoured with a welded double hull and armour protecting all her vital machinery, in addition to twenty-two watertight compartments below decks. It was claimed that she was 'unsinkable.'

***Bismarck* Sails**

After conducting trials in the Baltic Sea *Bismarck* was ready to sail in April 1941 with the new heavy cruiser *Prinz Eugen* to join up in the Atlantic with the battle-cruiser *Gneisenau*. The presence of the *Gneisenau,* together with the *Scharnhorst,* in the French port of Brest had kept reconnaissance aircraft busy and RAF bombers had been regular visitors to the port as the Battle of the Atlantic intensified. A force of ninety bombers attacked Brest on the night of 4 April 1941 and a bomb fell, without exploding, into the water of No 8 dock where *Gneisenau* was moored. As a precaution, the ship was moved and moored to a buoy in the outer harbour on the following day.

A Spitfire photographic reconnaissance sortie confirmed the move of *Gneisenau* and a torpedo strike against the ship was immediately planned. Six Beauforts of 22 Squadron were tasked, three armed with bombs and three with torpedoes, and they took off from St Eval in

Bismarck (German Federal Archive)

Cornwall. Difficulties arose from the outset and only one aircraft arrived at the target at the allotted time and Flying Officer Ken Campbell decided to attack alone in the worsening weather. Against intense anti-aircraft fire he entered the harbour and launched his torpedo scoring a direct hit that caused serious damage and put the battle-cruiser out of action for six months. The Beaufort was shot down, killing the four gallant airmen, but Campbell's remarkable lone attack was to have a profound consequence on the eventual fate of the *Bismarck.* Campbell was posthumously awarded the Victoria Cross for his great sacrifice and matchless courage.

On 18 May 1941 *Bismarck,* with 2,200 men on board and accompanied by the *Prinz Eugen,* sailed from Gdynia on the Baltic coast for Operation *Rheinübung* (Exercise Rhine). British intelligence had been keeping a close eye on the progress of the battleship and had also noted an increase in *Luftwaffe* reconnaissance activity over the north Atlantic, suggesting that the German fleet might soon break out. Confirmation came two days later from the British Naval Attaché in Stockholm who had received a report that the *Bismarck* was sailing with a heavy escort through the Kattegat and towards the North Sea. The following day members of the Norwegian resistance sighted the ships off the south coast of Norway. The *Bismarck* was heading for the Atlantic.

The Commander-in-Chief of the Home Fleet, Admiral Sir John Tovey, was aboard his flagship *King George V* at Scapa Flow in the

Orkneys. On receipt of the news that *Bismarck* was heading out of the Baltic, he ordered two of his cruisers to patrol the Denmark Strait, between Iceland and the ice shelf off Greenland, and a further two to patrol the gap between the Faeroe Islands and Iceland.

As soon as *Bismarck* was sighted sailing north, two reconnaissance Spitfires of the Photographic Reconnaissance Unit took off from Wick, in the north of Scotland, to search the Norwegian coast. Flying his Spitfire PR 1C (X4496) Pilot Officer M Suckling refuelled at Sumburgh in the Shetlands before setting off for the Bergen area on the Norwegian coast. He was nearing the end of his patrol at 1.15pm when he sighted a large cruiser-type ship ten miles west of Bergen which he photographed from 25,000 feet. He then flew towards Bergen and saw a second larger ship moored in Grimstad Fjord and he took more photographs before turning for Wick. As soon as the photographs were developed it was confirmed that Suckling had found the *Bismarck* and the *Prinz Eugen.*

That evening eighteen Beauforts armed with 250lb bombs took off from Wick to bomb the ships, but the very poor weather defeated them. In the meantime, Admiral Tovey ordered the battle-cruiser *Hood,* the flagship of Vice Admiral Holland, and the new battleship *Prince of Wales* to sail to a position south of Iceland and the Admiralty cancelled the sailing plans for the new aircraft carrier *Victorious* and the battle-cruiser *Repulse*, placing them at the disposal of Admiral Tovey. The battleship *Rodney* was diverted from her passage to Boston where she was due to undergo a re-fit.

From first light on 22 May, aircraft of Coastal Command tried to establish whether the German ships had sailed, but they were defeated by fog and low cloud. Late in the day, Captain Fanshaw, who commanded the naval air station at Hatston on the Orkneys, decided to send one of his 771 Squadron target-towing Marylands (AR270) to check the anchorages near Bergen. Hatston was a training airfield, with limited operational capability, but the Commanding Officer of the target-towing flight, Lieutenant N Goddard, volunteered to fly the sortie. The station's Executive Officer, Commander G Rotherham, a very experienced air observer, accompanied Goddard and they took off to search the fjords around Bergen. The fog had barely lifted, and Goddard flew at very low level. Rotherham's excellent navigation took them to Bergen where they searched all the anchorages despite accurate

anti-aircraft fire. It was a superbly executed and determined reconnaissance by the Maryland crew and they were able to confirm that the two German ships had left. On receipt of the news that *Bismarck* had sailed, Admiral Tovey and his main fleet left the anchorage at Scapa at midnight to take up a position to cover the two passages that *Bismarck* was most likely to use.

HMS *Hood* Engages And Is Sunk

Throughout 23 May Coastal Command mounted numerous sorties with Iceland-based Hudsons and Battles, and Catalinas flying from Scotland, in an attempt to locate the *Bismarck* but all were seriously hampered by poor weather. However, at 7.22pm on 23 May the cruiser *Suffolk* sighted the *Bismarck* entering the Denmark Strait. A short time later, her sister ship, the *Norfolk*, also sighted the enemy ships at the dangerously close range of six miles and the *Bismarck* fired the first shots of the action, forcing *Norfolk* to retreat making smoke and signalling the first sighting report. Admiral Holland's battle-cruiser force immediately started to close the enemy at high speed.

As the sighting signal arrived, Flight Lieutenant R Vaughan and his crew of 201 Squadron were preparing to take off from Reykjavik in Sunderland L5798 for a cross-over patrol. They took off immediately and were ordered to proceed directly to the Denmark Strait, arriving at 9.40pm when they started a patrol thirty miles ahead of *Bismarck's* estimated position. Throughout the night they re-adjusted the search area, based on the reports from the shadowing cruisers; the low cloud base of 500 feet made a sighting difficult but they continued with the patrol.

As *Bismarck* increased speed to thirty knots, the two shadowing British cruisers maintained contact, with *Suffolk's* radar proving a crucial aid. Just after midnight on 24 May, Admiral Holland in the twenty-five year old *Hood*, and with the *Prince of Wales* in company, prepared for battle but the shadowing cruisers lost touch with the enemy in a snowstorm and the crucial element of surprise was lost.

When contact was regained two hours later, Admiral Holland had lost the initiative and was lagging behind. This placed *Bismarck* too fine on his bow and thus only the forward turrets of his two ships could engage, giving the German force a major advantage. All four ships opened fire at 5.52am at a range of 25,000 yards with the two German

HMS Hood. (State Library of Victoria)

ships concentrating their fire on *Hood.* Both German ships were able to deliver a full broadside and their second salvo started a fire amidships in the *Hood.* As Admiral Holland turned to bring his after turrets into action, the *Hood* was straddled and blew up with a huge explosion as one of *Bismarck's* shells crashed through the lightly armoured deck and into one of the main magazines, splitting the ship in two. In three minutes the pride of the Royal Navy sank with just three survivors from the crew of 1,419 men.

The crew of a 269 Squadron Hudson, supporting the shadowing cruisers, witnessed the engagement and the crew of the patrolling Sunderland saw the gun flashes on the horizon and hurried to the scene. They arrived in time to see one of the grimmest tragedies in naval warfare as the *Hood* blew up. Vaughan stayed on the scene to offer assistance and at 6.00am he started to search for survivors, but was tasked by *Norfolk* to investigate a report that the *Bismarck* was on fire. At 6.50am he signalled back, 'Enemy course 220 True. 30 knots. No fire but *Bismarck* losing fuel.' Following this critical report, the Admiralty assessed that the *Bismarck* would either attempt to return to Norway or make for a French port and so they immediately allocated additional forces. Admiral Somerville, commanding Force H, consisting of the battleship *Renown,* the aircraft carrier *Ark Royal* and the cruiser *Sheffield*, was ordered to sail north from Gibraltar and other ships were diverted to the possible scene of action. Hudsons of 269 Squadron and Catalinas of 240 Squadron continued to give close support to the Royal Navy ships as they shadowed the *Bismarck.*

The damage to the German battleship and the loss of oil was to have a crucial bearing on the outcome of the final battle and, as the Admiralty had correctly assessed, Admiral Lutjens abandoned his Atlantic foray.

***Victorious*' Swordfish Attack**

When he received the Sunderland's report, Admiral Tovey was over three hundred miles away with his force and he immediately sailed at high speed to intercept the German ships. He detached the aircraft carrier *Victorious* and her escorts to a position one hundred miles from the enemy in order to launch a torpedo strike by the Swordfish of 825 Squadron. *Victorious* was also a new ship and there had been little time to train her crew. Some of the Swordfish pilots were only partially trained and few had flown at night.

At 10.15pm nine Swordfish, led by Lieutenant Commander E Esmonde, were launched in poor weather. Forty minutes later three Fulmars of 800Z Squadron took off to locate and shadow *Bismarck* and *Prinz Eugen* and to create a diversion for the torpedo attack. Finding the *Bismarck* under the low cloud caused difficulties for the Swordfish crews, but they first located the shadowing Royal Navy ships and were given directions before attacking just after midnight against intense anti-aircraft fire. One torpedo found its target, but the heavy armour of the *Bismarck* prevented any serious damage. All the Swordfish set course to return to *Victorious* as darkness fell and, to complicate the recovery, it was discovered that the aircraft carrier's homing beacon was unserviceable. However, as they approached V*ictorious* one hour later, the captain of the carrier decided to risk switching on his searchlight to guide the aircraft back to the ship. Shortly afterwards the Swordfish crews were all back on board, some of the pilots having made their first ever night deck landing. It was a remarkable and very gallant attack. Two of the Fulmars were lost.

As darkness fell on 24 May, Admiral Lutjens decided to detach the *Prinz Eugen.* After a brief gun action, the cruiser slipped away undetected and just after 3.00am the following morning the German admiral managed to shake off the shadowing cruisers and he immediately turned south-east to head directly for a French port. For the time being the *Bismarck* had escaped.

At 8.10am on the morning of the 25th seven Swordfish were launched to search for *Bismarck* but no trace was found and one aircraft

Catalina AH545 of No 209 Sqn. (209 Squadron)

failed to return. In the evening, seven Swordfish carried out a further search, but they too failed to sight the enemy. More searches were conducted the next day with the loss of two more Swordfish, but the worsening weather prevented any further flying after midday and *Victorious* left the scene to return to port.

Catalina Sighting

Throughout 25 May, long-range Catalinas of Coastal Command had been searching the most probable areas but had sighted nothing. Plans for the following day were prepared and passed to Coastal Command's Commander-in Chief, Air Marshal Sir Frederick Bowhill, for his approval. He had many years' experience of maritime warfare and decided that the German admiral was likely to steer further south to stay outside the range of bombers based in the south-west of England before turning for France, so he ordered an additional southern patrol. His assessment proved completely accurate. At 10.30am on 26 May a Catalina (AH545) of 209 Squadron, piloted by Flying Officer D Briggs, flying the extra patrol spotted the *Bismarck*. The aircraft came under heavy anti-aircraft fire, but a wireless message was transmitted indicating that the German battleship was 700 miles northwest of Brest. It was to be the turning point in the battle. At 2.45pm a Catalina of 240 Squadron took over the shadowing role and continued to send radio reports. During the patrol it was attacked by an unknown aircraft and was fired on five or six times by *Bismarck* before handing over the shadowing task to a third Catalina, piloted by Flight Lieutenant P Hatfield of 210 Squadron.

After the initial Catalina sighting, *Ark Royal's* Swordfish continued

to shadow the *Bismarck* and Admiral Somerville detached the radar-equipped cruiser *Sheffield* to stay in contact and direct an air attack. Conditions for the launch of the Swordfish could hardly have been worse with winds over the deck of 50 knots and they had to be launched when the pitch of the ship fell off for a time. Even so, on certain occasions, aircraft taking off and passing over the bows met a wave of spray coming over the flight deck.

When the Catalina's sighting report was received, Admiral Tovey in *King George V* was 130 miles away. *Repulse, Prince of Wales* and *Victorious* had departed, short of fuel, but the battleship *Rodney* had joined. *Norfolk* was still in pursuit and *Dorsetshire* was closing from the south. Force H, on its northward passage from Gibraltar, was seventy miles to the east of the *Bismarck*, putting Admiral Somerville's force in the best position. The fuel situation with Admiral Tovey's force was critical and he could not close the gap with the *Bismarck* before the German battleship reached the cover provided by the *Luftwaffe* based near Brest. His only chance of catching the *Bismarck* was to slow the battleship down and for this he must rely on *Ark Royal's* Swordfish.

Ark Royal's Swordfish Attack

At 2.50pm on 26 May, fourteen Swordfish armed with torpedoes took off from *Ark Royal's* pitching deck and an hour later they obtained a radar contact and set up an attack in very poor weather. After eleven torpedoes had been launched the remaining crews realised that they had attacked the *Sheffield.* With remarkable restraint, *Sheffield's* captain, Captain C Larcom, held his fire as he skilfully manoeuvred his ship and took drastic avoiding action as each flight of three aircraft approached. Fortunately all the torpedoes missed or exploded on impact with the sea. The chastened Swordfish crews left the scene with one crew signalling the *Sheffield,* 'Sorry about the kipper!' All aircraft returned to be prepared for a second strike. While it had been potentially disastrous, the initial attack had a significant, and positive, consequence, because the failure of the magnetic fuses in the original torpedoes caused them to be replaced by contact fuses for the second strike.

After refuelling and re-arming, fifteen Swordfish, led by Lieutenant Commander T Coode, took off for a second strike at 7.10pm. The

Swordfish aboard HMS Ark Royal. (Wikipedia/commons)

striking force comprised four Swordfish each from 810 and 818 Squadrons and seven from 820 Squadron. They formed up into six sub-flights and proceeded to rendezvous with *Sheffield* who was trailing the *Bismarck* twelve miles astern and would give final directions to the target. The weather was very poor, and darkness was descending when the first Swordfish attacked at 8.47pm. All the aircraft faced intense anti-aircraft fire and the sub-flights attacked independently. Over a period of half-an-hour the crews pressed home their attacks with great determination and gallantry and their tenacity was rewarded when two torpedoes hit their target. One hit amidships on the armour belt, causing superficial damage only. However, as the *Bismarck* was making an avoiding turn to port, the second exploded right aft, damaging the ship's steering gear and jamming the rudders hard over to port. The *Bismarck's* fate had been sealed. All the Swordfish returned safely, although a number were damaged and some aircrew had been wounded.

As the *Bismarck* slowed down and lost steerage, Captain Vian's 4th Destroyer Flotilla closed in to mount torpedo attacks throughout the night, while continuing to shadow her as the main battle fleet closed in. The last of the shadowing Catalinas, W8416 captained by Flight Lieutenant P R Hatfield, sighted a seaplane at 7.10am the next morning, but all help for the *Bismarck* was too late. Admiral Lutjens radioed U-boats for assistance, but the only one in the area, *U-556,* had already fired its torpedoes against merchant shipping earlier in its patrol, and the stricken battleship was still beyond the range of the French-based

Luftwaffe bomber squadrons. The third Catalina finally departed and landed at Oban after a flight of twenty-six hours, thirteen minutes – the longest patrol recorded in the north Atlantic theatre.

Final Engagement

As dawn broke on 27 May, *King George V* and *Rodney* arrived, together with the only ship to be present throughout the chase, the *Norfolk.* The British battle squadron manoeuvred into position and opened fire at 8.47am and soon registered hits on the crippled *Bismarck.* At 9.20am twelve Swordfish took off from *Ark Royal* in very difficult conditions and proceeded to the scene of action with a groundspeed of just fifty-three knots! By 10.15am the German battleship had been reduced to a flaming wreck and Admiral Tovey withdrew, aware of the acute shortage of fuel of his ships. As the Swordfish arrived for their third strike, the cruiser *Dorsetshire* closed in and fired three torpedoes from close range and at 10.36am the *Bismarck* sank with her colours still flying. There were just 115 survivors from Germany's greatest battleship, that had so nearly evaded the combined efforts of nineteen major warships, including two aircraft carriers, several squadrons of torpedo aircraft and a considerable number of Coastal Command aircraft. The latter had flown thirty-eight sorties totalling 295 hours in support of the naval forces.

Aftermath

The loss of the *Bismarck* was a major turning point in the Battle of the Atlantic. The U-boat menace remained, but Admiral Raeder's vision of surface raiders destroying the merchant fleets as they crossed the north Atlantic with their vital supplies never materialised. The *Bismarck's* sister ship, *Tirpitz*, remained locked in a Norwegian fjord before it was finally destroyed by bombers of the Royal Air Force. The battle cruisers *Scharnhorst* and *Gneisenau* finally escaped from Brest in the famous and gallant 'Channel Dash' but neither were to pose a major threat again.[1] Some of the Swordfish crews that had attacked the *Bismarck* were to lose their lives as they attacked the two German battle-cruisers in one of the most gallant attacks ever flown by the men of the Fleet Air Arm. Their leader, Lieutenant Commander Eugene Esmonde, who had been the first to attack the *Bismarck*, lost his life and was posthumously awarded the Victoria Cross for his inspirational leadership and supreme gallantry.

The *Bismarck* action graphically illustrated the growing importance of air support in maritime battles. The availability of reconnaissance, shadowing and strike aircraft gave a crucial advantage to the British naval forces. In the end, Admiral Lutjens made a dash for the security of the *Luftwaffe* umbrella based in north-west France, but his ship was crippled by an air strike before he could reach that sanctuary and his fate was sealed. Vice Admiral Weichold of the German Navy wrote, 'the most obvious lesson of the *Bismarck* operations was the growing importance of air power in naval warfare […] the *Bismarck* episode is thus a turning point in the war at sea.' Sadly, the British were slow to learn this lesson and, just six months later, the *Prince of Wales* and *Repulse* sailed from Singapore without air cover and Japanese aircraft sank both ships. In many respects, the *Bismarck* episode sounded the death knell for the battleship

The sinking of the *Bismarck* was one of the great naval battles of all time and a glorious chapter in the history of the Royal Navy. However, for those who may doubt the crucial role of aircraft, let Captain R A B Edwards RN of the Directorate of Operations Division in the Admiralty have the last word. In a letter, dated 30 May 1941, to AOCinC Coastal Command, Air Chief Marshal Sir Frederick Bowhill, he wrote, 'May I take this opportunity of offering my very humble congratulations on the part your Command took in the destruction of the *Bismarck.* It is no exaggeration to say that without them it would never have been accomplished.' Coupled to this generous acknowledgement should be the Fleet Air Arm whose wood and fabric biplanes were so instrumental in the destruction of Germany's 50,000 ton monster battleship.

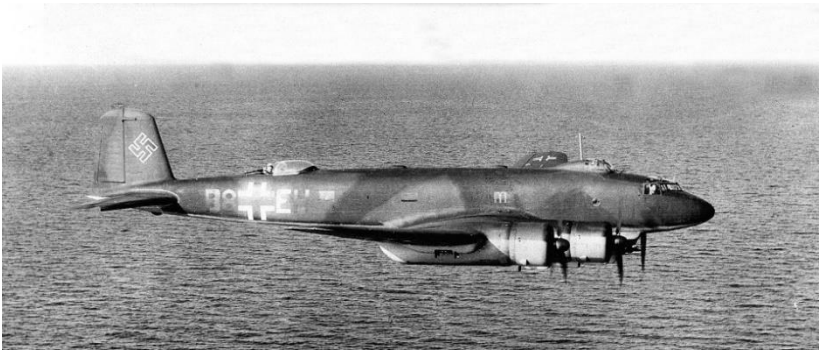
[1] See *'Executive Fuller!' – The Royal Air Force and the Channel Dash*; the 2009 RAF Two Air Forces Award paper by Gp Capt Alistair Byford in RAFHS Journal 50.

CATAFIGHTERS

by Andrew Thomas

When airfields in western France were captured in mid-1940 the *Luftwaffe* began patrols deep into the Atlantic using the long range of the Focke Wulf Fw 200s of I./KG 40. Based at Bordeaux/Merignac, the predatory Condors were soon making their presence felt, sinking 90,000 tons of shipping between August and November 1940. As shipping losses mounted, a counter to the Condors was desperately needed, but there was a severe shortage of aircraft carriers. Since none were available for Atlantic convoy escort duty, the concept of the catapult fighter was born. A fighter would be carried atop a heavy catapult mounted on a vessel's bow, or midships, to be fired off by rockets when the presence of an intruder was detected. After conducting the intercept, the pilot would either attempt to reach land or bale out into the sea near an attendant escort.

As a first step, to prove the concept, the elderly catapult training ship HMS *Pegasus* was converted during November 1940 to become the first Fighter Catapult Ship (FCS). Four merchant ships were identified and, after being adapted as FCSs, commissioned into the Royal Navy as HM Ships *Ariguani*, *Maplin*, *Springbank* and *Patia*, although the latter was sunk in April 1941 before it had become operational. Each carried either a pair of Sea Hurricanes or a Fulmar. However, it was merchant ships fitted with a catapult on the bow and designated as



The threat represented by the Fw 200 led to the development of the FCSs and later the CAM Ships. (via John Weal)

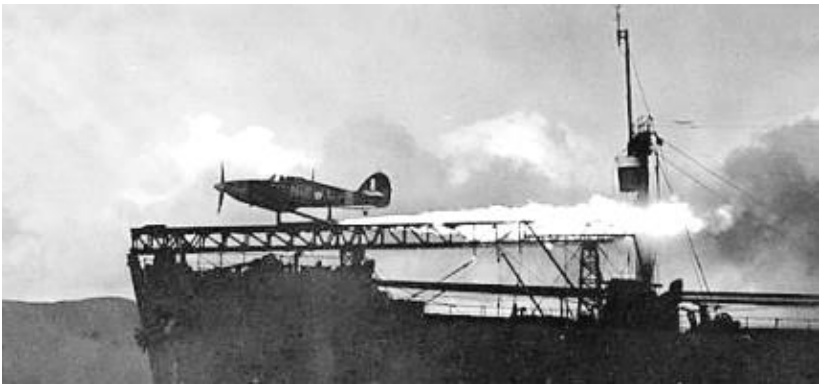
An MSFU Hurricane, Z4935, being prepared for a practice launch at Speke with a number of, still to be loaded, rockets at the rear of the catapult. (IWM CH 15390).

Catapult Armed Merchantmen, or CAM ships, that saw the most service, each carrying a single Sea Hurricane of the Merchant Ship Fighter Unit (MSFU). The MSFU was an RAF unit within Fighter Command's No 9 Gp so, paradoxically, it was mainly pilots wearing light blue uniforms that flew on catapult ship operations in the Atlantic and Arctic.

Condors attacked 46 ships in the first two months of 1941, sinking 26 of them. If that were not crisis enough, the Condors were being increasingly used to find and shadow convoys for waiting U-boats. The RN's FCSs had their only success in the early afternoon of 3 August, while the *Maplin* was escorting a convoy from Gibraltar. Her Sea Hurricane, flown by Lt Bob Everett, shot down a shadowing Condor before he successfully baled out.

Atlantic crossings

The RAF-manned MSFU was formed at Speke on 5 May 1941, 'to provide merchant shipborne fighter aircraft for the protection of shipping against air attack.' All the MSFU pilots were volunteers. It was a large unit, commanded by Wg Cdr E S Moulton-Barratt who had, as his training officer, a colourful ex-WW1 pilot, Sqn Ldr Louis Strange. The adventurous Strange, then aged 49, made the first launch off the training catapult at Speke declaring, 'If an old boy can do it, so can you!' The 'P' Type catapult, fitted to the bow of selected merchant ships, was designed by the Royal Aircraft Establishment at Farnborough to launch aircraft of up to 10,000lb maximum weight at 60 knots. Thus fitted, these vessels became CAM ships, each of which



The impressive spectacle of a Hurricane being launched ashore from a CAM ship at Greenock. (IWM A 9423)

carried a Sea Hurricane modified for catapult launching and an RAF sea party comprising one or two (depending on the destination) pilots supported by a fitter, a rigger, an R/T operator and an armourer. The RN provided a fighter direction officer, a radar operator and a seaman for servicing the catapult. At the end of each voyage, the aircraft would be catapulted off to shore for maintenance and eventually the MSFU established permanent detachments at Dartmouth, Nova Scotia and Gibraltar to provide support during convoy turnarounds.

The Air Ministry requested volunteers in early 1941 and the first pilot to join the MSFU was the experienced Plt Off Henry Davidson, who arrived on 5 May. He joined the first CAM ship, the *Empire Rainbow*, from which he made the first trial launch on the 31st, although it almost ended in disaster. As the ship sailed into the Clyde at 10 knots, only half of the rockets fired as Davidson sped down the rails and, to the dismay of those watching, the Hurricane dropped below the bow and its port wingtip touched the sea. Fortunately Davidson was able to regain control to land at Abbotsinch, but the experience resulted in a change in procedures that avoided a recurrence. On 8 June he sailed with the ship for Halifax on the first operational run by the MSFU.

The second CAM ship was the *Empire Moon*, which sailed shortly afterwards with Plt Off A R M Campbell. By the end of the month there were six CAM ships at sea and by early July the MSFU had 25 modified Sea Hurricane IAs on charge. Among the other early MFSU pilots was

Sea Hurricane IA V6756/NJ-L aboard the CAM ship Empire Tide *in August 1941.* (IWM A 9421)

Fg Off John Greenwood, a Battle of Britain veteran, who joined the *Empire Flame*, a newly completed 7,000 GRT wheat carrier. He recalled his first trip to Halifax as taking 21 days of tremendous boredom as watches were held only until the convoy passed 30º West. Another pilot was Fg Off 'Stapme' Stapleton who later described a catapult launch as follows,

> 'A series of 13 solid fuel rockets fired in sequence. As each set of rockets fired, the Hurricane flew down the ramp with the throttle open before the latches were released and the aircraft took off. The ship's mate was responsible for controlling the release and started the first rockets as the ship was on a downward roll. By the time the Hurricane reached the end of the ramp the roll would have reached its pinnacle and, with the speed of the aircraft at about 80 mph, the Hurricane was propelled into the air in an upward trajectory.'

Like many others, Stapleton never had an operational launch.

By early September, 39 pilots and 164 groundcrew had passed

The first operational launch was made by Plt Off George Varley on 1 November 1941. (247 Sqn Assoc)

through Sqn Ldr Strange's training programme and there had been 37 CAM ship sailings. These included 15 round trips to North America where three pilots, under Flt Lt Tony Linney, were detached to Dartmouth NS to form a reserve pool.

Success and tragedy

Later that month it was decided to transfer six CAM ships to the Gibraltar route as the convoys had to run the gauntlet of the Bay of Biscay, hence the establishment of a reserve pool on the Rock. The first Gibraltar-bound CAM ship, the *Empire Gale*, sailed in early October 1941. Action for the MSFU eventually came on 1 November, during a return journey from Halifax. When 550 miles west of Ireland Plt Off George Varley was launched off the *Empire Foam* in Sea Hurricane Z4865. He immediately spotted an Fw 200, with its bomb doors open, off to his right, but he was spotted by the German crew which took refuge in cloud. Having kept the enemy at bay for almost two hours, Varley was eventually obliged to bale out to be picked up by the destroyer HMS *Broke* whose crew had a hot bath ready!

The first success was claimed by Fg Off John Kendal on 25 May 1942, but he did not survive the subsequent bale out. (Author's Collection)

It was on the Russian run to Murmansk and Archangel that the MSFU had its first success when the homeward-bound convoy QP 12 came under surveillance as it passed the northbound convoy PQ 16. On the morning of 25 May 1942, Fg Off John Kendal, another Battle of Britain veteran, was launched in the Barents

Sea from the *Empire Morn* against a shadowing BV 138. Having persuaded it to desist, at 0850 hrs Kendal was vectored onto a Ju 88 (4D+IT of III./KG 40) which he rapidly closed onto and attacked from about 200 yards, causing black smoke to pour from the Junkers which gradually lost height and speed to crash about 8 miles ahead of the convoy. Tragically, Kendal, who had just claimed the MSFU's first victim, baled out too low and died soon after being picked up.

As the two convoys passed each other, a full-scale attack, initially by Ju 88 dive bombers, began to develop against the Russia-bound ships. In the early evening, Plt Off A Hay was launched off the bow of the *Empire Lawrence* and he quickly closed on the inbound 'V' formation of He 111 torpedo carriers. Firing on the last aircraft on the starboard side with a couple of three-second bursts from 200 yards, Hay saw strikes on the engine and pieces fly off before switching to another aircraft where he saw his fire hitting near the cockpit. He was then hit by return fire. Streaming glycol, wounded and half blinded, he nonetheless managed to expend the rest of his ammunition on a crossing Ju 88. Hay baled out and was picked up, after only six minutes in the freezing water, to learn that his first victim had been confirmed as destroyed. Although several ships were sunk, the attack had been severely disrupted by Hay's intervention and it never recovered its essential symmetry. The *Empire Lawrence*, however, was sunk later on the voyage.

Non-swimming pilot!

By the end of November 1941 the CAM ships had completed 60 round trips with the MSFU's sea crews tolerating the Atlantic winter but seeing little action. Fg Off Spurdle described the Atlantic in winter as follows,

> 'I have seen the propellor forced around against the compression of a 12-cylinder motor in a gale and actually screwing up and tearing off the canvas engine covers. Salt corrosion and dampness were an unending battle for the ground crews on the ships.'

CAM ship sailings were suspended on 3 January 1942 and not resumed until March, by which time Wg Cdr George Pinkerton had assumed command of the MSFU.

Weather was not the only hazard; the spirit of frustrated young pilots

Flt Lt Norman Taylor was lucky to survive his ditching because he was a non-swimmer! (via B Marsden)

could also cause problems, as happened on 10 February 1942. Fg Off Jack Sheppard having been goaded by the Merchant Navy crew of the *Kafiristan*, decided, after being catapulted off for Speke in Z4569, '… to show them'. However, as he sped past the ship at very low level his controls jammed; he dug a wing into the water and was lucky to survive.

CAM ships on the Gibraltar run also began to see action and on 14 June Plt Off Vernon 'Sandy' Sanders from the *Empire Moon* attacked and drove off a shadowing Condor. There was a more conclusive combat on 1 November 1942 that involved a convoy homebound from Gibraltar. Fg Off Norman Taylor DFM was the duty pilot aboard the *Empire Heath* with V7070. Just before 10am 'action stations' was sounded when a Condor was sighted and began circling some 8-10 miles away from the convoy. As the bow rose in the heavy swell, the Hurricane was launched just as the enemy aircraft began an attack run onto the CAM ship. In spite of R/T difficulties, Taylor swung in the correct direction and at full throttle chased after the now retreating Condor. Despite being blinded by the dazzle off the sea, he closed into a furious curtain of defensive fire that hit his port wing. The low flying bomber then pulled up to try to reach cloud, Taylor calling, 'He's pulled up in front of me. I think I've got him.' Closing to 200 yards, he opened fire, hitting the cockpit area, although the Condor kept climbing before suddenly entering a shallow dive and crashing into the sea. Taylor announced over the R/T, 'He's down. He's gone down!' There was no sign of survivors of 7/KG 40's F8+DS or of *Oblt* Arno Gross' crew. Taylor flew back to the convoy where every ship sounded its siren in salute before he baled out into the sea. But, unknown to anyone, he was a non-swimmer! Barely able to stay afloat he was fortunate to be picked up and later received a well-earned DFC for this feat.

Fg Off Basil Tatham's Sea Hurricane 1A Z4852 from the SS Empire Foam ashore at Dartmouth NS in January 1942.
(J D Friedlander)

A final fling

In March 1943 the remaining CAM ships were concentrated on the Gibraltar and North African runs. These were no sinecure, however, as several ships succumbed to mines or torpedo attack. Escort on the Gibraltar run was to counter the threat from Condors and the larger Ju 290s, which were also being employed on long range reconnaissance duties over the Atlantic. With the increasing availability of escort carriers, the *raison d'etre* for the MSFU had ceased and it was officially disbanded on 8 June. However, it still had elements at sea at the time, including convoy SL 122 from Sierra Leone which was now inbound to the UK from Gibraltar. It was accompanied by the last of the CAM ships, the *Empire Tide* and the *Empire Darwin*. On 23 July Condors attacked and Fg Off Jimmy Stewart was launched off the *Empire Darwin* to shoot down one of the predators and drive off a third. He wrote in his combat report:

> 'I recognised it as a F.W.200 flying at 1,000ft and gave chase, he was flying north but turned and flew south for a minute then proceeded eastward and reducing height to about 200ft. I had no difficulty overtaking at 6¼ boost, 2,600 revs and approximately 250mph and made my attack on the port quarter out of sun. My attack was delivered from 40º to 15º, opening fire at 300 yds and closing to almost point blank. I aimed at the cockpit giving 1½ to 1 ring deflection and gave a five second burst. I could see

strikes in the sea round the nose, then a vivid white flash from near the turret, return fire was very heavy and uncomfortably close, but I could not see any strikes on my aircraft. Having broken away to port I repeated the attack.'

Stewart baled out and, after spending 15 minutes in the water, he was picked up by the escort HMS *Leith* where he was given a well-deserved hot bath and a shot of whiskey.

Shortly afterwards the *Empire Tide's* sea crew launched Fg Off 'Paddy' Flynn just 84 seconds after the alert had been sounded. He soon found an Fw 200 which he attacked, raking the rear upper turret, lateral gun position and the cockpit before concentrating on the port engines. He too was subjected to heavy return fire that shattered the canopy near his head before the Focke Wulf jettisoned its bomb load. With smoke pouring from at least one engine, the Condor staggered away losing height to crash soon afterwards. Returning to the convoy, Flynn also baled out, to be picked up safely by HMS *Enchantress*.

Although it had only a brief existence, the MSFU's final action over the Atlantic had ensured that it had ended in a blaze of glory.

In total, there had been nine operational launches, resulting in the destruction of nine German aircraft with others damaged and/or driven off. The cost had been only eight Hurricanes (one was able to recover to a Russian airfield) and just one pilot, Fg Off John Kendal.

Catapult Armed Merchantmen: MV *Daghestan,* MV *Daltonhall,* MV *Eastern City,* SS *Empire Baffin,* SS *Empire Burton,* SS *Empire Clive,* SS *Empire Darwin,* MV *Empire Day***,** SS *Empire Dell,* SS *Empire Eve,* MV *Empire Faith,* SS *Empire Flame,* SS *Empire Foam,* SS *Empire Franklin,* SS *Empire Gale,* SS *Empire Heath,* SS *Empire Hudson,* SS *Empire Lawrence,* SS *Empire Moon,* SS *Empire Morn,* SS *Empire Ocean,* MV *Empire Rainbow,* MV *Empire Ray,* MV *Empire Rowan,* SS *Empire Shackleton,* SS *Empire Spray,* MV *Empire Spring,* MV *Empire Stanley,* SS *Empire Sun,* SS *Empire Tide,* SS *Empire Wave,* SS *Helencrest,* MV *Kafiristan,* SS *Michael E,* SS *Novelist,* SS *Primrose Hill.*

Unit Identity Codes: The size of the MSFU meant that it was allocated four unit identification code combinations for concurrent use on its Sea Hurricanes: KE, LU, NJ and XS.

WHAT WAS THE POINT OF POTSDAM? THE RAF AND THE POTSDAM RAID, 14-15 APRIL 1945

by Dr Alastair Noble[1]

Volume Six of the Air Historical Branch (AHB) narrative, *The RAF in the Bombing Offensive Against Germany*, concludes the chronological operational series. It includes the last major Main Force attack by Bomber Command on a major German town – the bombing of Potsdam on the night of 14-15 April 1945.[2] This contribution considers the raid in greater depth.[3] It attempts to set the strategic context for the operation before evaluating the aims, objectives and effectiveness of the attack, whilst trying to assess the impact on the ground. Significantly, it questions, why, when Berlin was being menaced by all-Mosquito forces, did Potsdam face a Main Force attack so late in the war?[4] Could it be justified when even Prime Minister Winston Churchill expressed concerns days later?

At the outset, it should be recognised that, in mid-April 1945, the RAF did not know that the war would end within four weeks. German forces were offering fierce localised resistance. An Alpine Redoubt was apparently being prepared for the last stand. Resistance was talked up in Nazi propaganda, notably the proclamation of the *Werwolf* resistance movement, with the unwelcome prospect of a bitter partisan war in the Reich's ruins. Nor should it be forgotten that the Third Reich's wheels of death rolled until the end. If the Nazis were going down, they were taking their enemies with them. Allied forces uncovered the horrific evidence as they liberated extermination, concentration, and labour camps.

The Potsdam operation has received more coverage in German than in British accounts, not all wholly accurate. The ideologically charged approach of the former German Democratic Republic condemned the Western Allies and Nazi Germany as two sides of the same 'imperialist' coin. The 'Imperialist Air War Doctrine' accepted the use of terror as a legitimate form of warfare, started by German fascists at Warsaw (1939) and Rotterdam (1940), but embraced by the western Allies as the war went on. For Olaf Groehler, East Germany's leading air war historian, the raids late in the war, including Potsdam, reflected the beginning of new Cold War horrors, not the end of fascist barbarity.[5]

Following German unification in 1990, the charge was led by

revisionist scholars, notably Jörg Friedrich. Friedrich echoed the East German line but was more graphic. In *Der Brand* (The Fire), published in 2002 [English translation, 2007], he claimed Potsdam was destroyed to erase the history of Prussian militarism, Potsdam being the Prussian Army's historic home, rather than being attacked as a military objective.[6] The most extreme criticism labelled the Potsdam operation a 'war crime' – claiming the RAF shifted to attacking targets with no military importance, selected for symbolic reasons. Potsdam epitomised reactionary Prussia; Berchtesgaden was associated with Hitler and Heligoland was historically significant.[7]

Friedrich cited 5,000 deaths in Potsdam, more than those killed by bombing across Germany in 1940 and 1941 combined. His figure repeated East German estimates. Newer accounts, from work done in 1993, now suggest at least 1,593 deaths;[8] many possibly in uniform. The recently deceased local historian Hans-Werner Mihan provided a balanced, accurate account of the raid in his seminal 1997 study, *Die Nacht von Potsdam*, suggesting a death toll of around 1,800 and conveying the scale of subsequent damage inflicted during the fighting for Potsdam later in April 1945.[9] Meanwhile, the air war's legacy still affects Potsdam. In June 2020, it experienced its largest post-war evacuation, when 13,600 residents were moved from the town centre as the authorities made safe a 500lb RAF bomb found in the River Havel, near the main railway station.[10] Over 200 unexploded bombs have been found in Potsdam's environs since 1990.[11]

The Potsdam operation came two months after the Anglo-American attacks on Dresden. In the interim, Nazi Germany's military position deteriorated further. By the second week of April, the Reich's remit was restricted to a narrowing strip of land, barely 120 miles wide in central Germany, the area between the rivers Elbe and Oder. The Americans placated Uncle Joe [Stalin] and left Berlin to the Soviets. The Red Army had sat on the Oder, forty miles east of Berlin since the end of January. The final offensive commenced on 16 April.

While the Nazi leadership remained in place, last-ditch resistance was demanded from all Germans. The boys of the *Hitlerjugend* (Hitler Youth) and old men of the *Volkssturm* (Home Guard) were primed for the final fight. Roaming courts martial dispensed summary justice. Explosives were attached to bridges. Berlin's trams were filled with debris, a plentiful resource, to form barricades. President Roosevelt's

death on 12 April was seized upon by Nazi propagandists as divine intervention, signalling the collapse of the 'unnatural' enemy coalition.[12] Allied differences would not impede the short-term priority of defeating Nazism. Nevertheless, despite years of setbacks and retreats, the German military in April 1945 remained capable of maintaining stiff resistance.[13] It was an entity in defeat but not yet conclusively defeated.

From the perspective of German air defence, territorial losses in the west rendered the shrunken Reich bereft of effective early warning radar. The lack of warning time was already recognised by the air raid protection authorities in Potsdam because of the front's proximity. The *Potsdamer Tageszeitung* acknowledged this very point in an article on 14 April, describing the shorter period from the air raid alarm to the appearance of enemy aircraft, hoping a ten-minute warning time could be maintained.[14] This was accompanied by diminishing fighter numbers, fewer trained pilots, an acute fuel shortage and weaker *Flak* defences. Germany's *Flak* artillery had been denuded of trained *Luftwaffe* personnel, being increasingly manned by elderly factory workers, prisoners, women and children. *Flak* batteries went to the Ardennes (December 1944) and to the Oder (January 1945) to tackle tanks. Swathes of Germany were stripped of *Flak* defence. Thirty heavy and thirteen light *Flak* batteries were removed from the defences surrounding Berlin from 23 January. Two weeks later, to release more men for the fronts, searchlight units around Berlin were reportedly disbanded. The remaining *Flak* batteries were critically short of ammunition.[15] By April 1945, nearly half [44%] of *Flak* forces were manned by civilians. Remaining *Luftwaffe* personnel tended to be too old to otherwise fight or war-wounded.[16] Indeed, for months the only real restriction on Allied air operations over Germany was bad weather.[17]

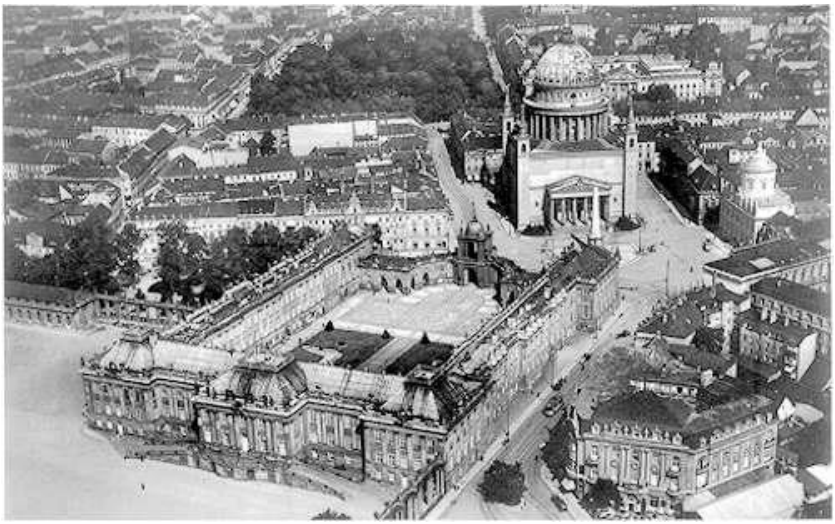
From an Allied perspective, at this point the Combined Bomber Offensive was explained by the Combined Chiefs of Staff directive OCTAGON 29, of 16 September 1944. This stated the primary objectives were: 'the progressive destruction and dislocation of the German military, industrial and economic systems and the direct support of land and naval forces.'[18] Potsdam had its own Bomber Command target code – CRAYFISH. Berlin was WHITEBAIT.[19] Potsdam became a priority at the 17th meeting of the Anglo-American

Combined Strategic Targets Committee (CSTC) on 7 February 1945. In addition to Berlin, Leipzig and Dresden, seven cities, including Potsdam, were selected as being associated with the movement of evacuees and military forces behind the Eastern Front. Potsdam was in eighth place in this ten-city priority list.[20]

In early 1945 there were decidedly mixed messages from the Prime Minister about bombing German cities. The same Winston Churchill who in late January demanded attacks on centres behind the Eastern Front, as the Germans retreated from Breslau, setting Bomber Command on a course towards Dresden, was now more critical. In late January, he had also [again] told the Chief of the Air Staff, Sir Charles Portal, to focus on oil.[21] A series of brutal raids and Churchill seeing their repercussions, when visiting Montgomery on the Rhine on 26 March, probably motivated his [later withdrawn] minute to the Chiefs of Staff on 28 March:

> 'It seems to me that the moment has come when the question of bombing German cities simply for the sake of increasing the terror, though under other pretexts, should be reviewed. Otherwise, we shall come into control of an utterly ruined land…the destruction of Dresden remains a serious query against the conduct of Allied bombing…I feel the need for more precise concentration upon military objectives rather than on mere acts of terror and wanton destruction, however impressive.'[22]

Bomber Command's Sir Arthur Harris was unimpressed. He believed the bombing of German industrial cities had fatally weakened their war effort, resulting in Allied armies advancing into Germany with negligible casualties. Writing to Norman Bottomley, Vice Chief of the Air Staff, Harris echoed the former Prussian and German 'Iron Chancellor' Otto Von Bismarck's maxim: 'I do not personally regard the whole of the remaining cities of Germany as worth the bones of one British grenadier.'[23] A less 'rough' Prime Ministerial minute was issued on 1 April but still questioned 'area bombing' from the standpoint of Allied self-interest, 'We must see to it that our attacks do not do more harm to ourselves in the long run than they do to the enemy's immediate war effort.'[24] The Air Staff ordered the end of the area offensive, except when needed specifically to support the land and sea campaigns. It was not watertight.[25] Built-up areas could still be



The heart of pre-war Potsdam: the Alter Markt, *flanked by the large rectangular compound of the* Stadtschloss *in the foreground, with the large dome of the* St Nikolaikirche *beyond it and, to the right, the smaller dome of the* Rathaus. (https://alchetron.com*)*

attacked if this assisted the Allied armies. Oil refineries, shipyards and marshalling yards were bombed into May.[26]

Why Potsdam? *Oberbürgermeister* Jann Jacobs posed this question in 2010. Potsdam was a key east-west rail hub, alongside its numerous barracks, support, and training establishments. Harris had reservations about bombing barracks, when these were primary targets at Nordhausen on 3 and 4 April 1945. He did not 'consider barracks suitable targets for heavy bombers. They would also shortly be required for the occupying forces.'[27] However, it was there, that the Reich's last levy was being readied for the last battle.

There were military sites in Potsdam. Nevertheless, the Foreign Office and Ministry of Economic Warfare's *Bomber's Baedeker* of 1944 had not rated it as a target. Located 18 miles south-west of Berlin's city-centre, Potsdam had 126,000 inhabitants. It had been the chief residence of the Hohenzollerns, and had developed into an important military centre with extensive barracks, garrisoned mainly by household troops.[28] It was dubbed the '*Soldatenstadt'*. The 'Day of

Potsdam' in March 1933 symbolised the fusion of old Prussia and new National Socialist Germany, represented by President Hindenburg and Chancellor Hitler.[29]

Potsdam was believed to house many administrative and archival offices of the German and Prussian Governments. It had 'no industries' and was mainly residential, home to many retired military and governmental officials. The Railway Repair Shops (*Reichsbahn-ausbesserungswerke*), with 3,500 workers dealing with all types of rolling stock, was the only location in Potsdam in the British document 'Economic Keypoints in German Towns and Cities', assigned a Priority 2 rating. There were no top priority targets. The Arado aircraft components works, which had *Flak* installations on its roof, was not mentioned.[30] Worryingly, from the German standpoint, there was no major air-raid shelter construction in Potsdam following Hitler's decree on air raid protection of October 1940.[31] Industrial centres were prioritised for shelter building. Most Potsdamers were completely unprepared for air raids with no shelters and cellars not properly supported.[32]

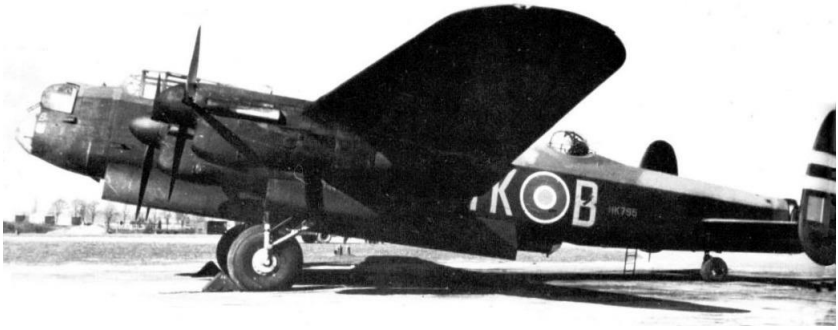
Although Brandenburg's regional capital and home to Nazi regional leader, *Gauleiter* Emil Stürtz,[33] Potsdam was eventually included in Berlin's defensive planning. On 2 February 1945, *Wehrkreis* (Military District) III became responsible for Berlin's defence. Only a month later, when the Berlin Defence Area was established, did preparations begin. The 'Basic Order for the Preparations to Defend the Capital' of 9 March incorporated Potsdam.[34] Greater Berlin, including Potsdam, was divided into eight sub-sectors, with concentric rings of defences. Despite propaganda claims, Berlin was a threadbare fortress. Going direct to Hitler's headquarters, Stürtz frustrated an attempt by the Potsdam authorities to persuade the Berlin military commander not to declare Potsdam a fortress. They highlighted over-population due to the refugee influx, mostly women and children, and insufficient reserves of foodstuffs. Nevertheless, Stürtz insisted Potsdam would be defended as a fortress and the military would fight to the last man.[35]

Potsdam's population had swollen with the influx of refugees from the Reich's eastern provinces since January with some 30,000 registered on 28 February 1945. It was the centre of the administrative efforts for Brandenburg's eastern districts 'temporarily' occupied by the Soviets; the pretext being maintained that they would be recaptured,

and the refugees would return home.[36] Alongside endless refugee treks, other developments indicated the deteriorating situation. Anti-tank obstacles were erected on the Glienicker Bridge to the north of the town, Soviet prisoners dug trenches in the parks and the *Volkssturm* drilled. The most significant symbolic development was kept quiet. On 12 March, the tombs of the Kings Frederick William II and Frederick II [the Great] were removed from the Garrison Church and taken to the *Luftwaffe* Command Centre bunker at Geltow, south-west of the town.[37]

Bomber Command did not bomb rubble in Potsdam. Excluding an American day raid by 40 Liberators on 21 June 1944 which damaged eastern districts, killing five, Potsdam avoided direct air attack until 1945.[38] Potsdamers watched Berlin being bombed. It was thought this behaviour led many to perish in April 1945 – not believing the attack was directed at their town.[39] However, its proximity to Berlin meant bombs were dropped on Potsdam 50 times from June 1940.[40] Some 130 Potsdam citizens perished in air attacks, beginning on the night of 4-5 September 1940 when stray bombs meant for Berlin killed two Potsdam brewery workers.[41] Another 30 were killed when an American air mine landed on Babelsberg on 9 March 1944 and 21 were killed by an air mine in Baberowweg, Babelsberg early on 16 July 1944. Some twelve members of a *Flak* unit at Eiche barracks were killed on 17 August 1944, nine were killed by high explosive bombs at Bornstedt/Bornim on 26 August 1944, five Soviet Prisoners of War were killed by an air mine in Babelsberg on 13 September 1944 and an air mine killed ten in Potsdam West on 24 February 1945.[42]

Potsdam eventually felt Bomber Command's full force. Reconnaissance images taken on 9 April by a Spitfire XI, PL961 of No 542 Sqn flying from RAF Benson, were used in planning three days later. The target area was a square, with its corners marked by circles in pen, on an aerial image of the town.[43] The Potsdam operation was not designed as an area attack, being directed against rail facilities and barracks accommodating military and Nazi party personnel, but it was of similar magnitude.[44] Harris proposed the operation at the Air Commanders meeting at SHAEF (Supreme Headquarters Allied Expeditionary Force) on 12 April. SHAEF's deputy commander, Sir Arthur Tedder, was not convinced, anticipating repercussions with the Soviet High Command. He deferred the target clearing to CAS, Sir Charles Portal.[45] CAS was told by the Joint Intelligence Committee



HK795/TK.A of No 149 Sqn was one of the 500 Lancasters despatched to Potsdam on 14 April 1945; it delivered 1 × 4,000lb 'Cookie' and 7 × 500lb bombs. The bars on the fin indicate that it was equipped with Gee-H. (Lancaster-Archive.com)

(JIC) that the central control of the *Luftwaffe*'s operational headquarters and the *Luftwaffe*'s High Command had been evacuated to the Potsdam area and argued that the town was an important communications centre leading west from Berlin.[46] The *Luftwaffe* claims, also cited in Allied propaganda, proved inaccurate and despite claims to the contrary no bombs fell on the *Luftwaffe* command post at Potsdam Wildpark.[47] A daytime attack was initially proposed for 1630 hrs on 14 April, involving a smaller force of 255 No 1 Gp Lancasters [alongside 30 Lancasters and 8 Mosquitos of No 8 (Pathfinder) Gp], with the attack lasting eight minutes. The attack order was revoked.[48] The AHB narrative observed that 'lack of long-range fighter cover prevented a daylight attack.'[49]

The Potsdam operation mounted that evening involved 500 Lancasters and 12 Mosquitos of Nos 1, 3 and 8 Gps – 490 aircraft eventually attacked the town. It marked the first time four-engined Bomber Command aircraft had penetrated the Berlin defence zone since March 1944. Nevertheless, 'no undue trouble' was anticipated, since the route was across Allied-occupied Germany to within 60 miles of Potsdam. The town was to be attacked in two waves. Railway facilities and barracks were targeted. The domed *Nikolaikirche* (Church of St Nicholas), 640 metres (700 yards) north of the railway facilities, was the reference point. That same Saturday night, 24 Lancasters and four

Mosquitos were sent as a feint to attack naval installations and shipping at Cuxhaven on the North Sea and 72 Mosquitos were despatched to raid Berlin [62] and Wismar [10] on the Baltic. A further 104 aircraft were tasked with radar jamming and monitoring German night-fighter stations. Altogether, 716 aircraft were despatched that early evening from 25 airfields across eastern England.[50]

Bomber Command's night raid report stated that the two WINDOW diversions and the Cuxhaven attack hoodwinked many of the remaining German night fighters, with Hamburg apparently viewed as the likely target. Few night fighters were near the actual target. At Potsdam, one attack by, and six combats with, German night fighters were reported. Along the 30 miles south-west of Potsdam three combats occurred. Light *Flak* was reported at Potsdam and Cuxhaven, with active ground defences encountered at Magdeburg, Brandenburg, Wittenberg and Dessau. Losses were low. One Lancaster from No 138 Sqn was shot down by German fighters.[51] Six of the seven aircrew perished. Another Lancaster from No 35 Sqn experienced an engine fire close to the target. Six of the crew baled out, one being killed; four fell into German captivity and one evaded. The pilot, Fg Off V B Bowen-Morris, got the aircraft back into Dutch air space then baled out himself.[52] Less fortunate was Sgt Allan Sliman of No 75 (New Zealand) Sqn, flight engineer of a Lancaster hit by fatal fire from German fighters 20 miles south-west of Potsdam.

Central Potsdam suffered severe damage, including the railway traffic centre where the locomotive depot, goods station, passenger stations and the carriage and wagons shops were destroyed or heavily damaged. Military barracks suffered considerable damage. The plant and offices of the Arado works was also heavily damaged.[53] Just over 1,750 tons of bombs were dropped – 98% were high explosives, the remainder incendiaries. Some 16 × 8,000lb bombs and 383 × 4,000lb 'Cookies' were dropped. The raid lasted 34 minutes – from 22.42 to 23.16 hrs. Weather conditions were reportedly excellent, with no cloud and good visibility. The clear weather meant the town and lakes were easily identifiable. A continuous concentration of markers was maintained around the aiming point, which the Master Bomber, Wg Cdr H J F Le Good of No 35 Sqn, No 8 (Pathfinder) Gp, identified in the light of flares, and on which, under his instructions, a heavy and

An F24 image of Potsdam taken by Lancaster HK690 of No 90 Sqn at circa 2250hrs.
http://www.bomber-command.de/april.html

accurate attack was delivered.[54] The first flares fell at 22.39. He reported 'bombing was good at first, then fell back to west, then came forward again. Very big fires with smoke from 12-14,000 feet.'[55] Mosquitos returning from Berlin reported huge fires.[56] Potsdam was shrouded by a pall of smoke. Numerous heavy explosions were observed. The glow of fires was reportedly seen over 100 miles away on the return journey. German decoy markers did not attract bombing. However, there were numerous and accurate searchlights. Many aircraft were coned in their beams. Slight to moderate heavy *Flak* was reported but largely burst below the bombers.[57]

No 1 Gp's Operations Record Book (ORB) highlighted the numerous searchlights which had 'considerable success in coning our aircraft.' However, heavy *Flak* was 'meagre' and largely below the height of the Main Force. Even aircraft coned by searchlights were not heavily engaged. Some 206 aircraft from the Group bombed the target and again it was stated that night fighter activity was light.[58] From the Rhine onwards there was no cloud. In the target area conditions were excellent with good visibility. Marking commenced punctually [six minutes before H-hour] with red target indicators and illuminating flares. The early crews identified the built-up area and nearby lakes. The Master Bomber, who was heard by most crews, issued concise, helpful instructions throughout, advising crews to ignore the wide markers. He varied his instructions to bomb on whichever of the red or green markers visible seemed at the time most accurate.[59] Preliminary examination of photographs confirmed the raid's success.[60] Meanwhile, Squadron ORBs highlighted good visibility and plentiful, concentrated markers, leading to accurate, concentrated bombing and many fires.[61] For No 300 (Polish) Sqn the objective was 'to cause

Above, the East façade of the ruins of the Stadtschloss *– Potsdam's City Palace – in 1959; a year later it was demolished by the East Germans.* (pinterest.com) *Below, a rebuild was completed in 2013; this is the South façade of what is today home to the Brandenburg* Landtag. (A Savin)

maximum damage to the aiming point at Potsdam'.[62] Squadron accounts mentioned two favourable factors – good weather and minimal German opposition, repeating that despite numerous searchlights coning individual aircraft, *Flak* burst below the bombers and fighter opposition was light.[63]

Photographic Reconnaissance Unit (PRU) images taken on 16 April by a Spitfire XI, PM127 of No 542 Sqn, showed heavy high explosive damage throughout central Potsdam.[64] This confirmed that the railway traffic centre was severely damaged and the Arado works further east was also badly damaged.[65] Some fires were still burning west of the rail centre.[66] Around 13% of Potsdam's built-up target area was destroyed – 559 acres of the town was 40% or more built-up and 75 acres were destroyed.[67] The Air Ministry Intelligence Summary later stated that the 'military stronghold of Potsdam' constituted an army target, using the PRU's 16 April photographs which showed severe damage to the railway centre, where the semi-roundhouse of the locomotive depot was gutted and all important installations damaged, most severely. Industrial facilities in the south-east and east of the town were gutted or heavily damaged. Between the railway centre and Charlottenstrasse, towards the north of the town centre, there were 'several areas of devastation', where most buildings were destroyed or gutted, including the post office, town hall, police barracks, city palace and two small military barracks areas. In Nowawes, east of the Nuthe river, the gas works was severely damaged and a large industrial premises on the town's eastern outskirts was affected.[68]

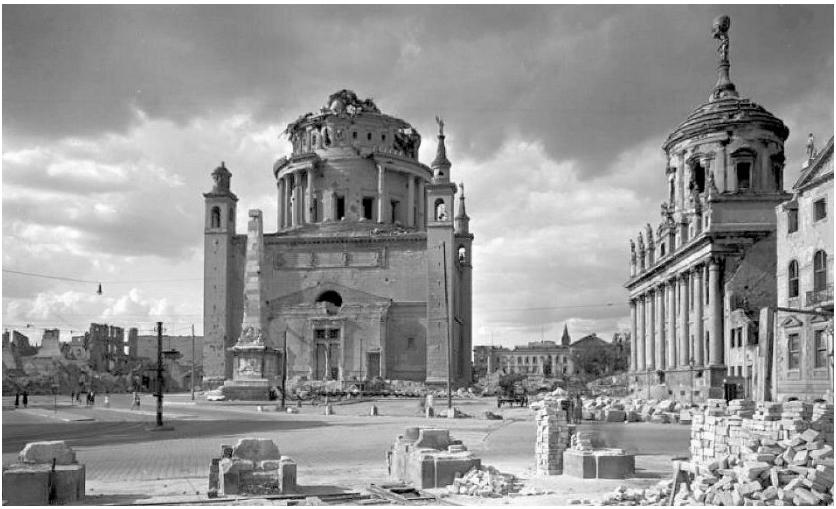
Brief British press reports claimed Nazi military and political departments had recently moved from Berlin to Potsdam. This explained the attack.[69] A Swedish newspaper's Berlin correspondent reported the raid had 'almost eliminated the town.'[70] Even the records perished. The *Reichsarchiv* was in the former military school on the Brauhausberg in the Teltower Vorstadt. Some valuable files had been moved away from August 1943. When the bombs fell on 14 April, the archival warehouse was destroyed and the tower and one wing damaged. Over half of the Army's archive was lost.[71]

There is limited documentation telling what happened on the ground and how the German authorities coped during the fortnight before Soviet occupation. Potsdam's sirens had howled over 130 times since January 1945[72] and they did so again at 22.15 on this spring Saturday evening, when the bombers reached the Hannover/Brunswick area. The first bombs fell 25 minutes later. The Germans first plotted the raid in the Brunswick area but paid as much attention to two WINDOW feints – north-east to Neuruppin, and south-east to Juterbog, as to the main force. The only German fighter group to react was given plots on the

northern WINDOW feint as well as being directed to a point on the approach route to Potsdam.[73] German sources stated that the 22 operational night fighters failed to destroy any enemy aircraft.[74] The town's loudspeaker system proclaimed, 'Major Attack on Potsdam.'[75] German accounts note that in addition to those killed, almost 1,000 town centre buildings were destroyed, and claimed 60,000 residents were rendered homeless, nearly half the population.[76] The railway yards were engulfed by fire. An ammunition train exploded in the main railway station at 2257, killing numerous wounded soldiers on a hospital train at an adjacent platform.[77] Historic civic buildings fell victim to explosion and flames.[78]

The *Wehrmacht* report for 15 April stated: 'Potsdam, the historical royal capital of Frederick the Great, was the target of a nightly British terror attack. A considerable part of the Old Town with its many buildings, including the Garrison Church, was destroyed. Casualties were considerable.'[79] The *Luftwaffe* report on the morning of 15 April stated that 200 aircraft had attacked, with serious damage to buildings in the town centre and Babelsberg and numerous large fires. Around 500 deaths were mentioned, with numerous wounded and still more buried under rubble. While many famed historical buildings had been hit, the Sanssouci palaces were not. The report highlighted damage to the railway with the *Reichsbahnausbesserungswerke* badly damaged and the station temporarily out of operation.[80] Other German military reports mentioned around 250 British four-engine bombers had attacked transport targets and the 'city area of Potsdam' with 'considerable effect.'[81]

Eye-witness accounts conveyed the terror when it was realised that Potsdam was the bomber fleet's target. In barely 35 minutes Potsdam was transformed into Pompeii according to one witness. The tower of the Garrison Church was ablaze, resembling a burning torch. During the following days fires still burned in the town centre and they were still smouldering weeks later. Some bodies were only dug out of the rubble in the summer. Fear of a second raid led many to spend the next evening in nearby villages, the woods, or the Sanssouci Park.[82] In Babelsberg citizens emerged when it became quieter. No 'all clear' was sounded because the air raid alarm system had been destroyed.[83] The following day everything seemed either damaged or closed. One witness took consolation in that it was not as bad as Dresden and he had



Above, the ruins of the St Nikolaikirche *and. on the right. the* Altes Rathaus (Max Baur; Bundesarchiv Bild 170-370) *and, below, after post-war restoration.*

not seen any corpses, but he lamented the loss of the town's 18th century Frederician Rococo architecture.[84]

From 15 April, the National Socialist Women's League provided emergency accommodation and soup kitchens for the bombed out. On

16 April, the Party authorities began to issue the bombed out with ration cards. The editorial offices and printing works of the *Potsdamer Tageszeitung* had both been bombed. Much slimmer emergency editions were produced between 17 and 20 April. On 18 April, its appeal to Potsdamers emphasised that Potsdam had suffered the same gruesome fate that so many German towns had endured. The extent of the destruction made necessary the most effective assistance measures. Clearing the streets was prioritised to get the town functioning again with communal accommodation and rationing arrangements outlined, local Party groups checking eligibility.[85] After the raid there were no more trams and no buses.[86] Ominously, the handing over of four foreigners to the *Kripo* (criminal police) for plundering was mentioned in a report on 16 April.[87]

The Nazi authorities were responsible for relief measures for only a short period. As panic spread, Soviet troops advanced towards the south-east suburbs on 21 April. The streets were now full of wounded and clogged by munitions and supply trucks, indicating the front's proximity. Looting was reported. The Red Army entered the town from 23 April, freeing thousands of POWs, and slave labourers in Babelsberg. Following heavy fighting, including artillery barrages and attacks by low-flying Soviet aircraft, the Red Army had control of the town by 27-28 April.[88] Over 1,200 German soldiers and civilians were killed in the fighting.[89] Some 21% of buildings in Potsdam's 10 districts were destroyed at the war's end, 56% in the three old town districts. Perhaps 40-50% of this damage was caused by the fighting of 24-30 April[90] – broadly vindicating the RAF's assessment that the bombing destroyed 13% of the built-up area.

Post-war images of Potsdam's destruction often made no detailed distinction as to its cause. Significantly, the local historian Hans-Werner Mihan asserted that the *Nikolaikirche*, the old town hall and the city palace had suffered further damage from Red Army artillery. The condition of the symbolic city palace and Garrison Church later provided a pretext for the East Germans to demolish both ideologically inconvenient structures.[91] In contrast to Friedrich, Mihan insisted that crippling Potsdam as a railway hub for west-east German troop transports was the raid's objective.[92]

In a terse minute, a frustrated Churchill asked the Secretary of State for Air, Sir Archibald Sinclair, and Portal, 'What was the point of going

and blowing down Potsdam?'[93] Portal argued the Joint Planning Staff and Joint Intelligence Committee (JIC) underlined Potsdam's importance in 'any attack on the German Government machine.' Portal repeated that the JIC had asserted that the central control of the *Luftwaffe*'s operational headquarters and the *Luftwaffe* High Command had been evacuated to the Potsdam area. The operation's objective had been the 'destruction of such control centres' as well as communications heading west from Berlin via Potsdam and the barracks which accommodated military and Nazi personnel. Moreover, the operation had been discussed and agreed at SHAEF on 12 April. Portal also advised that in accordance with the Prime Minister's decision, on the reconsideration of the Chiefs of Staff, instructions had already been given to Bomber Command to discontinue area bombing designed solely with the objective of destroying industrial areas and signalled an Order of the Day on 16 April for circulation in Bomber Command and to share with the press. For the first time since February 1942, the directive contained no mention of industrial areas or enemy morale as dedicated objectives. However, the Potsdam operation was 'calculated to hasten the disintegration of enemy morale.'[94] In any event, it was too late for Potsdam. Following Soviet occupation, Potsdam remained behind the Iron Curtain for 45 years.

In conclusion, with victory on the horizon, Bomber Command operations posed awkward questions. Post-Dresden, Churchill's faith in strategic bombing and striking at German morale was shaken. It had fluctuated before but was now decidedly negative, perhaps with one eye on his political legacy. For Bomber Command, attacking German morale was now ostensibly off limits. Assisting the advancing Allied armies was paramount but could result in similar results to strategic bombing, with heavy civilian casualties. That was broadly the case with Potsdam. Precision in 1945, from 20,000 feet, was of a different order compared to today, with Mihan mentioning the *Rückwärtbewegung* or *Rukkriech Effekt* (creep back effect) and wind aspect when bombing, as factors in the damage to historic town centre buildings.[95] The palaces in the surrounding parks survived, enabling the Potsdam Conference of the victorious Allied powers to take place at the Cecilienhof Palace in July-August 1945. The difference between strategic and tactical bombing was hazy. This contribution argues, difficult as it seems 75 years later, that the operation had some military justification.

Even in April 1945 there were targets in Potsdam whose incapacitation assisted the advancing Allied armies. First, the railway system, secondly the numerous barracks and thirdly, governmental and administrative structures evacuated from Berlin to Brandenburg. With the aiming point being the town centre, targeting specifically the Guards barracks and the railway infrastructure, this was not technically an area attack, but it resembled one.[96] Moreover, the RAF was not alone in raiding the Reich late in the war. American attacks in April 1945 are often forgotten or obscured. One leading air historian reminds us, 'American bombing of the shrinking German area reached a climax.'[97] Concurrently, USAAF attacks on Japan peaked with the Tokyo firestorm raid of 9 March. Historic Potsdam was devastated in April 1945. It suffered a similar fate to so many other German cities, reaping the whirlwind of a war which only Germany's leadership sought. For Bomber Command, the efficient and effective implementation of the Potsdam operation, marked the end of an era.

Notes.

1 I am most grateful to my Air Historical Branch (RAF) colleague Stuart Hadaway for his valuable comments on this draft.

2 The National Archives, Kew (TNA), AIR 41/56, *The RAF in the Bombing Offensive Against Germany Volume VI – Final Phase March 1944-May 1945*, https://www.raf.mod.uk/our-organisation/units/air-historical-branch/second-world-war-campaign-narratives/raf-in-the-bombing-offensive-against-germany-vol-vi-the-final-phase-march-1944-may-1945/ pp226-227.

3 A mass night raid on Leipzig was planned for 15-16 April 1945. It was cancelled at 1325 hrs on 15 April. Air Historical Branch (AHB), No 1 Group, Royal Air Force, Operations Record Book, pp6-7. American forces entered Leipzig on 18 April.

4 In February 1945 there were 14 Mosquito raids on Berlin, 29 in March and in April there were 15 – none after the evening of 20 April as Soviet forces entered the city's suburbs. TNA, AIR 41/56, *The RAF in the Bombing Offensive Against Germany Volume VI – Final Phase March 1944-May 1945*, https://www.raf.mod.uk/our-organisation/units/air-historical-branch/second-world-war-campaign-narratives/raf-in-the-bombing-offensive-against-germany-vol-vi-the-final-phase-march-1944-may-1945/ p227.

5 See von Benda-Beckmann, Bastian Robert, '"*Imperialist Air War" East German historiography and the work of Olaf Groehler, 1965-1995'*, University of Amsterdam Digital Academic Repository 145206_09.pdf (uva.nl) accessed 23 September 2020. According to Groehler, the leading East German historian, German, British and American bombing strategies were grounded in an 'imperialist air war doctrine'. This was different 'fundamentally' from 'socialist' strategy because it accepted the use of terror against civilians as a legitimate method of warfare. See Groehler, Olaf,

Bombenkrieg gegen Deutschland (Akademie Verlag, Berlin, 1990); Groehler, Olaf, 'The Strategic Air War and its Impact on the German Civilian Population', in Boog, Horst ed., *The Conduct of the Air War in the Second World War: An International Comparison* (Berg, Oxford, 1992), pp279-297.

[6] Friedrich, Jörg, *Der Brand: Deutschland im Bombenkrieg 1940-1945* (List Verlag, Berlin, 2004), p 524. Friedrich claimed, 'Terrible crimes were committed but no one could talk about them.' This line of argument was said to have shattered a half-century long taboo in Germany, claiming RAF bombing was geared to terrorising civilians, an issue worthy of being weighed against the German-inflicted horrors of the concentration camps. Boyes, Roger, 'British "set out to terrorise civilians"', *The Times*, 19 November 2002, 'Friedrich followed up *Der Brand* with *Brandstätten* (Fire Sites), published in 2003 and showing photographs of the corpses of German civilians killed by Allied bombing. See also: *'Kriegsverbrechen!? Der 14. April 1945 in Potsdam'*, https://potsdam.presseclubpotsdam.com/?p=1031#Anmerkungen accessed 28 July 2020. Ironically, the attack came exactly 200 years after the foundation stone was laid for Schloss Sanssouci, the best-known Potsdam palace of Frederick II.

[7] https://potsdam.presseclubpotsdam.com/?p=1031#Anmerkungen accessed 11 March 2022. Potsdam Geschichten und Geschichte – '*Potsdam Möglichkeiten und Grenzen: Kriegsverbrechen! Der 14. April 1945 in Potsdam'*, 21 January 2020.

[8] https://www.potsdam-museum.de/artikel/die-nacht-von-potsdam accessed 28 July 2020; Mihan, Hans-Werner, *Die Nacht von Potsdam* (Kurt Vowinckel-Verlag AG, Berg am Starnberger See, 1997)' pp118-119. In the early years after 1945 it was thought 3,000-5,000 had died. In 1966, local sources mentioned 3,578 deaths. Mihan later mentioned another 200 buried or missing who were never found which, added to the 1993 figure of 1,593, gave a total death toll of around 1,800. Some 82 were members of the military, police, fire services, air raid police and Labour Service. There were 28 foreigners killed.

[9] Mihan, *Die Nacht von Potsdam*. Mihan died in September 2018, aged 91.

[10] Kramer, Henri, 'Blindgänger in der Potsdamer Innenstadt gefunden', *Potsdamer Neueste Nachrichten (PNN)*, 24 June 2020; Müller, Christian; Haase, Jana; Kramer, Henri; Barsig, Valerie; Kistler, Florian, 'Update Blindgänger in Potsdam', *PNN*, 24 June 2020; Menschner, Michaela; Meischen, Dennis, 'Blindgänger in Havel: Potsdamer Bombe erfolgreich gesprengt', *Berliner Morgenpost*, 26 June 2020; '26.06 Potsdam Museum bleibt geschlossen!', Potsdam Museum. 26.06. Potsdam Museum bleibt geschlossen ! Weltkriegsbombe in der Havel nahe Freundschaftsinsel wird entschärft | Potsdam Museum (potsdam-museum.de) accessed 11 March 2022.

[11] For instance, on 15 July 2020, the 204th unexploded bomb, an American 500 pounder, was made safe. It was found in the Arado Lake in the Teltower suburb. Some 7,500 residents were evacuated on this occasion. '204. Blindgänger seit der Wende: Wieder Bombenfund in Potsdam – Entschärfung für Mittwoch geplant', *Berliner Zeitung*, 10 July 2020; Schmid, Eva, Blindgänger in Potsdam: Alle Informationen zur Bombensprengung am Mittwoch in Potsdam', *PNN*, 14 July 2020; Kluge, Christoph; von Cölln, Hajo, 'Keine größeren Schäden nach Bombensprengung', *PNN*, 15 July 2020.

[12] More immediately for the Nazi hierarchy, on 12 April, the Red Army occupied Vienna.

[13] For instance, German resistance in *Festung* (Fortress) Breslau, the capital of Silesia, lasted 78 days, for most of the time encircled by the Red Army, until its surrender on 6 May 1945.

[14] 'Wann Fliegeralarm?' *Potsdamer Tageszeitung*, 14 April 1945.

[15] Westermann, Edward B, *Flak: German Anti-aircraft Defenses 1914-1945* (University Press of Kansas, Lawrence, Kansas, 2001), pp279-280.

[16] Gaslasco, Marc, 'An Iron Roof', *Iron Cross*, Issue 9, September 2021, pp6-17.

[17] Neitzel, Sönke, 'The City under Attack', in Addison, Paul, and Crang, Jeremy A., *Firestorm: The Bombing of Dresden* (Pimlico, London, 2006), p66.

[18] Saward, Dudley, *'Bomber' Harris: The Authorised Biography* (Sphere Books, London, 1990 edition), p388.

[19] The fish codewords originated from Air Marshal Sir Robert Saundby who was a keen fly fisherman. Saundby was Senior Air Staff Officer (SASO) at Bomber Command from 1940 and from February 1943 Deputy Air Officer Commanding-in-Chief, Bomber Command. He produced a list of 94 German towns as targets for Air Chief Marshal Sir Arthur Harris with each given a 'Fish code' codenames. Berlin was WHITEBAIT; Hamburg was DACE and Potsdam was CRAYFISH.

[20] TNA, AIR 41/56, The RAF in the Bombing Offensive Against Germany Volume 6 – Final Phase March 1944-May 1945, p201. The other six cities selected by the CSTC were Chemnitz, Halle, Plauen, Dessau, Erfurt and Magdeburg. A revised list of 17 industrial area targets was also issued; they were selected due to their association with the current priority target systems. In order of priority, they were as follows: Kassel, Nuremburg, Hanover, Zwickau, Hildesheim, Flensburg, Munich, Mannheim, Gera, Wurzburg, Weimar, Jena, Hanau, Bielefeld, Pforzheim, Worms and Ludwigshafen. See also Mihan, *Die Nacht von Potsdam*, p30; Baller, Kurt and Reinholz, Marlies, *Potsdam im Zweiten Weltkrieg. Eine Chronik* (docupoint Verlag, Magdeburg, 2010), p352. Potsdam was described as a training centre of the first significance. The only industry worth mentioning was the Nitro-Cellulose factory.

[21] For recent correspondence concerning prioritising bombing oil see TNA, CAB 120/301, Prime Minister to Chief of the Air Staff, 28 January 1945; CAS to Prime Minister, 28 January 1945.

[22] Probert, Air Commodore Henry, *Bomber Harris: His Life and Times* (Greenhill Books, London, 2001), p321; Saward, '*Bomber' Harris*, p382.

[23] Probert, *Bomber Harris*, p322; Saward, '*Bomber' Harris*, pp384-387.

[24] TNA, CAB 120/30, Prime Minister to General Ismay and CAS, 1 April 1945; Saward, '*Bomber' Harris*, pp387-388. Churchill thought controlling an 'entirely ruined land' would mean a major shortage of accommodation for Britain and its Allies. It would be impossible to get housing materials out of Germany for British needs as temporary provision would need to be made for the Germans themselves.

[25] On 4 April, Portal informed the Chiefs that attacks on industrial districts for the sake of destruction should now cease. Overy, Richard, *The Bombing War: Europe 1939-1945* (Penguin Books, London, 2014), p397. See Saward, '*Bomber' Harris*, p391. The Air Staff note submitted by Portal to the War Cabinet Chiefs of Staff Committee on 4 April concluded: '(a) Area bombing designed solely with the object of destroying or disorganising industrial areas should be discontinued; (b) There should be no alteration to the current bombing directive such as would exclude area bombing;

(c) Area targets may prove necessary against those targets, the destruction of which is calculated best to assist the advance of the Allied Armies into Germany or to have the most immediate effect upon the enemy's ability to continue armed resistance; (d) Any ultimate political or economic disadvantages of area bombing necessitated by these operations should be accepted.'

[26] Saunders, Hilary St George, *Royal Air Force 1939-1945: Volume 3 The Fight is Won* (Her Majesty's Stationery Office, London, 1975), pp271, 276.

[27] AHB, *The RAF in the Bombing Offensive Against Germany, Volume VI, The Final Phase March 1944-May 1945,* p237. https://www.raf.mod.uk/our-organisation/units/air-historical-branch/second-world-war-campaign-narratives/raf-in-the-bombing-offensive-against-germany-vol-vi-the-final-phase-march-1944-may-1945/

[28] AHB, Enemy Branch (Foreign Office & Ministry of Economic Warfare), The Bomber's Baedeker Part II, p554. See also TNA, AIR 14/2663.

[29] Clark, Christopher, *Iron Kingdom: The Decline and Downfall of Prussia, 1600-1947* (Penguin Books edition, London, 2007), pp655-657. Following the *Reichstag* fire on 27 February 1933 and the national elections of 5 March, the 'Day of Potsdam' was celebrated in the Garrison Church on 21 March, marking the opening of an alternative *Reichstag* facility in the Kroll Opera House. At the ceremony President Hindenburg and Chancellor Hitler stood together.

[30] Bomber's Baedeker Part II, p554; AHB, Ministry of Economic Warfare Enemy Branch, The Bomber's Baedeker (Guide to the Economic Importance of German Towns and Cities Part III - Survey of Economic Keypoints in German Towns and Cities (Population 15,000 and over), p218. See also TNA, FO 837/1315. The *Reichsbahnausbesserungswerke* in the Teltower Vorstadt was east of the present main railway station. On *Flak* defences on the Arado works' roof see Baller and Reinholz, *Potsdam im Zweiten Weltkrieg.* p297. Sharp-edged anti-aircraft ordnance splinters were found nearby after raids on Berlin.

[31] Groehler, 'Strategic Air War's Impact on German Civilians', p287.

[32] Baller and Reinholz, *Potsdam im Zweiten Weltkrieg*, pp295, 298-299. The most recent *Gauluftschutzwoche* (air raid protection week) had taken place from 12 to 18 June 1944; Mihan, *Die Nacht von Potsdam*, p94. Following the building of bunkers in 1944, in February 1945 further construction was prohibited. The high-water level, particularly close to the River Havel meant most shallow cellars did not provide sufficient protection.

[33] Emil Stürtz was *Gauleiter* of Brandenburg from 1936. Stürtz's *Gau* was much diminished following the Red Army's capture of districts east of the Oder in late January 1945. As Reich Defence Commissioner for Brandenburg, he was responsible for preparing defences between the Oder front and Berlin in early 1945. Stürtz was captured by the Soviets in 1945. His fate remains uncertain, although it is thought he died in captivity.

[34] Ziemke, Earl F., *Battle for Berlin: End of the Third Reich – Purnell's History of the Second World War battle book, No 6* (Macdonald & Co, London, 1969), pp38-39.

[35] Mihan, *Die Nacht von Potsdam*, p96.

[36] Baller and Reinholz, *Potsdam im Zweiten Weltkrieg,* p356.

[37] *Ibid*., pp361-363. The Glienicker Bridge was blown up by German forces on 30

April. The Long Bridge in the town centre had been dynamited by the Germans on 24 April.

[38] AHB, Air Ministry War Room, Air Staff Operational Summary No 1309, 22 June 1944; Karutz, Hans Rüdiger and Fröhlich, Alexander, '*Die Nacht von Potsdam Codename* "*Crayfish*"', *PNN*, 13 April 2020; '*Die Nacht von Potsdam', Märkische Allgemeine Zeitung*, 24 June 2020, https://www.maz-online.de/Lokales/Potsdam/Bombenentschaerfungen-in-Potsdam/Die-Nacht-von-Potsdam/Potsdam-Timeline-der-Bombardierung-am-14.04.1945

[39] Middlebrook, Martin, and Everitt, Chris, *The Bomber Command War Diaries: An Operational Reference Book 1939-1945* (Viking, Harmondsworth, Middlesex, 1985), p696. This account stated: 'No information is obtainable from Potsdam (now in Eastern Germany) but a figure of 5,000 dead has been mentioned. This high figure, if true, was caused by the fact that the people of this community had seen Berlin and not themselves bombed so often that they failed to take proper cover when the sirens sounded.' Taylor, Frederick, *Dresden: Tuesday 13 February 1945* (Bloomsbury paperback, London, 2005), p435 cited similar numbers but stated they were 'probably not all civilians' and assessed that so many alarms in neighbouring Berlin led to complacency in Potsdam which 'failed to take proper precautions.' This had been a recurring phenomenon in wartime Potsdam. One witness reported seeing a red haze over Berlin on 24 August 1943, after the previous evening's heavy raid; See Vassiltchikov, Marie 'Missie', *The Berlin Diaries 1940-1945* (Pimlico edition, London, 1999), p89, 24 August 1943; p91, 4 September 1943.

[40] Karutz and Fröhlich, 'Die Nacht von Potsdam', The first bombs fell on Potsdam on 21-22 June 1940. See also Vassiltchikov, *The Berlin Diaries*, p130, 2 January 1944; p135, 14 January 1944. 'Missie' dodged falling bombs on two occasions in Potsdam during January 1944.

[41] Mihan, *Die Nacht von Potsdam*, p12; Baller and Reinholz, *Potsdam im Zweiten Weltkrieg*, p79. Either two or three were killed on night of 4-5 September 1940. Two deaths were registered but three fatalities were reported from the Berliner Kindl Brewery [Potsdam] fire watch.

[42] Mihan, *Die Nacht von Potsdam*, pp9-26.; Baller and Reinholz, *Potsdam im Zweiten Weltkrieg*. pp282, 300, 304, 315, 316, 320, 355.

[43] Mihan, *Die Nacht von Potsdam*, p31.

[44] TNA, AIR 41/56, *The RAF in the Bombing Offensive Against Germany Volume VI - Final Phase March 1944-May 1945*, https://www.raf.mod.uk/our-organisation/units/air-historical-branch/second-world-war-campaign-narratives/raf-in-the-bombing-offensive-against-germany-vol-vi-the-final-phase-march-1944-may-1945/ accessed 10 March 2022 p226.

[45] *Ibid*.

[46] *Ibid*., pp226-227.

[47] Mihan, *Die Nacht von Potsdam*, p.117.

[48] *Ibid*., p32.

[49] TNA, AIR 41/56, *The RAF in the Bombing Offensive Against Germany Volume VI – Final Phase March 1944-May 1945*, https://www.raf.mod.uk/our-organisation/units/air-historical-branch/second-world-

war-campaign-narratives/raf-in-the-bombing-offensive-against-germany-vol-vi-the-final-phase-march-1944-may-1945/ p226.

[50] AHB, Bomber Command ORB, January-May 1945, p2623, 14/15th April Night; AHB, Air Ministry War Room, Air Staff Operational Summary No 1607, 16 April 1945; Middlebrook and Everitt, *Bomber Command War Diaries*, pp695-696.

[51] AHB, Night Raid Report No 892, Bomber Command Report of Night Operations, 14-15 April 1945.

[52] TNA, AIR 27/382, No 35 Sqn, Operations Record Book, 14 April 1945; Chorley, W R, *Royal Air Force Bomber Command Losses of the Second World War Volume 6 Aircraft and Crew Losses 1945* (Midland Publishing second impression, Hinckley, 2004), p163.

[53] AHB, Night Raid Report No 892, Bomber Command Report on Night Operations, 14-15 April 1945.

[54] AHB, Air Ministry War Room, Air Staff Operational Summary, April and May 1945, Volume 31, ASO Summary No 1607, 16 April 1945. Some 35 tons of marker bombs and flares were dropped. In total, 1,751.9 tons of bombs were dropped – 1,717.1 tons of high explosives and 34.8 tons of incendiaries. Master Bomber Wg Cdr [later Gp Capt] Hugh James Felce Le Good was flying Lancaster PB676 from Graveley, south of Huntingdon. On the previous day, 13 April 1945, Le Good was awarded the DFC for his services with No 635 Sqn. He was awarded the AFC in 1942 and the DSO in October 1945.

[55] TNA, AIR 27/382, No 35 Sqn.

[56] AHB, Bomber Command Intelligence Narrative of Operations No 1057, 15 April 1945.

[57] AHB, Air Ministry War Room, Air Staff Operational Summary, April and May 1945, Volume 31, ASO Summary No 1607, 16 April 1945.

[58] TNA, AIR 25/17 No 1 Group Summary of Operations Night 14/15th April 1945 Target – Potsdam. Three out of five combats experienced by No 1 Gp aircraft were in the target area.

[59] AHB, No 1 Bomber Group, Operations Record Book, Night 14th/15th April. Karutz and Fröhlich, '*Die Nacht von Potsdam'*.

[60] AHB, No 1 Bomber Group, Operations Record Book, Night 14th/15th April. During the later stages, the heavy pall of smoke rising began to obscure the markers, of which a plentiful supply was maintained throughout the raid.

[61] TNA, AIR 27/2143, No 625 Sqn. Squadron ORBs substantiated the raid's success and pointed to poor weather leaving England but cloudless conditions over Potsdam.

[62] TNA, AIR 27/1658, No 300 (Polish) Sqn.

[63] No 626 Sqn thought the raid successful and commented on, 'an abundance of searchlights – clueless – *Flak* was heavy but bursting beneath the aircraft. Fighters nil. Route and outgoing weather very poor. However, tactics were of the best.' TNA, AIR 27/2145, No 626 Sqn. No 103 Sqn reported all its aircraft took off in poor weather, but over the target area was 'perfectly clear'. German defences 'were not very active' with some inaccurate heavy *Flak* and some fighter and searchlight activity, but no squadron aircraft was hit. AIR 27/817, No 103 Sqn. No 150 Sqn thought it a 'very good attack' and commented on numerous searchlights *en route* and around Potsdam although they 'appeared ineffective'. Heavy *Flak* was slight to moderate, and no German fighters

were seen. AIR 27/1013, No 150 Sqn. No 12 Sqn viewed *Flak* at the target as 'practically nil'. One crew reported searchlights were active and they were coned for about three minutes on the bombing run, but no fighters were seen. The weather was good over the target permitting visual identification but, on the way, there was haze and some cloud. AIR 27/169. No 12 Sqn. No 460 Sqn RAAF reported clear visibility over Potsdam. The weather over England on the way out was bad. The bombing 'looked accurate' and the glow was visible for about 150 miles on the course home. *Flak* over the target and fighter opposition was 'negligible'. AIR 27/1910, No 460 Sqn RAAF.

[64] TNA, AIR 27/2017, p224, No 542 Sqn ORB, 16 April 1945.

[65] AHB, Bomber Command Intelligence Report No 4684, 17 April 1945. It was reported the locomotive depot, goods station, passenger station, foundry, machine shop, carriage wagon shops and power plant were either destroyed or damaged. In addition, the Nowawes motor transport depot south-east of the railway centre suffered damage while fires continued to burn west of the rail centre.

[66] AHB, Bomber Command Intelligence Report No 4684, 17 April 1945.

[67] AHB, Bomber Command Review 1945, p55, Graph No 11, 'Progress of the Bomber Offensive Against German Industrial Towns Schedule, By Towns, Of Attacks and Devastation Resulting'. Details for Potsdam were shown in this table. The review mentioned a host of raids on industrial cities, communications centres, synthetic oil refineries, naval targets and operations supporting the Allied advance into Germany, but the Potsdam operation was not specifically cited.

[68] AHB, Air Intelligence Weekly Intelligence Summary Number 294, 21 April 1945; Air Intelligence Weekly Intelligence Summary Number 295, 28 April 1945. TNA, AIR 24/317, Potsdam provisional report, 17 April 1945; Potsdam report, 6 May 1945.

[69] 'Glider Troops Capture Von Papen in Ruhr – Potsdam Heavily Bombed', *Observer*, 15 April 1945; 'Concentrated Bombing of Potsdam', *The Times*, 16 April 1945; 'Bombers attack Potsdam', *Guardian*, 16 April 1945.

[70] 'Stop-Press News', *Guardian*, 16 April 1945. The Stockholm newspaper was *Dagens Nyheter*.

[71] The building later housed the Brandenburg Landtag. Geschichte des ehemaligen Landtagsgebäudes auf dem Brauhausberg – Landtag Brandenburg https://www.landtag.brandenburg.de/de/geschichte_des_ehemaligen_landtagsgebaeudes_auf_dem_brauhausberg/bb1.c.488749.de accessed 15 December 2021; Friedrich observed: 'The Army Archives in Potsdam died along with the German Army in April 1945', Friedrich, *Der Brand*, p533.

[72] 'Die Nacht von Potsdam', *Märkische Allgemeine Zeitung*.

[73] AHB, Bomber Command Intelligence Report No 4682, 15 April 1945.

[74] AHB, German Land and Air Situation Reports, 15 April 1945.

[75] Mihan, *Die Nacht von Potsdam*, p74.

[76] Potsdam Museum, 'Die Nacht Von Potsdam', https://www.potsdam-museum.de/artikel/die-nacht-von-potsdam accessed 14 March 2022.

[77] Mihan, *Die Nacht von Potsdam*, pp66-67; Karutz and Fröhlich,' Die Nacht von Potsdam'.

[78] Kellerhoff, Sven Felix, 'Warum die letzte Großangriff der Royal Air Force Potsdam traf', *Die Welt*, 14 April 2020 stated that only 3% of the buildings in the town centre and Berliner suburb were lightly damaged or undamaged.

[79] Baller and Reinholz, *Potsdam im Zweiten Weltkrieg*, p372.
[80] Mihan, *Die Nacht von Potsdam*, pp100-101.
[81] AHB, German Land and Air Situation Reports, 15 April 1945.
[82] Baller and Reinholz, *Potsdam im Zweiten Weltkrieg*, pp374-377; Mihan, *Die Nacht von Potsdam*, pp79, 84. Comparisons were made with Dresden when the bombers had returned.
[83] Mihan, *Die Nacht von Potsdam*, p77.
[84] Baller and Reinholz, *Potsdam im Zweiten Weltkrieg*, p377.
[85] *Ibid*, pp377-382.
[86] Mihan, *Die Nacht von Potsdam*, p77.
[87] *Ibid*., p115.
[88] Baller and Reinholz, *Potsdam im Zweiten Weltkrieg*, pp381-388.
[89] Mihan, *Die Nacht von Potsdam*, p119. Mihan suggested the figures for bombing deaths and those killed in the fighting in late April could have been combined to produce the death toll of 3,578 quoted in the Potsdam statistical yearbook of 1966.
[90] *Ibid*., p.122.
[91] *Ibid*., pp75, 81, 10, 122-123. Buchvorstellung, Potsdam Museum, 1 December 2016. The largely intact palace ruins were blown up on the direct order of the East German Politburo in 1960 as a symbol of Prussian history. The rebuilt palace is now the seat of the Brandenburg Landtag. Thomsen, Nele and Winkel, Carmen eds., *Potsdamer Ge(h)schichte: Eine Stadt und ihr Militär* (edition q, Berlin, 2005), pp34-40. Much of the tower of the Garrison Church remained – fire had spread from sparks from adjoining buildings in the Lange Stall – the nave was burnt out; the top of the steeple was lost. The Garrison Church suffered a similar fate to the palace on similar grounds in 1968. See also 'Die Nacht von Potsdam', *Märkische Allgemeine Zeitung* notes that the palaces and buildings in the parks surrounding the town [Sanssouci, Babelsberg and Cecilienhof] avoided bomb damage. The Garrison Church, the *Lange Stall* and the *Alten Markt* were badly damaged, but the *Nikolaikirche* was relatively undamaged.
[92] Karutz and Fröhlich, '*Die Nacht von Potsdam'*; Salzmann, Dieter and Weirauch, Dieter, '*Kriegsentscheidend? Warum Bomben auf Potsdam fielen*?' *Die Welt*, 7 April 2003. Friedrich and Mihan had differing perspectives on the Potsdam raid and debated them on the anniversary of the attack on 14 April 2003.
[93] TNA, CAB 120/301, Prime Minister's Personal Minute No 362/5, Prime Minister to Secretary of State for Air, CAS, 19 April 1945.
[94] TNA, CAB 120/301, CAS to Prime Minister, 20 April 1945. Wheeler, Sir Charles and Frankland, Noble, *The Strategic Air Offensive Against Germany 1939-1945, Volume IV Annexes and Appendices*, pp183-184, 16 April 1945, Directive No 4 for Strategic Air Forces in Europe. At the outset, under General Mission, it said, 'The main mission of the Strategic Air Forces is to give direct assistance to the land campaign. Operations in support of the Russian armies will be made only when specifically requested by the Russian High Command.' There were three objectives – oil supplies, German lines of communication and missions specifically requested by the Supreme Commanders. See Overy, *The Bombing War*, pp396-397. In his memoirs Harris recalled, 'When the allies had crossed the Rhine and struck deep into Germany, we were ordered to stop all strategic bombing, since the end was obviously at hand, but we

continued to attack by day and night such centres of organised resistance, together with road and railway communications, as still confronted the advancing armies.' Harris, MRAF Sir Arthur, *Bomber Offensive* (Pen & Sword Military Classics, Barnsley, 2005), p255. On security grounds, the potential sharing of Bomber Command's intentions to the Germans and the endangering of his bomber crews if the Germans concentrated air defences in areas where tactical attacks were considered likely, led Harris to restrict Portal's message to within Bomber Command. Probert, *Bomber Harris*, p325; Taylor, *Dresden*, pp434-435.

95 Mihan, *Die Nacht von Potsdam*, p63.

96 Taylor, *Dresden*, p435. Karutz and Fröhlich,' Die Nacht von Potsdam'.

97 Overy, *The Bombing War*, p397; Taylor, *Dresden*, p435. From 5 April 1945, the American air forces defined all objectives as tactical. A similar raid was mounted on transportation connections in Dresden by nearly 600 aircraft of the US Eighth Air Force which dropped around 1,500 tons of bombs three evenings later, on 17 April. The last raid by the 8th Air Force was on the Skoda works at Pilsen on 25 April and the final attack by the 15th Air Force was on Klagenfurt on 26 April. Indeed, for the Americans 'marshalling yards' served as a euphemism for city areas. See Cox, Sebastian, 'Autumn 1944-May 1945', *Royal Air Force Historical Society, Journal 31*, 1994, pp129-138.

SANDYS OF TIME – THE 1957 DEFENCE STATEMENT

by Wg Cdr Andrew Brookes

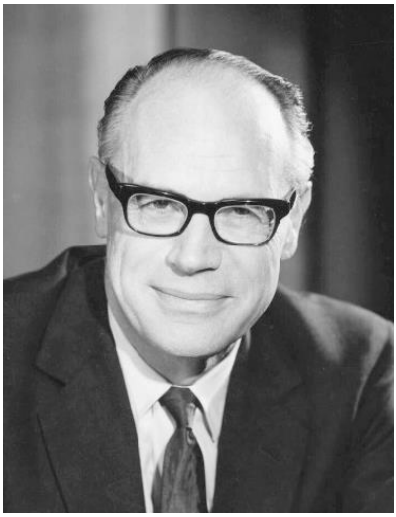
Overstretched

Following the Korean War, UK defence expenditure peaked at 9·8% of GDP and manpower across the Services neared 900,000. The RAF strength of 277,125 officers and men included 90,000 National Servicemen. From the mid-1950s there was a clear political will to reduce the defence burden. The task was eventually entrusted to Secretary of State for Defence, Duncan Sandys. Sandys was the first defence secretary to dominate the defence establishment. His 'ground-breaking' – or 'notorious' – White Paper of April 1957 raises blood pressures even today. In a BBC interview on 5 April 1957, Sandys was asked how long he thought manned aircraft would retain their usefulness: he replied, 'I am afraid I can't give you a definite answer in dates. I would say that there are some roles, for example in minor wars and anti-submarine work, where manned aircraft continue to be needed as far ahead as one can see.' But did Sandys, as some aver, set out to axe manned fast jet aircraft? Was the White Paper all bad?

The Defence Scene

Duncan Sandys was first elected to Parliament in 1935. He became a close ally of his father-in-law, Winston Churchill, and during the Second World War Sandys became chairman of the War Cabinet Committee for defence against the V-weapons onslaught. With the return of the Churchill administration in 1951, Sandys was appointed Minister of Supply – 'the ministry of boots to Atoms' as somebody called his overarching organisation. Sandys was a hard man and politically astute. He was a defence modernist, and, in many ways, he was the Michael Heseltine of his day.

But it was the view of his boss in No 10 Downing Street that mattered. Harold Macmillan took over as Prime Minister in early 1957 but before that he had served as Air Minister, Defence Minister and Chancellor of the Exchequer. When at the Treasury, Macmillan's view in May 1956 was that fighters were not effective against ballistic missiles. Fighter Command could not achieve its purpose in the nuclear age so it could have had no part to play in the emerging type of global

Left, Duncan Sandys, Minister of Defence 1957-59; right, Aubrey Jones, Minister of Supply 1957-59. (National Portrait Gallery)

war. Macmillan was not opposed to fighter aircraft *per se* but he regarded the Gloster Javelin and Hawker Hunter as the last aircraft for Fighter Command. He appreciated the need for fighters to support the RAF oversees, or the Fleet Air Arm, but not for Fighter Command.

When Harold Macmillan took over as Prime Minister, he appointed Welshman Aubrey Jones as Minister of Supply. Jones, a dry Thatcherite, took charge of the British aircraft industry only to discover that the rest of the world was not greatly interested in its products. In October 1957 Jones watched, horrified, as a BEA Viscount sent to collect him from a press trip to a factory extension, crashed on landing at Belfast airport, killing all seven people on board. Faced with a cutback in military orders, Jones advocated a slimmer industry with fewer producers.

In his autobiography, published in 1947, ACM Sir Arthur 'Bomber' Harris regarded the manned bomber as having had its day. The future lay with missiles but, he noted, 'I have not the slightest doubt that the Air Force will cling to the antiquated weapons with which it will conceive its interests to be bound up.' Ten years later and government focus was on the increasing use of missiles. Combined with that was

the quest to bring a measure of coalescence to the British aircraft industry which was riddled with duplication and fragmentation.

This was exemplified by the failure of the Vickers-Supermarine Swift. Conceived as an 'insurance', in case the Hawker Hunter didn't work, the Swift formally entered RAF service with No 56 Sqn in February 1954. It was found to be uncontrollable at high speeds and, if anything, the modified F.2 was even worse than the F.1. There were a number of unfriendly headlines in national newspapers, as in September 1954 when the *News Chronicle* asked, *'Where are the Planes?'*

In January 1955 the Cabinet agreed to publish a White Paper, *The Supply of Military Aircraft*.[1] In the words of Professor Keith Hayward, 'At its core was the Swift fiasco, but surrounding it was a much lengthier explanation of post-war aircraft development and the military exigencies that had led to the concurrent development and production of both the Hawker Hunter and the Swift and other fighter aircraft, as well as a description of its successes [largely the V-bomber programme and the Canberra]. There was also a forward look, aimed at modernising the system by which complex military aircraft were to be developed and procured in the future.'

Development of the Javelin, designed to intercept Russian nuclear-armed bombers and regarded as 'our most important aircraft after the V-bombers', was fundamental to the strategic defence of the UK. Since it was an Allied asset, procurement of 300 of the 427 Javelins produced for the RAF was financed by the USA but that funding stopped in 1956. As the Minister of Supply noted, the so-called 'Thin-Wing Javelin', might 'never become a satisfactory fighting machine' unless more money was spent on development and at the cost of a 'serious delay'.

In total, there were 26 active research projects during this period, costing just under half a billion pounds out of a total aircraft spend of £34 billion. This had little negative effect on the strategic-bomber programme, as a protracted development of the delivery system would be in step with building the atomic bomb. But the impact on UK fighter aircraft was more serious. First, it delayed development of supersonic concepts; secondly, when the UK was involved in a serious shooting war, its fighter aircraft were inferior to both its allies and its adversaries.

By 1956 the Ministry of Supply was openly considering how it might encourage the growth of 'larger technical teams': weaker firms with a record of poor performance were classed as 'candidates for

relegation' through 'selective allocation of contracts'. On 24 January 1957, Macmillan announced that he had entrusted Sandys, 'with the task of formulating, in the light of present strategic needs, a defence policy which will secure a substantial reduction in expenditure and in manpower and to prepare a plan for the re-shaping and reorganisation of the armed forces in accordance therewith.' Sandys received authority, 'to give decisions on all matters of policy affecting the size, shape, organisation and disposition of the armed forces, their equipment and supply, including defence research and development and their pay and conditions of service.'

Presented on 4 April 1957, the White Paper – entitled *Defence: Outline of Future Policy*[2]– began with a broad review of the shape of things to come and the vital need to protect the country's economic structure. It went on to say that:

> '. . . it must be frankly recognised that there is at present no means of providing adequate protection for the people of this country against the consequences of an attack with nuclear weapons. Though, in the event of war, the fighter aircraft of the RAF would unquestionably be able to take a heavy toll of enemy bombers, a proportion would inevitably get through. Even if it were only a dozen, they could with megaton bombs inflict widespread devastation. This makes it more than ever clear that the overriding consideration in all military planning must be to prevent war rather than to prepare for it.
>
> While comprehensive disarmament remains among the foremost objectives of British foreign policy, it is unhappily true that, pending international agreement, the only existing safeguard against major aggression is the power to threaten retaliation with nuclear weapons. Since peace so largely depends upon the deterrent fear of nuclear retaliation, it is essential that a would-be aggressor should not be allowed to think he could readily knock out the bomber bases in Britain before aircraft could take off from them. The defence of the bomber airfields is therefore an essential part of the deterrent and is a feasible task. A manned fighter force, smaller than at present but adequate for this limited purpose, will be maintained and will progressively be equipped with air-to-air guided missiles. *Fighter aircraft will in due course be*

replaced by a ground-to-air guided missile system (my italics).'

With reduction in the size of garrisons and other British forces overseas said Sandys, it was more than ever essential to be able to dispatch reinforcements at short notice. With this object, a 'Central Reserve' was to be maintained in the British Isles.

'To be effective, the Central Reserve must possess the means of rapid mobility. For this purpose, a substantial fleet of transport aircraft is being built up in RAF Transport Command. This is at present mainly composed of Comets, Beverley freighters and Hastings aircraft, to which a number of Britannias will later be added.'

However, the main thrust of the White Paper was on people rather than platforms. After reviewing manpower requirements, and announcing that there would be no further National Service call-up after the end of 1960, 'the recent improvement in its recruiting makes it reasonable to hope that the RAF will be able to enlist enough regulars to meet the smaller numbers required under the revised plan.' In other words, nuclear weapons plus the latest aeronautical technology were to take the place of army divisions in deterring the Soviet Union.

The Aircraft Programme

Which led into the part of the White Paper which vitally affected the future of the British aircraft industry.

'If the weapons and equipment of the armed forces are to be kept up to date, an adequate effort on research and development must be continuously maintained. However, in view of the shortage of scientists and technicians in civil industry, it is important to restrict the military programme to those projects which are absolutely essential.

High priority will therefore continue to be given to the development of British nuclear weapons suitable for delivery by manned bombers and ballistic rockets. Nuclear warheads are also being evolved for defensive guided missiles.'

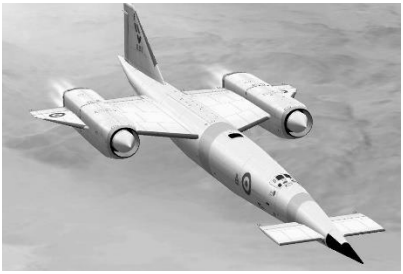
The British Blue Streak medium-range ballistic missile was based on the transfer of US Atlas ICBM technology, negotiated by Sandys when he was Minister of Supply. Reliance on the US was

duly acknowledged in the 1957 White Paper. 'The close co-operation with the United States over research on guided missiles and ballistic rockets, initiated under the agreement of 1953, has proved of mutual benefit to both countries and will be maintained and further developed. The agreement in principle for the supply of American rockets should result in savings of time and money, and will enable work to be concentrated upon more advanced types.

> 'Having regard to the high performance and potentialities of the Vulcan and Victor medium bombers and the likely progress of ballistic rockets and missile defence, the Government have decided not to go on with the development of a supersonic manned bomber, which could not be brought into service in much under ten years.
>
> Work will proceed on the development of a ground-to-air missile defence system which will in due course replace the manned aircraft of Fighter Command. In view of the good progress already made, the Government have come to the conclusion that the RAF are unlikely to have a requirement for fighter aircraft of types more advanced than the supersonic P.1, and work on such projects will stop.'
>
> The White Paper concluded that, 'The Government have adopted this new defence plan in the confidence that it will not only give relief to the country's sorely strained economy, but will produce compact all-regular forces of the highest quality. The three Services will be equipped and organised on the most up-to-date lines. […] The Air Force will be supplied with British megaton bombs; a missile system of air defence will be developed; and ballistic rockets will be introduced to supplement the V-bombers. In short, it is the intention that, when reorganised in accordance with the new plan, Britain's armed forces shall be better equipped, better trained and better designed for the tasks that lie ahead.'

Manned aircraft projects

The 1957 Defence White Paper declared that no more manned combat aircraft would be needed beyond the current generation. Cutting edge projects cancelled were the Avro 730 supersonic bomber, the Saunders-Roe SR177 rocket-plus-jet fighter, the Fairey Delta III



Just two of the impressive, advanced projects that were cancelled in 1957, left, the Saunders Roe SR177 jet/rocket interceptor and, right, the Avro 730 supersonic bomber.

long-range fighter and the Hawker P1121 supersonic strike-fighter, successor to the Hunter. None of these projects were in production: the English Electric P.1 Lightning only survived because it was so close to entry into service that cancellation would not have saved money. The increasing complexity of weapon systems was thought to be beyond what reservist training could cope with so the Royal Auxiliary Air Force's flying role and the Air Branch of the RN Volunteer Reserve were terminated. The Short Seamew being no longer required for the latter, its production was cancelled.

The government wanted to reduce the cost of aeronautical R&D without crippling an industry that could benefit from a rapidly expanding civil market. Consequently, there would be support for the Bristol Type 223 supersonic transport (Concorde) and a few other promising designs such as the Fairey Rotodyne intercity transport. But with military orders accounting for 70% of the aviation industry's workload, the Sandys White Paper would seriously contract the UK aircraft industry. Even then, 'the units of the industry while fewer in number must also be made individually more powerful, financially, in their technical and production resources, and in their sales and servicing organisations overseas. Government influence should therefore be brought to bear to hasten the formation of suitable groupings' through 'persuasion' and the selective allocation of government contracts.

This was formally announced by Minister of Supply Aubrey Jones in May 1958. He described the process as 'something intermediate between full government authority and complete *laissez-faire*. What we need is a combination of impulse from above compelling the

assumption of responsibility on the part of industry itself.' This policy had already been partially implemented with the formation of Airco – a de Havilland-led consortium including Fairey and Hunting that had won BEA's contract for the DH121 Trident jet airliner. However, the most direct instrument to force rationalisation was Operational Requirement 339, the Canberra replacement, which begat TSR2. This was the only way that the UK could keep pace with the US in developing and procuring the more complex aircraft of the jet age. There was to be no more muddling through.

Impact

The technological thrust of Sandys' thinking was, 'let us focus on designing the latest and best platforms and weapons to ensure the UK retains a seat at the top table' – pretty much the same as today. Industry had to return to pre-Korean War levels with the Government anticipating that around 100,000 jobs would go, out of an aircraft industry of upwards of 300,000. The 1957 White Paper was about releasing defence funding for exports, and similar concern over the threat posed by missiles to manned aircraft was reflected across the Atlantic in the subsequent cancellation of the Mach 3 XB-70 Valkyrie and the impact on its chronological cousin, the SR-71 Blackbird.

To Sandys, the future lay in rationalisation, a new generation of military aircraft and industrial cooperation. The Avro 730 had to go to help pay for Blue Streak. He was in favour of cooperation with Europe – there was a section in the White Paper on this. He needed to save the big aviation design teams and if orders were slack, companies should diversify. Hawker ended up making barrels for Watneys Red Barrel and Handley Page branched out into making central heating radiators, but diversification only went so far.

The Sandys switch was to use air power instead of manpower east of Suez. There were then more British troops east of Suez than there were in Germany, and Sandys was only interested in multi-role aircraft that were capable of adaptation as circumstances dictated. Consequently, the Armstrong Whitworth Argosy tactical freighter was built as a result of the Sandys White Paper to allow rapid mobility of the UK-based 'Central Reserve'. The Hawker Hunter was another such flexible and reliable gem. The ground support Harrier was pure Sandys. His White Paper had its effect, not least in cooperation with Europe and the US, but that is not

what it is famous for.

To say that Duncan Sandys made himself unpopular by his 1957 White Paper is something of an understatement, but much of the opprobrium heaped upon him was deposited by people who failed to appreciate fully what the White Paper was all about. Sandys had been tasked by Macmillan with redirecting scarce funds from military to civil projects. He didn't kill manned aviation; he killed big government military funding. He got some things wrong – the Bloodhound 1 SAM didn't really work, but Sandys put a good spin on it. Forty-five years ago, I interviewed ACM Sir Harry Broadhurst who was CinC Bomber Command in 1957. 'Broady' was quite clear that his opposite number in Fighter Command, ACM Sir Thomas Pike, was fully supportive of the logic underpinning the 1957 Defence White Paper, as was the Air Force Board. It was only subsequently, when the recriminations were flying around, that the RAF hierarchy quietly forgot that they had supported the White Paper and Sandys was left to carry the can.

Aubrey Jones foresaw that many of the industry's pet projects, notably TSR2, would eventually be cancelled. Jones lobbied for his waning Ministry to be converted into a Ministry of Technology (an idea that Labour would realise six years later), but Duncan Sandys pushed back. After the Conservatives' landslide victory in 1959, Macmillan abolished Supply and made Sandys Minister of Aviation. But the problem of rising project costs and managing complex defence programmes would not go away, and by the early 1960s the UK government faced a succession of procurement crises. Much of the Sandys White Paper had withered by 1961, with the F-4 Phantom proving to be the optimum manned fast jet of my generation. Yet this formidable long-range interceptor/ground attack fighter, which joined the RAF and RN in 1968, bore a very close resemblance in performance and payload to the Hawker 1121 which had been cancelled by Sandys in 1957. Manned fast jets were still very much on the agenda.

Looking back, Sandys was aiming to reform defence procurement by creating a system that would deliver effective weapons on time and close to the original estimated costs. That is still a pipe dream today.

1 TNA CAB 129/73/35. *The Supply of Military Aircraft*, 10 February 1955.

2 TNA CAB129/86/29. *Defence: Outline of Future Policy*, March 1957.

THE EVOLUTION OF EUROFIGHTER TYPHOON

by Gp Capt Chris Granville-White

This summary was written in October 2017 in response to a question raised by Dr Mike Pryce at the UK Defence Academy: 'Why did the RAF switch from AST 410, for a STOVL aircraft, to AST 414 in 1983? The balance between political and technical issues in the decision is my main interest.'

1982

By the time I arrived at the MoD in March 1982 as OR40 (RAF), AST 403[1] had been split into ASR 409 for the Harrier GR5 (my OR40a Sqn Ldr John Bolton) and AST 410 for potential ASTOVL options (my OR40b Sqn Ldr Steve Nicholl).

There were some interesting ASTOVL concepts around at the time, notably the P1216 twin-boom design at BAe Kingston under Ralph Hooper. During June 1982 there was a fascinating Anglo-US ASTOVL conference at RAE Farnborough with some excellent presentations.

Some years earlier, BAe Warton had been working on a P110 delta-canard design as their industry initiative potential agile fighter (with air intakes each side of the fuselage). But by 1982 the Company was working on a Private Venture industry initiative, the 3-nation Agile Combat Aircraft (ACA) concept with chin intakes, in conjunction with

By 1982 BAe's P110 had morphed into the ACA Agile Combat Aircraft, a collaborative project with Panavia, ie MBB and. Aeritalia. (GlobalSecurity.org)

BAe's EAP technology demonstrator first flew on 8 August 1986.
(BAE Systems)

German and Italian industry. The Germans were particularly interested in exploring Post Stall Technology (PST) which I understood drove their wish for the chin air intake under the front fuselage.

The ACA concept aroused sufficient interest that the RAF hierarchy felt it would be worth trying for a decision. This led to a presentation to the Secretary of State for Defence, John Nott, that summer of 1982 during the Wimbledon fortnight (memorable because of a comment in the script that gaining an advantage in combat was similar to breaking an opponent's serve in tennis . . .) Steve Nicholl wrote the script, which was presented by Peter Taylor who was recently back from commanding RAF Brüggen and would rightly be perceived as a bright recent operational RAF commander. My humble role, as the new boy in the office, was as OHP slide operator, which was a good vantage point, while the Secretary of State was being briefed. This briefing led to the decision to build the one-off Experimental Aircraft Programme (EAP) to explore and demonstrate the aerodynamic characteristics of the canard-delta configuration, and to provide a progressive follow-on to the work in progress with the Jaguar Fly-By-Wire Technology Demonstration Programme (TDP). The objectives of the EAP were to further explore, demonstrate and develop:

Carbon Fibre Composite (CFC) aircraft structures

Unstable aerodynamics

Electronic Active Control Technologies (ACT).

1983

Around the turn of the year 1982/83 it become clear that if the RAF was to have any prospect of acquiring a new fighter it would have to be in collaboration with other European nations. The first I heard about this was in January 1983 when AVM David Harcourt-Smith, my boss as ACAS(OR), called me to his office along the corridor of the third floor in MoD and explained the situation. It was clear that the right people to talk with would be our Tornado partners, Germany and Italy, and our Jaguar partner, France. He said that we would be travelling together for informal talks with his opposite numbers in the other capitals to explore possible common ground in operational requirements. His office set about arranging these first meetings.

No time was wasted, and on 26 January 1983 the AVM and I flew to Bonn to talk with the German air staff; to Rome on the 28th, to meet the Italians and, on 9 February, to Paris for the French.

The UK line was that although industry was pressing for a commitment to ACA, to maintain work in the aerospace industry because of the run-down of Tornado work, there would be no early decision on a future combat aircraft. The UK assumptions were for a European collaborative STOL programme or a US collaborative STOVL programme; with the STOL option the more likely. STOVL would not be a sticking point in agreeing a common requirement.

In Germany high priority was being given to air defence, with top priority to the Patriot missile programme. Second to this was a need for an agile air defence fighter with a secondary air-to-surface capability to replace the Phantom. They were not interested in ACA and collaboration must include the French which, they acknowledged, could be difficult.

The Italians wanted a high-speed interceptor to replace the F-104S (against a potential threat from Libya), possibly on the lines of a single-seat Tornado F3 at two-thirds of the cost. It would need to be collaborative to keep down the costs. They were concerned about industrial solutions such as ACA forcing the pace before they had finalised their requirements. Meanwhile their aerospace industry was being kept busy with their joint AMX programme with Brazil.

The French General was clearly relieved that we had not come to discuss vertical landing, as the French had been convinced that the RAF

Seen here at the 1988 Farnborough show, Dassault's ACX had first flown, known by then as the Rafale A, on 4 July 1986, just one month ahead of BAe's EAP. (Chris Young)

only wanted to follow a STOVL route. It was also clear that the European Combat Aircraft (ECA) talks a couple of years earlier had left a sour taste with the French air staff. The French were also concerned about the potential dangers of industry taking the lead in the design of a new fighter which might become unaffordable. He envisaged the French ACX (*Avion de Combat eXperimental*) demonstrator leading to the development of an operational aircraft.[2]

Following these meetings, and some internal discussion in France, it was agreed that an informal 4-way meeting should be held in Paris during April. I had suggested Paris as the venue to be politic, and to avoid the UK appearing to be too pushy.

Much to my surprise, a week or so ahead of the date, I received a phone call in MoD from a Spanish Air Force officer (Lt Col Eduardo Gallarza) who had heard about 'our' meeting and wondered whether they might also attend. This was quite a surprise because, in the early post-Franco years, Spain was only just getting back into the idea of communicating with European neighbours.[3] I said that, as far as we were concerned, we would be delighted to see the Spanish air staff at the meeting but that, out of politeness, he should ask the French, who would be the hosts. The French agreed that the Spanish could attend to

make it a five-nation meeting.

ACAS(OR) and I duly flew to Paris for the meeting, which was held on 29 April, at which each nation outlined its position. It was concluded that:

there was a requirement for a new fighter in the mid-1990s;

it would be important to limit costs of development, production and through-life costs;

there were benefits in collaboration;

there was a need to retain a flexible approach at this stage to the operational requirement;

there should be good performance in more than one role;

the aircraft should be STOL and that

two engines were generally preferred.

In addition, the meeting directed the formation of a working group, together with national technical support, to explore and identify the extent of commonality in our requirements for a new fighter – and any differences.

It was agreed that we would have periodic 'Generals Meetings' for policy and we five 'colonels' would comprise the Colonels Working Group to discuss the detail. Each nation would have a technical adviser and ours was the outstanding Dr Lynn Davis who was then Assistant Director of Future Military Aircraft (AD/FMA) in MoD PE. These meetings would be chaired by the general or colonel in whose capital the meeting was taking place. Thus, with ACAS(OR) as the UK general and me as the UK colonel, my directions were to work with the colonels in the other four nations; and in MoD I would report directly to ACAS(OR) with no requirement to consult the group captain or air commodore above me, and only to keep them informed if I had the time.

At the Paris meeting the Spanish had indicated that they sought a relatively small number of twin-engine fighters. However, it became clear that their primary aim was re-integration within Europe and NATO, and to develop their aerospace industry.

As there was no appetite with the other nations for a vertical landing capability, ASTOVL work for the UK remained a research topic.

The first Colonels Group meetings was chaired by Col Brunke in

Bonn on 22/23 June during which each nation presented, in accordance with the NAFAG proforma, its outline requirements for a future combat aircraft. This enabled everyone to study the various requirements and to ask questions in order to understand the rationale behind them, and to see which attracted particular interest. It was emphasised that these should not be taken as fixed requirements.

At the end of the meeting, I offered to host and chair the next Colonels Working Group in London during October. The intention would be to continue the process of comparing and, where possible, harmonising our outline requirements, to be reviewed by the Generals before the end of the year. There was no room available in MoD Main Building for the meeting, so we booked a conference room in Northumberland House (Northumberland Avenue). The meeting was planned for Thursday and Friday 6/7 October, with the Saturday available as a spare day if required.

During the earlier Colonels' Meeting the French position had largely been put over by Monsieur Rouvin whose English was very good, in contrast to Col Viant's English which was less strong. However, Rouvin was a particularly difficult character and I wanted to be able to have a proper exchange with my French Air Force colleague, Col Viant. I therefore requested a French interpreter to attend the October meeting. This was duly arranged and the charming lady who undertook this task happened to be PM Thatcher's regular interpreter used by No 10.

The Colonels' Group comprised:

UK: Wg Cdr Chris Granville-White and Dr Lynn Davis
GE: Oberst Dieter Brunke and Herr Christian Biener
FR: Col J Viant and Monsieur Rouvin
IT: Col Ricardo Tonini (later head of the Italian Air Force) and Col G Sciandra
SP: Lt Col Eduardo Gallarza (later head of the Spanish Air Force)

As it would be too early to negotiate specific performance parameters at this stage, the intention during this meeting was to identify bandwidths of performance with which we could all agree at our level. We had prepared our own shopping list for this which I used as my agenda for the meeting. In the meantime, there had been a tri-national defence UK/German/French ministers meeting on

21 September which had discussed this project.

Following preliminary discussion during the first day, when I proposed an outline framework for a potential Outline Staff Target (OST), we reviewed the results of computer work, which had been carried out by the technical experts since the June meeting, on potential mission profiles. However, progress was disappointingly slow, largely because of French time-wasting. After the end of this first day, I went to my office in MoD Main Building to phone ACAS(OR) to give him an update. I explained my frustration about a largely wasted day and that I now planned to continue through the Saturday and, if necessary, Sunday, to make up for lost time. His response was that we had better get a move on because, following the tri-national defence ministers meeting, the Secretary of State for Defence (Michael Heseltine) had agreed with his French and German counterparts (Monsieur Hernu and Herr Ruhr) that they intended to sign an outline agreement by the end of the year. So no pressure!

Next morning (Friday) I asked for confirmation that everyone could stay on to continue the meeting on Saturday and Sunday. The Germans, Italians and Spanish said they had come to London to reach agreement and their orders were to stay as long as necessary, but the French said that they could not stay for Sunday and nor could they be in London on the Saturday as they needed to fly back to Paris. This was a real set-back and I asked for the time of their flight. They gave the time and I replied that we would therefore need to end the meeting by 1130 on Saturday to give them time to travel to Heathrow.

During the Friday we made reasonable progress. There were many pauses while delegations conferred within their group, and the Italians in particular were inclined to talk amongst themselves which sometimes made it challenging to chair the meeting. I therefore instituted a procedure whereby if any nation wished to have its own discussion they should lower the miniature national flag on the table in front of their delegation leader, so that we would all know that the meeting was on hold. This procedure worked really well, and at future meetings we would begin the day with all the flags lowered and once all the delegations had raised their national flag to show they were ready, the Chairman could open the meeting.

As this second day progressed there were many breaks for coffee

and individual delegate discussions. During these breaks I took the opportunity to talk in turn with the German, Italian and Spanish delegation leaders (but not with the French) to ask if they were willing to go along with a plan I had in mind. I also talked with the interpreter who said she would be delighted to go along with my plan which would give her time to do her family weekend shopping.

At 6pm, after a long day, I thanked everyone for their participation through the day and said that as there was still much to do, and the French delegation would be leaving in the morning, the other delegations had all agreed to work on through the night. But first we needed a break, and we would adjourn for an hour for supper and re-convene at 7pm. I ended by saying that as we were in central London there would be plenty of places nearby to get a bite to eat so – 'I'll see you back here at seven o'clock'.

The delegations rose and soon the room was almost empty – except for the French delegation who came and stood round my chair. Monsieur Rouvin said that I couldn't do this to them, to which I replied, 'Yes I can, and you had better hurry, as you now only have 55 minutes left to have supper!' With that the French left and I hurried to find a café near Trafalgar Square for a quick meal.

Everyone was back on time, and shortly after 7pm, with all the flags raised, we continued. By this time we had a few bottles of wine in the room which kept spirits up as we worked on through the evening. Unknown to the French, my wingman, Sqn Ldr Derek North (who had taken over from Steve Nicholl at the end of 1982) and was acting as secretary for the meeting, had been to the MoD typing pool to ask if we could have support through the night – so essential in those pre-computer days. A few of the WRAF girls volunteered to work on; and as we worked our way through an outline statement of our aircraft operational performance bandwidths, Derek took the individual pages to the typists. By 1am we had reached the end of my agenda and I called yet another coffee/wine break. We were all feeling pretty ragged by then and a young officer in the Spanish delegation asked how much longer we would be working. I replied that as the French delegation would need to leave at 11.30 in the morning, we had 10hrs 30mins to go. At this point they realised that I really was serious about working all night!

Before long Derek had collected five typed copies of the performance bandwidths which we had discussed. While M Rouvin sat looking glum, the rest of us proof-read the draft and at 3.20am the five of us Colonels signed all five copies of an Outline Staff Target (OST) for a Future Combat Aircraft (FCA). Although this was a very thin outline document with little precise detail, it showed our collective intent to acquire a next-generation fighter.

It was around 3.40am by the time Derek and I left to take our papers back to our office safe in the Main Building. The streets were still busy with late-night revellers as we hurried round the corner of Trafalgar Square into Whitehall trying not to attract attention as we held firmly onto our black leather secure MoD brief cases. When we arrived at the far end of the Main Building, we saw that a huge security clamshell had been lowered over the entrance with just a small window and bell for us to attract attention. The duty security guard was suspicious of us turning up at this time of night with secure brief cases and it took some explaining to gain access. It was a relief to get our papers locked away in our office and to be able to head off for some sleep.

Following this modest, but highly significant, success, the next step was to try to harmonise our requirements and develop the OST into a more definitive document. It was the turn of the Spanish to chair a meeting of the Colonels Air Staff Working Group, which was held in Madrid on 3/4 November. Unfortunately, the French did not have authority at this stage to change any of their requirements to harmonise, so we decided to harmonise between four nations and simply to state the French target figures. This approach proved acceptable to us all and in many cases the French figures coincided with the harmonised ones or were close. The Italians were particularly constructive in proposing target figures which also showed the French delegation the strength of the tri-national Tornado partnership. This all resulted in an updated Outline European Staff Target (OEST), with ‘European’ included in the title at German insistence.

With the continuing progress, the French team was given authority to begin the process of harmonising their target requirements with the other nations. This led to a Generals meeting chaired by ACAS(OR) in London on 15/16 November at which an updated OEST was signed at their level, using the new name proposed by the Germans of Future

European Fighter Aircraft (FEFA) or *Futur Avion de Combat Européen*.

Following this major landmark, on 16 December we flew to Koln/Bonn where the five Chiefs of Air Staff signed the OEST – then, simultaneously, at 1400 GMT, a press release was issued in each of the five capitals. This stated that

> 'The document specifies the jointly required operational characteristics of a single seat, twin-engine, agile, short take-off and landing (STOL) fighter for introduction to service in the mid-1990s. The aircraft should be capable of fulfilling Air Defence and Air-to-Surface roles. The Air-to-Air mission is to be the main conditioning factor for the design of the aircraft.'

It went on to emphasise the importance of affordability and that the five-nation programme was assumed to be in the range of 800 aircraft. The next steps would be for the National Armament Directors (NAD) in the five nations to begin feasibility studies and to formulate industrial proposals.

1984

1984 began with the first meeting in Paris (during January) of the newly formed Technical Services Working Group, after which the five NADs wrote to their industries tasking them with a pre-feasibility study. Further meetings of the Technical Group were held in London during February; in Rome and Madrid during March; and in Bonn during April. These meetings were chaired respectively by a MoD PE official and the equivalents in the other nations. This work was to prepare a report for the NADs to submit to Ministers ahead of Ministers writing to their industries as a formal start to a programme.

Meanwhile, at a national level, in early December, OR40b and I had prepared an initial draft AST 414 together with a covering paper for a desk-level circulation at my level during January 1984. So things were moving along fast. Having completed much of this initial work, my OR40b, Sqn Ldr Derek North, was posted away at the end of 1983 (after only a year in post) to be succeeded by David Hamilton.

In parallel with the Technical Services Working Group, through 1984 we refined the OEST into a European Staff Target (EST**)** which was signed at the end of the year. In time the 'F' in FEFA was dropped to become EFA, on the basis that it can become counter-productive to

use the word ‘Future’ for too long – as the future never comes.

Our perception through this early phase was that, throughout this programme, the French were keen to gain access to our advanced radar technology know-how and our hot-end engine (turbine) expertise.

1985-1988

I left the MoD in March 1985 after three years as OR40 (RAF). By the time I returned in September 1988 as a group captain to be DDOR4 (Air) we were now a part of the central staffs, so the suffix (RAF) had become (Air), and the ACAS(OR) post was now ACDS OR(Air). Meanwhile, there had been many significant developments with EFA. They were, in brief:

At a meeting in Turin during August 1985 the French had been unable to agree to what became known as the ‘Turin Agreement’ for key aircraft performance parameters in the draft European Staff Requirement (ESR), including Basic Mass Empty (BME), and they left the programme to pursue Rafale on a national basis. Meanwhile, the remaining four nations signed the ESR.

The ESR then progressed to become an endorsed European Staff Requirement for Development (ESR-D), signed by the four Chiefs of Air Staff in Madrid on 18 September 1987 and the Development Phase was now in progress.

The 4-nation NATO European Fighter Management Agency (NEFMA) had been built up in Munich.

The DDOR4 (Air) team had moved from Whitehall to the MoD Procurement Executive at St Giles Court to be co-located with the MoD PE Project Team under D/EFA and alongside the RAF Integrated Logistics Team under Gp Capt Ian Brackenbury. Meanwhile, the OR40(Air) team had expanded to include:

OR40a Radar and EW Defensive Aids Sub System (DASS)

OR40b Training

OR40c Test & Evaluation, Studies, etc.

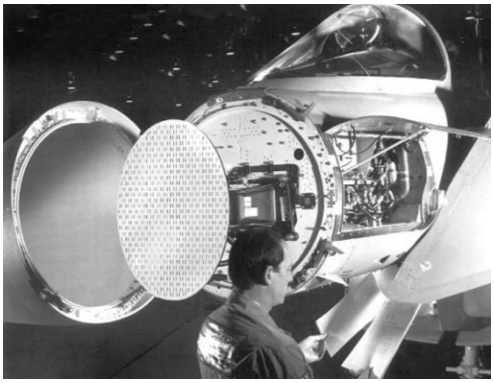
and in the early 1990s the post of OR40d was established for an OR Liaison Officer (ORLO) at BAe Warton.

1988 and beyond

The next major issue was the choice of radar during 1989/1990, which was a long and complex process during which the UK choice of the Ferranti ECR 90 radar was eventually selected; rather than the

Marconi MSD 2000 preferred by some.

Then followed the 'Reorientation' phase in 1992/3 which led to another new name, the Eurofighter 2000 (EF2000) after the German Defence Minister Herr Ruhr had announced in 1992 (during Wimbledon fortnight) that Germany now sought a smaller, lighter and cheaper fighter, nicknamed EFA-Lite. This led to an independent review by the five Chiefs of Defence Staff who were variously Army, Navy and Air Force officers. During this period I worked direct to Field Marshal Sir Richard Vincent (Chief of Defence Staff) and I also had direct access to the Chief of Air Staff. This was a fascinating, if unusual, time during which we had a 5-nation meeting of the Chiefs of Defence Staffs (CHODS) in the margins of a Nuclear Planning Group meeting at the Gleneagles Hotel in Scotland. I went out of the hotel for an early morning walk in the grounds and was immediately pounced on by security men!



Ferranti's ECR 90 radar aka Captor. (http://eurofighter.airpower.at/sensorik-captor.htm)

To enable a fresh look at the programme, a German Air Force 1-star was appointed as a 'new face' to chair the Working Group (WG). He told me that he was fearful of failure, which would ruin his career. He could not see a way resolve the situation as it seemed impossible for the WG to agree a document which could include all four nations. The document was to be in five parts:

Part 1. Assessment of the strategic and military situation.

Part 2. Operational Environment.

Part 3. Air Defence in the new Security-Political Situation.

Part 4. The Operational Requirement .

Part 5. Conclusion.

It was clear that we would be able to agree on four of these parts, but would never be able to agree Part 4.

DA1, the first Eurofighter to fly, made its maiden flight from Manching on 27 March 1994. (EADS D)

The key to solving the deadlock came to me when we began drafting the document. I proposed that we should have two versions of Part 4. One version would set out a 3-nations Operational Requirement (OR) and the second version would contain the German OR. In this way we would have a single document which included the two versions of Part 4. This solved the problem so that each nation would be able to sign, in the knowledge that their version of Part 4 contained their national requirement. We worked on this basis and flew to Rome on 20 November 1992 where all four Chiefs of Defence Staff signed. Two days later the UK CDS wrote to the Secretary of State for Defence confirming a satisfactory outcome for the programme to continue.

During this period, there was one Friday afternoon when DGA1 (MoD PE), Jack Gordon, and I were summoned to the Cabinet office, together with officials from the Treasury and other Government departments (two of us from each department), under the chairmanship of Pauline Neville-Jones to prepare a collective brief for PM John Major's weekend bag.

Nationally, after carrying out a Combined Operational Effectiveness and Investment Appraisal (COEIA), and a top-down and a bottom-up

The RAF took delivery of its first Typhoon in 2003, but it was another three years before the first operational unit, No 3 Sqn, began to form.
(Copyright Eurofighter; Geoffrey Lee, Planefocus Ltd)

numbers study, we had several meetings with the Treasury at 2-star level about UK EFA numbers. From this it was agreed that there should be 232 aircraft for the UK. However, even then we probably recognised that the full numbers for the three Production Tranches might not necessarily all come to fruition.

At last, early in 1996, a few months before I completed my time in the RAF, the contract was signed for the first batch of production aircraft.

There were many hurdles along the way, but these were all resolved in various ways and Eurofighter Typhoon finally entered service with the four nations (and initial export customers) – and since then Typhoons have seen operational service in Libya and the Middle East.

[1] During the period before I was OR40 (RAF), AST 403 had been drafted to provide a replacement for the Harrier GR3 and Jaguar. Talks had taken place with the French and others in what became known as the European Combat Aircraft (ECA). However, French and British views were not compatible. In particular, the French were insistent on using their M88 engine and that the Basic Mass Empty weight of the aircraft (ie without stores and fuel) should not exceed 10 tonnes.

[2] The ACX project eventually materialised as the Rafale A, which flew for the first time on 4 July 1986.

[3] Gen Franco ruled Spain as a military dictator from 1939 until his death in 1975.

THE ALPHABET SOUP OF MILITARY AVIATION

by the Editor

In conducting its business, what President Eisenhower called 'the military-industrial complex', tends to indulge in initialisms. The problem with initialisms, and other forms of jargon, is that, while they are a convenient shorthand for a sub-section of the community, they tend to be time-sensitive and, sometimes, relatively short-lived. Thus, for example, an AEO might be an Air Electronics Officer or an Assistant Equipment Officer, and Fairey's TSR I became the Swordfish, whereas BAC's TSR2 didn't become anything. It depends on the timeframe – and that can be a problem for the historian. The preceding paper, which features more than twenty initialisms, is a good example.

While pondering which sets of initials were unfamiliar enough to warrant inclusion in the glossary, your Editor needed to decipher NEFMA. Google's answer is ***N****ATO* ***EF****A Development Production and Logistics* ***M****anagement* ***A****gency* which comes up several times – although it doesn't quite work! On the other hand ***N****ATO* ***E****uropean* ***F****ighter* ***M****anagement* ***A****gency* does work – but I only got one 'hit' for that. And, somewhere in the on-line background noise, wasn't there a NETMA? Or was that just a typo?

In search of enlightenment, I consulted the author, Gp Capt Granville-White, who passed the ball to the oracle, Jack Gordon, the erstwhile 2-star Director General Aircraft 1 (DGA 1) in MoD PE and Chairman of the 4-nation Board of Directors for Eurofighter Typhoon in its varying names. He responded as follows:

> 'Prior to the 1985 Turin conference on essential characteristics for the new aircraft, the five nations had not decided how the new project should be managed. IT, GE and UK felt we should use the NAMMA (***NA***TO ***M***ulti-role combat aircraft development and production ***M***anagement ***A***gency) model that had worked OK for the Tornado project; France favoured a lead-nation approach, similar to that used in most US programs; Spain sat on the fence. Post-Turin, the four EF sponsor nations each sought parliamentary approval to enter a collaborative project definition phase and, in the course of that, GE (at minister level) committed itself to use NAMMA to manage the work – and

NAMMA just happens to be based in Munich. Spain felt that this would put them in an inferior position, compared to the other three nations, and threatened to pull out unless the project was managed by a new agency that would give them equal status with the other partners. IT and UK didn't have a rigid position and sought to find a compromise.

Eventually they all agreed to form a new agency for Eurofighter that would be co-located with NAMMA and would share their security and support services. The new Agency was called NEFMA (***N***ATO ***E***uro***F***ighter development, production and logistics ***M***anagement ***A***gency). The Germans did not tell their parliament the details of the compromise and their defence minister and politicians continued to think that NEFMA was a subsidiary division of NAMMA, which complicated communications subsequently. We resolved this little difficulty in the early '90s, post the Eurorfighter 2000 reorientation charade. At that stage, the Tornado national design configurations for the UK had diverged so far from those of the Italian and German aircraft that all further Tornado developments for the UK were being managed directly from MOD/PE and NAMMA's contribution was minimal. So I came up with a plan for integrating the two agencies that saved money and offered something for everyone. The other nations all bought into the idea, some more enthusiastically than others.

In January 1996 we implemented the plan and NETMA (the ***N***ATO ***E***urofighter and ***T***ornado development production and logistics ***M***anagement ***A***gency) was born; both NAMMA and NEFMA were consigned to history. NAMMA's remaining functions were taken on by adding an extra division to what used to be called NEFMA and life continued as normal for both projects . . .

All clear?'

BOOK REVIEWS

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

A History of the Mediterranean Air War 1940-1945, Vol 5 by Christopher Shores and Giovanni Massimello with Russell Guest, Frank Olnyk, Winfried Bock and Andrew Thomas. Grub Street; 2021. £50.00.

Vols 1-4 having been reviewed in Journals 54, 59, 65 and 71, this series has now reached Vol 5, the sub-title of which is *From the Fall of Rome to the End of the War 1944-1945*. That is a reasonable indication of the content, although it does not make it clear that it focuses on 'tactical' air warfare, essentially the activities of the medium bombers and, especially, fighters. Furthermore, notwithstanding the '1944' in its title, the first 100 pages of Vol 5 actually cover activities in the Aegean and the Dodecanese from as early as May 1943 (Rome fell in August). The bulk of the rest of the narrative covers the advance up the Italian peninsula but adequate space is devoted to relatively peripheral activities, including the invasion of southern France and the fighting in Greece and the Balkans. There are some incidental references to the 'strategic' campaign, but this will form the basis of the forthcoming Vol 6, which will complete the series and include an addendum providing amendments and corrections to earlier volumes.

As before, the presentation is strictly chronological, each day's combat claims and recorded losses are tabulated, by air force, providing the unit and aircraft type with, where known (and in many cases, especially fighters, they are) the serial number and the pilot's name, along with the time and location of the claim/loss and a brief note on what happened. There is usually a narrative account of the day's events which summarises, and often attempts to make sense of, the tabulated data, not least rationalising some extreme cases of over-optimistic claiming of victories.

This trend first became apparent in Vol 3, a major contributory factor appears to have been the increasing scale of the air war once the USAAF had become fully committed. Just as an example from Vol 5, on 9 October 1943 a squadron of P-38s was credited with destroying sixteen Ju 87s; German records admit to the loss of only eight. That said, overclaiming was not confined to the Americans; everyone did it.

Where possible, the combined expertise of the international team of authors has permitted many of the claims and losses to be reconciled and Vol 5 is a worthy addition to a series that, when it is complete, will present as comprehensive a day-by-day account of air operations in this theatre as is ever likely to appear in print.

Errors? In a book of this size and complexity there are bound to be a few. For example, the RAF's No 227 Sqn was redesignated to become No 19 (not 16) Sqn SAAF (p129). On p390 there is a reference to SAAF Kittyhawks dropping bombs in level flight at 12,000ft 'directed by a ground station', the implication being that this technique employed SHORAN. But how? SHORAN used two ground stations, but their signals were interpreted by an airborne operator using dedicated equipment – in a P-40? Typos? I found a couple but, in a 526-page book, that is hardly surprising.

These quibbles aside, the story that Vol 5 tells reveals a number of issues that characterised the air campaign in Italy of which this reviewer was largely unaware. Most significantly, while the narrative is largely concerned with the activities of the single-seat fighter squadrons, there was relatively little air combat. In fact the *Luftwaffe* withdrew its last fighter unit, II/JG77, at the beginning of September 1944, leaving the air defence of northern Italy in the hands of the rump of the fascist Italian Air Force (the ANR), but even on a good day this could rarely field more than a score of Bf 109s. As a result, the Allied single-seaters were almost exclusively employed as fighter-bombers, which was not without its hazards. *Flak* was intense and daily losses of up to ten aeroplanes were not uncommon. Of even more concern was the incidence of premature detonation, with bombs, especially those delivered by Spitfires, exploding as soon as they were released, resulting in the instant, and total, destruction of the aeroplane and the death of its pilot. It would seem that this phenomenon had been identified, but that remedial action was constrained by the need to sustain offensive operations; the authors identify some forty such incidents – only one of the pilots survived. Friendly fire was another problem, one which affected both sides.

As with the previous editions, the illustrations are as impressive as the written content. This time the authors have provided no fewer than 300, informatively captioned, contemporary photographs many of which will surely have been reproduced for the first time in an English

language publication. The quality is variable, reflecting the quality of the original image, but the reproduction in all cases is first rate. My personal prize goes to a pair of Libya-based, stark naked Spitfire IXs of No 10 Sqn SAAF. They were stripped of all paint and markings, save a tiny serial number, and highly polished in the hope of being able to intercept high flying *Luftwaffe* reconnaissance aircraft. As with Vols 1-4, Grub Street are also to be commended on the quality of the binding. While this book is unlikely to be read from cover to cover more than once, if at all, it will be frequently used as a reference work and to withstand the wear and tear that that involves, it will need the support of the substantial spine that has been provided. The last 75 pages are devoted to comprehensive indices, covering personnel, locations and units named in the text.

Strongly recommended. This is another, *tour de force* by the team; five down – one to go . . .

CGJ

Sweeping the Skies by David Gunby. Mention the War Ltd, Merthyr Tydfil; 2021. £15.00.

Squadron histories may be conveniently divided into two categories. Those written by academic historians and those written by folk who have some kind of vested interest in the unit. The latter tend to be better – more detailed. *Sweeping the Skies* is one of those, its genesis lying in the author's attempts to find out more about his father, WO Charles Gunby, whom he had scarcely known and who had died while flying with No 40 Sqn in October 1944. Almost inevitably, his contacts with ex-squadron members led him down the rabbit hole and he finished up writing a history of the squadron which was published as an *octavo*(ish) hardback in 1995. Unfortunately (as this reviewer can confirm from personal experience), most of the more financially savvy publishers are not keen on lengthy unit histories so, unless the author is prepared to edit his work down to an acceptable size, his only option is a DIY job of some kind. Gunby underwrote a print-run of 800 copies and had sold about 600 when the publisher, the Pentland Press, went belly-up. The remaining 200 copies were never traced (possibly never printed?) and, as a result, the market had/has not been completely satisfied and the asking price for copies of the first edition, on AbeBooks for example, currently starts at £60. That put it out of reach of many of the families

of ex-squadron members who subsequently contacted the author with snippets of additional information and this, along with the publication of a great deal more information, particularly with regard to WW I, led to this revised second edition.

In brief, No 40 Sqn spent WW I flying scouts in France, initially the idiosyncratic FE8 pusher, before switching to more conventional Nieuports and SE5As. It reformed in 1931 as a bomber squadron, working its way through Gordons, Harts, Hinds and Battles to start WW II on Blenheims. Having re-equipped with Wellingtons before the end of 1940, a year later, the bulk of the squadron was sent to Malta. In February 1942, the residual UK echelon became the nucleus of a new No 156 Sqn and, at the same time, the remnant of the Malta element moved to Egypt where it effectively ceased to exist. In May a new Wellington-equipped No 40 Sqn was reconstituted in Egypt, whence it took part in the North African campaign, eventually relocating to Italy at the end of 1943. The Wellingtons were finally replaced by Liberators in early 1945 and it took these to Egypt before the end of the year where they were soon replaced by Lancasters, but only briefly, as the squadron disbanded in 1947. It has had two relatively brief post-war existences, 1947-50 on Yorks, including participation in the Berlin Airlift, and 1953-57 on Canberra B2s.

All of this is told in satisfying detail in this new edition, a much larger format (11" × 8½") softback, and a close reading of the text reveals a number of subtle amendments compared to the original. Is it flawless? Not quite. For instance, on p260 the death of Sgt J Griffin on 18/19 April 1941 is listed, correctly, but in the amplifying note, he is identified as Sgt Martin. And the statement, on p234, that the last of the RAF's Canberra bombers were withdrawn in 1961, is about 10 years off. But those are the only errors that this reviewer spotted in 293 pages. There are no new pictures, but all of those that were in the 1995 edition have been carried forward, their quality often being somewhat indifferent, reflecting, as ever, the quality of the original 'snaps' and/or being perhaps copies of copies. The only other issue, that might be regarded as a downside, is that the original edition featured a list, topped by McElroy and Mannock, of the twenty-three pilots who chieved 'Ace' status while flying with No 40 Sqn during WW I and a table of losses (killed, POW, wounded and injured, broken down by year) in WW II. Both of these have been omitted in the 2021 edition.

Indicative of the extent of more recent research, the new edition has many more endnotes compared to the 1995 original, eg Ch 2 had eight whereas it now has fourteen and Ch 20 now has six rather than just two, this pattern being reflected throughout the book. Similarly, the annexes dealing with losses have been extensively revised and significantly expanded, many more of the squadron's lost aeroplanes having been identified with much more detail being provided in the accompanying notes.

If you are 'into' squadron histories, this one is about as good as they get, and it can be highly recommended. Furthermore, at the price, this second edition is a bargain.

CGJ

Fighter Pilot: From Cold War Jets to Spitfires by Christopher Coville. Pen and Sword; 2021. £25.00.

At first glance Sir Chris Coville's autobiography, is just another collection of stories from a senior officer whose career spanned the Cold War; not quite! The sub title, *The extraordinary memoirs of a Battle of Britain Memorial Fighter Pilot*, hints that the content is exactly what it says on the tin. Written in a conversational and informative style within its 220 pages and 36 photographs, his long career is described and illustrated in detail, rising from flying Chipmunks as an air cadet to Tornado F3s, with regular sojourns via the Hurricane and Spitfire, hence the subtitle of which he was immensely proud. His account begins with the routine of recruitment, selection for a cadetship to the RAF College at Cranwell and tales of life in and around fighter cockpits, of which some, but not all, are self-effacing. It is an informal, honest and entertaining account of a remarkable career

His progress through the standard flying training pattern on the Jet Provost and Gnat, before being streamed for fighter pilot tactical training on the Hunter, was not without incident. His accounts of one-sided interviews, where he thought that his career was under threat by social indiscipline and failure to conform, suggest that he had very patient superiors who recognised leadership potential. He doesn't hesitate to identify those with whom he crossed swords, together with those who viewed his exploits sympathetically. Could such a pattern of behaviour survive today? I doubt it. Some contemporaries who might have been regarded as equally good officers and gentlemen were

relegated to ‘also ran’ status. Perhaps they worked for less tolerant superiors so there was an element of good fortune in his career, being in the right place at the right time, working for the right people and with the right qualifications and ability.

His evident aspirations to rise to the higher ranks of his service were seen by some of his equals as over-ambitious, particularly as a junior squadron leader. However, in pursuing his career, he recognises the need to demonstrate an ability, ‘to empathise more with my colleagues and subordinates, seek less the recognition of my superiors and develop more gravitas in an increasingly competitive working environment’; an honest and sombre acknowledgement, delivered with a sense of humour which comes through many of his tales both within and without the flying environment. His message, ‘aggression must be encouraged but strong discipline is essential to constrain behaviour’, reflects his numerous personal experiences. Away from the cockpit, his observations about the human side of service life, handling the occasional, but in the 1970s, regular accidents, some fatal, led to the unenviable task of facing and breaking the grim news to bereaved friends.

Several tours on the Lightning and Phantom, including OCU postings as an instructor, were followed by Staff College and a NATO desk appointment with its own professional and social challenges. The ambition to command a front line squadron was delayed by his short notice appointment as OC Ops Wing at RAF Stanley. His five-month tour in the Falklands was exciting, coming shortly after the end of the hostilities, with several probing sorties by Argentina sending periodic Electra radar reconnaissance aircraft to exercise the air defence team. The three radar units and the Phantom squadron were brought to readiness regularly with the occasional scramble to intercept the potentially hostile intruder. The unpredictable nature of the Falklands climate, with RAF Stanley’s very limited forecasting resources, presented added challenges to operations but he had a successful tour in the South Atlantic before returning to the UK to take command of CXI Fighter Squadron (Treble One) at Leuchars. His several self-congratulatory comments are matched by honest self-criticisms of his own performance where, shortly after taking command, one of his routine sorties almost led to ‘controlled flight into terrain’, the modern term for a crash caused by pilot error; again fortune favoured the brave.

Promotion and, after another staff tour where he was able to retain currency, a tour as Station Commander at RAF Coningsby followed where he took full advantage of the unique opportunity to remain current on the Phantom and Tornado F3, plus conversion to the Hurricane and Spitfire with the occasional flight in the Lancaster as a qualified pilot. This was his final front-line flying tour but during subsequent senior staff appointments he was able to maintain cockpit currency while handling desk bound duties. His successive tours at Brampton as an air commodore and air vice-marshal, (interestingly as a non-QFI) confirmed his intention to focus particularly on flying matters. Promotion to air marshal in a senior NATO appointment, his knighthood and, later, as AOCinC Personnel and Training Command at Innsworth are covered in much less detail. However, he gives great credit to his wife's support through 30 house moves, some at fairly short notice, which summarises the lot of the service wife where the patience and tolerance of Irene, Lady Coville, shine through with her personal quotation: 'We both consider ourselves extremely fortunate to have lived in the RAF family, despite the "ups and downs" and hard work. Certainly, we have an abundance of mostly wonderful memories – and we both wish we could start all over again for a repeat experience.'

Sir Chris' closing remarks, 'But this book has focused on aviation and human stories; perhaps another is needed for everything else', suggest that there is more to come from his keyboard, in which case I'd be pleased to write a further review. *From Cold War Jets to Spitfires* is a fine record of the life and times of a senior commander who was focused on a definition of the main purposes of the Royal Air Force, to train, fly, fight and support and I strongly recommend it.

Gp Capt Jock Heron

Bombers at Suez by John Dillon. Helion; 2021. £16.95.

No 38 in Helion's, still growing, Middle East War Series of A4 softbacks, *Bombers at Suez* runs to 80 pages and is well illustrated – more than a photo per page of text – plus a few maps and 20 coloured profiles of participating airframes. As the sub-title, *The RAF Bombing Campaign During The Suez War, 1956*, makes very clear, the narrative is concerned only with the contribution made by the Canberras and Valiants; there are a few references to Cyprus-based French RF-84Fs and British fighter bombers, but these are incidental at best.

The author, a 1970(ish) ex-Vulcan nav rad, has researched the conduct of the brief bombing campaign in some depth and he provides extensive references to primary sources at Kew, including papers from CAS's office (AIR8), relevant papers accumulated by AHB (AIR20), squadron ORBs (AIR27) and sundry Cabinet papers (CAB128 and 195). These are amplified by some personal contributions by participants plus references to published works, not least this Society's Journal No 3.

To get the downside out of the way, while most of the photographs take advantage of the A4 format, and are reproduced full-page width, a couple of captions are surprisingly imprecise. For example, the Hunters deployed to Cyprus were Mk 5s, not Mk 1s, and, on the same page (p11) a picture of a Canberra B2 of No 21 Sqn visiting Khormaksar in March 1955 is, quite inexplicably, captioned as a B(I) 8 of No 16 Sqn. There are one or two niggles in the text, eg a reference to an Air Marshall (*sic*) and to Kasfareet being one mile east of Kabrit (it was 3 miles to the west). Tom Cooper's excellent profile drawings of Canberras serve to portray unit markings and variations in the application of 'Suez stripes'. While they are variously captioned as representing specific B2s and B6s, the images are all B6s as they feature the latter's rather phallic 'triple shot' starter cartridge housing.

Dillon's close study of the contemporary records, reveals a surprising degree of inconsistency in reporting. It was not uncommon, for instance, for the number of sorties flown by a unit, as recorded in its F540, to differ from the figures reported in post-op reports raised by the controlling HQ. Reconstructing events was further complicated by inconsistencies in recording time, some reports using Zulu while others used local time and, all too frequently, imprecisely in both cases. One of the issues highlighted by Dillon's analysis is that Bomber Command's focus on its contemporary European war role, which would have involved bombing using GEE-H, meant that its visual bombing capability was a trifle rusty – the routine training requirement was set at three visual attacks for every five using GEE-H, but in practice it had been closer to three in ten. The lesson that this taught, of course, was that crews really ought to be kept current in all roles that their aeroplane might be called upon to perform – a lesson that was re-taught in 1982 when Vulcan crews were unexpectedly required to resurrect techniques that had long since ceased to be practised.

The Suez campaign was only eleven years after VJ-Day and many of the folk flying the bombers had experienced combat before. For example, the COs of ten of the fifteen participating bomber squadrons shared an impressive 21 'post-nominals', including 9 DFCs, 5 DSOs and a VC, and, while the other five COs may not have sported decorations, they would surely have worn the standard wartime service medals and, probably, one or two campaign stars. Many of the junior aircrew would have been post-war recruits, of course, but there would have been a substantial leavening of wartime veterans among them. Nevertheless, despite the significant level of operational experience, the bombing campaign inflicted very little damage. So why were the results so unimpressive?

I took away two reasons for the apparent failure. Despite, the RAF's shiny new jet aeroplanes, bombing accuracy was still WW II standard. A Canberra could fly twice as fast and twice as high as a Lancaster, but it could carry only half the bomb load and could drop it with no greater precision. Apart from restoring the bombload, the Valiant was much the same. In theory, the latter's NBS should have improved the accuracy somewhat, but Dillon tells us that only six of the twenty-four aircraft committed actually had NBS installed – and at this early stage, it was still far from reliable. What might have made a difference was the availability of Doppler, but GREEN SATIN was only just being introduced into service. The Canberra B2s never had it and, although it did become standard in the B6, I doubt that many (any?) of them had it in 1956. To support the latter conjecture, the author's references to contemporary recommendations for the introduction of 'wind-finding aircraft' (eg on pp 34 and 47), clearly imply that GREEN SATIN was not generally available – if at all – Dillon does not, however, specifically draw the reader's attention to the lack of Doppler.

What all of this meant was that, as a ballpark figure, visual bombing from high level, using the last wind velocity that had been guessed at, one might expect to get 50% of one's bombs within *circa* 500 yards of the aiming point.[1] So, if the available equipment did not permit any improvement on WW II accuracy, the second reason for the poor

[1] AIR14/3937. Planning figures for Canberra visual bombing in 1953 included a 50% zone of 350 yds from 25,000ft on an academic range (700 yds operational) and 700 yds on a range from 40,000ft (900 yds operational). **Ed**

bombing results was the failure to recognise this limitation. Dillon tells us that the bomber effort delivered 1,884 bombs on 13 targets in the course of 18 raids. With a CEP of 500 yds, and targets the size of an airfield, the available effort was spread far too thinly. Quoting AIR20/10746 (*Operation MUSKETEER: Air Task Force HQ files: Report by Air Task Force Commander*), Dillon offers the following observation, 'This number of bombs would have been considered adequate for only relatively small targets during the latter period of the 1939-45 war.' So why was the application of force so badly misjudged? The crews did the best they could with their WW II vintage kit and techniques, albeit in impressive post-war aeroplanes, but it would seem that the contemporary art of 'weaponeering' at staff level lacked a degree of realism.

Plenty to chew on embedded within this account. Recommended. **CGJ**

Air Power in the Falklands Conflict by Gp Capt Dr John Shields. Air World (an Imprint of Pen & Sword); 2021. £25.00.

Sub-titled *An Operational Level Insight into Air Warfare in the South Atlantic*, this book runs to some 370 pages of which 219 are narrative, the remainder comprising annexes, a bibliography, endnotes and a full index; there are 14 b/w plates and numerous tables, diagrams and maps. The author's Introduction to his very detailed analysis of the employment of Air Power in the Falklands conflict quickly sets a tone which, for many of my generation, will be a reminder of how times and our profession have changed since our day. At the outset, Gp Capt Shields states firmly that, 'this book has adopted a revisionist approach', quoting by way of justification the lofty assertion of the late Professor Sir Michael Howard, that the historiography of late twentieth century conflicts was, 'akin to scrapings from barrel bottoms'. What follows is a detailed work owing much in style and content to the author's PhD researches, complicated at times by use of today's doctrinal jargon, which will be unfamiliar to at least some of the elderly. 'Doctrine in the RAF went into hibernation from 1968 … doctrinal thinking did not re-emerge until 1990', notes the author rather damningly.

Central to the book, and Shields' analyses, is the now widely embraced concept of operational 'Centres of Gravity', sometimes more

obviously described elsewhere as ‘points of main effort in attack or defence’. This appears to be today’s nod to the word *Schwerpunkt* which was fashionable in the late ‘80s. and has since been, ‘mistranslated from German and misunderstood in English’! Since the ‘90s, the codification and systemisation of operational decision making have proceeded apace. The application of today’s methodologies in this book inevitably makes for detailed and probably convincing *ex post facto* criticism of decisions made under the real-life pressures of 1982. In particular, a ‘Centre of Gravity Matrix’ assessing ‘Critical Vulnerabilities and Critical Requirements’ is used throughout, to test the validity, or invalidity, of decisions made then. Were I cynical, I might say that the process resembles the rather formulaic 1970’s RAF Staff College (ISS) Problem Solving Technique which, no matter how I tweaked the ‘Essential and Desirable Criteria’, repeatedly concluded that I should buy an Austin Maxi, advice that I cheerfully ignored!

This very detailed book benefits from the author’s academic research and deals with the Falklands war phase by phase, identifying both British and Argentinian ‘Centres of Gravity’ and the efforts of the opponents, successfully or unsuccessfully, to attack or defend them. He demonstrates clearly, failures of selection and consistency in the prosecution of changing operational priorities, arguing that a key benefit of today’s doctrine is that, ‘it enables a significantly greater depth of understanding and analysis’ than was then possible. That may be so, but that’s the way it was in 1982.

The chapters following Shields’s comprehensive introduction to modern doctrinal thinking deal with Air Power before and during Operation SUTTON, the San Carlos landings, and with the successes and failures of Air Power during the land battle – a section neatly entitled ‘Stanley or Bust’. I am not sure that Sir Michael Howard would have approved of the use of such a racy expression! This phase-by-phase analysis examines the protagonists’ identification and prosecution of centres of gravity, *Schwerpunkte*, priority target sets or points of main effort, call them what you will. Themes and criticisms emerge, common to both sides and affecting each phase of the campaign, to a greater or lesser extent.

Both British and Argentinian forces experienced largely self-inflicted difficulties of Command and Control and of often wafer-thin ‘Jointery’. Structures cobbled together for the operation did not always

make for efficient use of Air Power, let alone harmony. Extracts from some of the unfairly reviled 'scrapings of barrel bottoms', the memoirs of participants extensively quoted by the author, give powerful evidence of the impact of pre-existing inter-Service resentments and, in the case of the Argentines, of role demarcation. Perhaps understandably, weaknesses in Intelligence gathering pervaded the operations on both sides and at every level. The failure to exploit, admittedly limited, reconnaissance resources was a factor hindering the efficient employment of scarce resources on both sides.

Against that background, the author's conclusion that both sides failed consistently to identify and prosecute changing operational priorities or 'centres of gravity' is fair. At the same time it may be seen as rather unfair to those who laboured under the doctrinal weaknesses of 1982 and lacked the tools developed since the 1990s of which John Shields writes so passionately. Indeed, as many of those involved at the time will remember, it is amazing what was achieved despite our own weaknesses and the deficiencies laid bare by this book which is a challenging read, certainly to this reviewer who feels very old! Other readers will form their own judgements, but it is perhaps kindest to say that times and understanding have inevitably moved on since 1982. *Autres temps, autres moeurs*!

AVM Sandy Hunter

Cold War Test Pilot by Group Captain Ron Burrows AFC FRAeS JP. Pen and Sword; 2021. £20.00.

The usual domestic preliminaries, together with stories about his father's life as a flight engineer on Lancasters, are covered before Burrows goes on to reflect on the shape and size of the RAF front line in the 1960s. His account of flying training on the Jet Provost and Vampire is typical of the era, including the odd scrape – literally, when his Vampire's undercarriage was ripped off during a landing misadventure and his aircraft slid to a halt on its wooden belly before catching fire. This was the first of several dramatic incidents, which included operational flying in Aden and his first ejection, when the engine failed, shortly after take-off from Khormaksar.

His return to the UK took him to Little Rissington and a QFI tour with Oxford UAS before returning to the CFS as an instructor where he developed an interest in becoming a test pilot. Following a successful

interview at the ETPS, his mathematics skills led to selection for an exchange with the US Navy's Test Pilot School at Patuxent River. He joined the 1970 course during which he flew some 131 hours on fifteen different types, ranging from the T-28 Trojan to the F-8 Crusader. His test pilot training is described clearly and his analysis of standardised methods and procedures of US Navy clearances for front line operations are defined in 'pilot language' which is clear and easy to understand.

He experienced three serious incidents during the eight-month course, including his second ejection, this time from an A-4 Skyhawk following engine failure, fire and loss of control. At the time the USN's maintenance practices were the subject of a detailed enquiry. Militancy among some drafted personnel, at a time of civil unrest because of the Vietnam War, led to the suspicion that sabotage might have been involved.

His return to the UK as a flight lieutenant took him to A Squadron (fighter test) at the A&AEE when the Phantom, Harrier and Jaguar were all still at early stages of service clearance. However, initial assessment of the MRCA cockpit was the responsibility of B Squadron (bombers and other heavies) hence his reluctant transfer to the latter to bring his fast jet experience to the project. The RAF Buccaneer was also seen as a B Squadron responsibility but, within a few years, this administrative difficulty was resolved by absorbing the Buccaneer and MRCA into A Squadron and revising the Establishment's organisation.

Testing the Martel missile involved flying the elderly Sea Vixen, which he regarded as being superior to its RAF counterpart, the Javelin, but promotion kept him at Boscombe for another two years, practically a double tour flying all the modern fighter types both at home and overseas. A highlight was being selected as the first RAF pilot to fly the MRCA at the *Bundeswehr's* flight test centre at Manching. There he experienced an exciting first familiarisation ride in the rear seat when the flight control system misbehaved, leading to extreme pitch oscillations just after take-off. Fortunately his first flight in the front seat was much less adventurous.

Inevitably, a staff appointment followed and within a year he had returned to Germany as the RAF representative in the MRCA flight test programme management office in Munich. His return to the UK in 1973 took him to the JSSC at Latimer as a squadron leader and a posting to the Defence OR office where he spent only nine months before being

short-toured and promoted to wing commander to take command of A Squadron at Boscombe. The demands of 1982's Operation CORPORATE saw a variety of Harrier and Sea Harrier modifications requiring approval, together with in-flight refuelling clearances on several types. However, a short familiarisation flight in a Scout helicopter, captained by an RN colleague, almost caused his demise when mechanical failure led to a crash at fairly high speed.

A subsequent staff tour in the MoD was abbreviated, again, by promotion to group captain in 1986 and his appointment as Superintendent of Flying at Boscombe Down where he began to consider his professional future. Four flying tours in four ranks at the same station had become somewhat repetitive and, despite flying a large variety of aircraft from the elderly Harvard to the state of the art Tornado, he saw his future in the service being desk bound so he decided to retire prematurely so that the nature of 'the desk' would be of his own choosing. His aim was to follow a career altogether different to that of the military pilot so, to add to his credentials, he studied for an MBA at Brunel University before finding himself back in the QFI world for a year instructing at Kidlington. He subsequently joined the International Test Pilot School (ITPS) at Cranfield as its Director where he was faced by several business challenges to ensure that the young civilian enterprise remained viable. A quote from the book's epilogue summarises his varied civilian career beyond the cockpit:

> 'The post graduate year that he spent at Brunel University in 1988 and his business development experience at the ITPS eventually set him up for another thirty, quite different, professional years ahead. Until gainful employment ended at 76 years of age, his civilian life was as varied as it was unpredictable, determined as much by opportunity as any grand plan.'

Within its 168 pages, plus 32 black and white pictures, *Cold War Test Pilot* is an entertaining record of a distinguished flying career, described with clarity and brevity, easy for the layman to understand. A comprehensive index, with sections for people, aircraft, units and miscellaneous topics, provides excellent references. There are, however, some minor inaccuracies within both text and captions. For example, the reference to Sqn Ldr Graham Williams competing in a Phantom on the 1969 transatlantic air race is incorrect; both he and Sqn

Ldr Tom Lecky-Thomson flew the Harrier in that historic event. The photograph of a Sea Harrier launching from Yeovilton's 'ski jump', ostensibly in 1982, portrays an FA2 which didn't fly until 1993, and the photograph of the author alongside a two-seat Lightning is captioned as a T4 which is actually a T5. Finally, the reference to fourteen RAF Harriers being part of the CORPORATE task force deployment is suspect. Although these are relatively trivial observations within such an accurate account of a fine career, it is a pity that they crept into an otherwise authoritative book which I recommend as another excellent account of flying during the Cold War, this time as a test pilot, but with interesting diversions beyond.

Gp Capt Jock Heron

Beneath the Radar by Nina Baker. Nominally 'print on demand', 2021, but available via Amazon at £12.00.

This 144-page, square-format (21 × 21 cm) softback is sub-titled, 'An illustrated account of an ordinary radar operator's life in RAF Radar Stations 1942-46'. The airman in question was LAC Ian Baker and the account has been compiled, and published, by his daughter. Her primary sources of information are wartime letters from a young Ian to the girl he would marry in 1948, plus about 40 wartime photographs, 20 watercolour/ink wash paintings and 35 line drawings – Ian was clearly a gifted artist and, following de-mob, he would resume his studies to pursue a career as an architect. There are some observations within the narrative that suggest that his Record of Service may also have been consulted but, if so, it would seem to have been incomplete, as some of the dates of his movements, especially later ones, are not entirely clear – symptomatic perhaps of a system struggling to cope with the detail of repatriating and discharging the bulk of a million-man air force, spread across half the globe, in a relatively short period by a bureaucracy that would itself have been rapidly shrinking.

I have some personal reservations about the presentation. Like this Journal, most books, newspapers and periodicals use, as a font, Times New Roman, or something very similar, because it is easy on the eye – it just is. Other fonts tend to be used as attention getters, typically in advertising, but they are less user-friendly for long passages, as in this book, which is presented in something like this, which is

Rockwell Nova Light, throughout.

Most of the photographs have been well reproduced, bearing in mind the amateur nature of many of the originals, but the many hand-crafted illustrations, which are the USP of this book, have been printed with a heavy sepia background, which makes them look as if they had been drawn on brown wrapping paper. There are one or two oddly named locations, probably misspellings in the original material (eg Luca for Luqa) and/or misinterpretation of the handwritten script (El Maya, was surely Almaza). Oh, and (on p38) radar is an acronym derived from **RA**dio **D**etection (*not Direction*) **A**nd **R**anging.

Freed of its heavy sepia background, one of the many atmospheric illustrations illuminating Ian Baker's recollections.

The presentational issues aside, Ian Baker's short RAF career began when he was called up, aged 18, at the end of 1941. No 11 ACSB at Euston assessed him as suitable for commissioning as an observer, but his call-up was deferred until March 1943. The account is a trifle vague here but, he probably reported first to the ACRC at Regents Park before starting training at No 1 ITW at Babbacombe, followed by No 11 ITW at Scarborough. But he was withdrawn from aircrew training in May to become a trainee radar operator, passing though No 216 MU at Sutton Coldfield and No 9 RS at Yatesbury before becoming operational with postings to radar sites operated by No 78 Wg at Ashburton and No 73 Wg at Malton. In May 1945 he went to Worth Matravers, where he would have been introduced to GEE, before moving to Thame (Haddenham) where operating teams were being assembled, and equipment was being packed, for despatch overseas to create a series of GEE chains to support a post-war route all the way to India. [2]

Shortly before Christmas, LAC Baker boarded the MV *Felix Roussel* which delivered him to Port Said on 7 January 1946. After a

[2] See *Overseas GEE Chains 1945-46* by Walter Blanchard in RAFHS Jnl 61. **Ed**

brief, and not entirely clear, period in Egyptian transit camps (which provided the opportunity to take the statutory 'me and the Pyramids' snapshot) and a brief interlude in Jordan, in March the team was flown to Libya where it was to operate the recently completed Tripoli GEE Chain. No sooner had they arrived, however, the Chain ceased to operate with effect from 2 April. There ensued a period of uncertainty as to whether the equipment should be dismantled or reinstated but it never resumed operations. After a month in a tented transit camp at Castel Benito, Baker was transferred to Malta in September whence, after a brief stay, he was posted back to the UK to be discharged on 24 October.

There are relatively few books devoted to the humble 'erk', so this one is of interest and extracts from letters home provide some useful insights into what contemporary life was like. From a specifically RAF historian's perspective, it is a little short on the sort of detail that one would have liked, but that was unavoidable because it was simply not provided by the source material. Nevertheless it is a useful addition to the annals – especially the washes and line drawings – notwithstanding the surplus of sepia.

CGJ

Royal Air Force – **The Official Story** by James Holland. Welbeck; 2020. £25.00

I need to start this review with a serious health warning. Do not be misled by the title. This is not a new book; it is simply an attempt to take a second bite out of a pre-existing cherry. This is merely Holland's 224-page A4-ish hardback *RAF 100* of 2018 with its 'RAF100' logo deleted and some (but not all) of the erroneous captions corrected. But there has been no attempt to revise the text.

With respect to inappropriately captioned photographs in the first edition, among those previously pointed out, those featuring misidentified personalities have been corrected, and a Liberator, originally said to have been airborne over the USA, has been relocated to Northern Ireland. But other errors remain. For example, the RE8 of No 15 Sqn (p30) is still captioned as belonging to 12 Sqn (the '12' on the fuselage is the aeroplane's individual 'aircraft in unit' identity – not its unit) and a Lancaster, seen dropping a 'bouncing bomb' over the sea in daylight, is still said to be doing it while attacking a German dam –

in the dark! (p127) – while the Hurricanes that were photographed, very obviously, at Ta'Qali are still said to have been at Luqa (p107). One or two other captions have been amended, although not aways successfully. For instance, the picture of a downed He 111 in the first edition (p84) has been retained, but is now said to be of a fallen Spitfire of No 222 Sqn, this caption having been inexplicably duplicated and transposed from a picture on p95!

As to the text, that appears to have been reproduced pretty much verbatim, so we still have the horizon at 3,000ft being 150 miles away (p45) – it's less than half that – and the Americans having built no jets during WW II (p158) – they had, of course. Sir Richard Peirse has been corrected within the narrative (p143), but he's still Pierce in the index, while Marcel (previously Maurice) Dassault has also been corrected – although he doesn't feature in the index of either edition . . .

But the first edition had many more problems that, not considering it necessary to overegg the pudding, I had forborne to flag-up in my original review. Since they still need correcting, however, it may be helpful to point out a few more factoids that deserved attention. For instance, the Hart did not 'come into service as a fighter in 1930' (p39); it entered service as a bomber; the first fighter versions did not reach No 23 Sqn until the following year. The Vickers Type 271 (regarded as the Wellington prototype) was not armed with 'three twin Browning machine guns' (p52); it had only two hand-held guns, one each in the nose and tail. IFF was/is not a 'homing' device (p71). Describing the participation of the Canberras and Valiants at Suez as 'precision' bombing (p74) is – er – generous?[3] Meteors did not 'take part in the abortive mission over the Suez canal in 1956' (p159) because, as (then Air Cdre) David Lee noted at the time, they 'did not have the range to do any worthwhile photographic or reconnaissance work over Egypt and they were banished to Malta.' During the Berlin Airlift, the RAF's Dakotas did not carry 'the bulk of supplies to relieve the blockaded German city' (p165); figures vary depending on source, but the RAF's C-47s could hardly compete with the USAF's C-54s and the overall British contribution actually amounted to about 20% of the total. The first British nuclear test, on 3 October 1952, did not involve a 'thermonuclear bomb' (p166); it was a fission, not a fusion, device.

[3] Coincidentally, this issue is discussed in the publication reviewed on page 153.

B.35/46 was a specification, not a 'tender' (p168). RED FLAGs are exercises, not 'bombing competitions' (p170). No 194 Sqn was not 'the RAF's first purely rotary – helicopter – squadron' (p171); it was preceded by Nos 529 and 657 Sqns. A Soviet ICBM would not take fifteen minutes to reach the UK (p184); it would be less than five. At the end of WW II the RAF did not 'comprise ten commands' (p187). Apart from ignoring those overseas, there were only eight in the UK; of the ten cited by the author, two did not exist on VJ-Day – Balloon Command had disbanded in June 1945 and Reserve Command did not form until May 1946.

This list is not exhaustive, but it is evident that many of these statements are imprecise, rather being just plain wrong. Some contain a nugget of truth, but are such approximation good enough? This 'near miss' approach also crops up within the text. For example, there's a 'zealously' (p116) which kinda works, but 'jealously' would have been a much better fit. The description of the remarkably, indeed exceptionally, long nose of the Fairey FD2 as 'feline' (p180) is difficult to reconcile with the essentially flat face of a cat, and were the V-bombers ever really 'impregnable'? (p184) Typos? Not a lot, but there is a 'was' that should have been a 'were' on p94, and an 'Aircract' on p219.

In what way is that nose 'feline'?

When this book first appeared, I conjectured that some of its shortcomings might have arisen as a result of its having been cobbled together at short notice to meet an early deadline imposed by the RAF's Centenary celebrations in 2018 (although we had seen it coming for 100 years), and that this might have precluded independent proof-checking. I can offer no such rationale to excuse this second edition. It is particularly unfortunate that it retains the, always misleading, sub-title *The Official Story*. While the first edition was an officially licensed 'RAF100' product, this specifically did *not* amount to formal endorsement by AHB, this reservation being underlined by the cautionary note among the front matter to the effect that 'the views expressed are those of the author alone and do not necessarily represent those of' HMG, the MOD or the RAF. That very wise disclaimer also features in the second edition, where, were that possible, it is arguably even more significant, since this one lacks the leaky protection provided

by the 'RAF 100' umbrella.

Despite some minor corrections, this second edition is little improvement on the first. The author's overly careless – or is it perhaps ill-informed? – approach does not inspire confidence and this book cannot be recommended to the readership of this Journal.

CGJ

The Fauld Disaster by Nick McCamley. Folly Books; 2015. £ 24.99.

In 2004, this society's autumn seminar, which was devoted to the RAF's supply organisation (see Journal 35), included an examination of the issues involved in the storage and distribution of explosives, including a few paragraphs describing the explosion that shook No 21 MU's underground facility at Fauld, near Burton-on-Trent, on 27 November 1944. The storage aspect was amplified in considerable detail by Stuart Hadaway in Journal 78, but, apart from striking it a glancing blow in the header, he did not discuss the explosion. While the publication of *The Fauld Disaster* in 2015 escaped the attention of this Society at the time, since it sheds a great deal of light on this remarkable, indeed tragic, incident, this review is offered better late than never.

In brief, an estimated 4,000 tons of bombs and explosive ordnance had detonated. Seventy people, civilians, RAF personal and Italian former POWs, had died and an entire farm and its livestock had been obliterated, leaving a crater over 400 yards in diameter. The explosion was detected by seismographs as far away as North Africa and the height of the 'mushroom cloud' was estimated at 2,000 feet. Windows, chimneys and loose structures in Burton were damaged, and the adjacent village of Hanbury was so badly affected that some buildings had to be demolished and rebuilt. Those are the basic, and generally known, facts.

McCamley, who seems to have created a niche market with books dealing with happenings below ground in the UK, has conducted an exhaustive examination, not just of the destruction of Fauld but also the sorry saga of other (mostly RAF) explosive storage sites in the UK. His book is divided into two parts. The first looks at the general topic and examines other storage and distribution sites but in Chapter 6 the author specifically turns his attention to Fauld, which forms the second part of the book.

The narrative records the creation of the storage facilities, part of which were shared with a mining company, and then discusses the disaster in detail, its consequences, the recovery of much unexploded ordnance and the reconstruction of some elements of the site – which the RAF continued to use until the mid-1960s. The formal post-event enquiry is covered, and the book describes the site as it now is.

This 242-page, square format (26cm × 26cm) hardback could be described as a 'coffee table' piece and its production is of a high standard. It is exceptionally well illustrated throughout, with monochrome and colour photographs and a generous number of maps and diagrams. As an example, a map of the mine is marked with the location of each of the several dozen photos, which follow it. The account draws, and often expands, on some of McCamley's other titles.

At a penny under £25.00, it is remarkably good value for a book of this quality. However, for those RAFHS members who are more focused on aeroplanes and flying activities, this one is not for you! That said, nothing should detract from the exceptional coverage the book gives to an aspect of the apparently mundane topic of supply – or 'logistics' as it's called this week!

Wg Cdr Colin Cummings

Bomber Command's War Against Germany. Air World; 2020. £25.00.

Although, as reflected above, he is not named on the cover, the front matter identifies the author of this book as the historian Noble Frankland.[4] The explanation for this apparent oversight is that this book is not a newly-authored 2020 account; it is a reprint, of just one part, of the seven-volume 1950(ish) official history, *Bomber Command's War Against Germany* – specifically *Vol VII, The Planning of the Bombing Offensive and its Contribution to German Collapse*. Beyond that, there is little more for a reviewer to say. Prepared by AHB and published, internally, in 1951, it is as comprehensive and authoritative an account as one would expect. It has been available to the public at The National Archives (TNA), as AIR41/57, for many years, but it has not been

[4] Anthony Noble Frankland CB CBE DFC (1922-2019) won his decoration flying with Bomber Command as a navigator. Post-war, having resumed his interrupted studies, he graduated from Oxford in 1947 to spend 1948-51 on the staff of the AHB. But he will be better known as the Director of the IWM 1960-82.

digitised so, if you needed/wanted to read it, you had to go to Kew. Now, however, it has been made available as a 228-page hardback. I cannot claim to have read it word for word, but an on-site comparison with an original copy indicates that the only changes are superficial, eg some overlong paragraphs have been sub-divided, but the text is verbatim. However, only one of the two annexes in the original document, and one of its seven appendices, have been provided, although the latter have been replaced by seven relevant documents written by such key players as Harris, Slessor, Bottomley and Arnold. One hopes that sales will be sufficient to justify the publication of the other six volumes in this series.

That said, in the specific case of Bomber Command, AHB's seven original monographs were, arguably, superseded by Webster and Frankland's four-volume *The Strategic Air Offensive against Germany 1939-1945*, which was published commercially by HMSO in 1961. Nevertheless, the collection of AHB-produced monographs at Kew has grown to 98 pieces. A few have already been made more readily available, notably by Pen and Sword who have previously published at least three other AHB's accounts within TNA's AIR41 series.

So, buy this one to stimulate the market, and then watch this space. **CGJ**

Dresden – The Fire and the Darkness by Sinclair McKay. Penguin; 2020. £8.99.

Among the more controversial aspects of the allied bombing offensive of WW II was the destruction of the eastern German city of Dresden in February 1945. Much has been written and said about almost every aspect of the attack and of the validity of the city as a target. Almost 80 years later, there remain unanswered questions as to who ordered the bombing and the precise rationale underpinning it.

The book begins with a lengthy discourse on the city, its history, its culture and the notable personalities associated with it. It moves on to consider the impact that the Nazi regime had on all aspects of life, including that of what remained of the Jewish community by 1945 and the constraints and uncertainty under which it existed. Dresden was unusual in that, lacking any critical war industry, it had spent much of the war in relative tranquillity; despite being the same distance from the UK as Berlin, it was not attacked until October 1944 and, even then, by

a mere 30 American bombers. Within a few months, however, an influx of refugees, fleeing from the advancing Red Army, had begun. Testimony is presented to describe the conditions under which these newcomers were living, along with those of resident POWs and the city's own population, many of the latter still leading relatively untroubled lives. The book then looks at some of the international players and delves into the lives of RAF and USAAF bomber crews who carried out the attacks.

This preamble is so comprehensive that one is about a third of the way through this paperback's 369 pages before the narrative focuses on the raids themselves. It was originally planned that the USAAF would open the campaign with a daylight raid, but the weather interfered, so the first two attacks were carried out by the RAF on the night of 13/14 February. The first was made by Mosquitos and Lancasters of the elite self-marking No 5 Gp, the second by Main Force Lancasters of Nos 1, 3 and 6 Gps with marking provided by No 8 Gp. Following the, by now well-established, RAF procedure, these attack saw huge quantities of blast bombs being dropped, followed by incendiaries to start, and later, stoke the fires. Subsequent attacks by B-17s of the US 8th Air Force on 14 and 15 February seemed almost superfluous, since Dresden had already been effectively destroyed.

The focus then shifts to the desperate plight of the city's inhabitants and the efforts of the authorities in attempting to cope with the thousands of homeless, deal with the dead and restore some semblance of order. The final part of the book describes the occupation by the Russians, the post-war rebuilding of the city, the political fallout and the moral considerations, some which remain unresolved.

I found this book a somewhat unsettling read as the numerous first-hand accounts compel the reader to confront the human aspects of mass bombing raids, which were, of course, faced by all the combatant nations in Europe.

Setting aside some publishing hype, this is a comprehensive and riveting account of one of the last major raids of the war. The narrative is supplemented by 58 photographs and two maps, although I found the latter to be barely adequate. I recommend this book to anyone interested in the specific detail of a major WW II bombing raid.

Wg Cdr Colin Cummings

ROYAL AIR FORCE HISTORICAL SOCIETY

The Royal Air Force has been in existence for one hundred years; the study of its history is deepening, and continues to be the subject of published works of consequence. Fresh attention is being given to the strategic assumptions under which military air power was first created and which largely determined policy and operations in both World Wars, the interwar period, and in the era of Cold War tension. Material dealing with post-war history is now becoming available under the 20-year rule, although in significantly reduced quantities since the 1970s. These studies are important to academic historians and to the present and future members of the RAF.

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

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

Membership of the Society costs £18 per annum and further details may be obtained from the Membership Secretary, Wg Cdr Colin Cummings, October House, Yelvertoft, NN6 6LF. Tel: 01788 822124.

THE TWO AIR FORCES AWARD

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

1996	Sqn Ldr P C Emmett PhD MSc BSc CEng MIEE
1997	Wg Cdr M P Brzezicki MPhil MIL
1998	Wg Cdr P J Daybell MBE MA BA
1999	Sqn Ldr S P Harpum MSc BSc MILT
2000	Sqn Ldr A W Riches MA
2001	Sqn Ldr C H Goss MA
2002	Sqn Ldr S I Richards BSc
2003	Wg Cdr T M Webster MB BS MRCGP MRAeS
2004	Sqn Ldr S Gardner MA MPhil
2005	Wg Cdr S D Ellard MSc BSc CEng MRAeS MBCS
2007	Wg Cdr H Smyth DFC
2008	Wg Cdr B J Hunt MSc MBIFM MinstAM
2009	Gp Capt A J Byford MA MA
2010	Lt Col A M Roe YORKS
2011	Wg Cdr S J Chappell BSc
2012	Wg Cdr N A Tucker-Lowe DSO MA MCMI
2013	Sqn Ldr J S Doyle MA BA
2014	Gp Capt M R Johnson BSc MA MBA
2015	Wg Cdr P M Rait
2016	Rev (Sqn Ldr) D Richardson BTh MA PhD
2017	Wg Cdr D Smathers
2018	Dr Sebastian Ritchie
2019	Wg Cdr B J Hunt BSc MSc MPhil
2020	Gp Capt J Alexander BA MBA MA MSt MSc RAuxAF

THE AIR LEAGUE GOLD MEDAL

On 11 February 1998 the Air League presented the Royal Air Force Historical Society with a Gold Medal in recognition of the Society's achievements in recording aspects of the evolution of British air power and thus realising one of the aims of the League. The Executive Committee decided that 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
Wing Commander C G Jefford MBE BA
Air Vice-Marshal N Baldwin CB CBE

SECRETARY
Gp Capt K J Dearman
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MEMBERSHIP SECRETARY
(who also deals with sales of publications)
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October House
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